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Nondirective meditation used in stress management

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Abstract

Aims: The present field study investigated the difference between practicing a nondirective relaxation technique – Acem Meditation – for stress relief and merely learning about stress and stress management in a population of active, working professionals. **Methods:** A six-months follow-up of an intervention group ($N = 73$) and a control group ($N = 47$) recruited from six large Norwegian companies. **Results:** The findings revealed significant improvements in the intervention group on all outcome variables – comprising mental distress (GHQ-12), worries and nervousness (EPQ-N), sleep problems (BIS) and musculoskeletal pain. In the control group, there were no changes. The differences between the intervention group and control group were significant, regarding EPQ-N, GHQ-12 and musculoskeletal pain. **Conclusion:** A nondirective meditation technique promoted specific bodily and psychological benefits for active working professionals: less pain and sleep problems, and a personal style less characterized by worries and nervousness. Acem Meditation used as a stress management technique may be a positive supplement to other measures a company puts forward, both to reduce negative health impacts of stress and to improve the capacity to cope with the stressors at work and in daily life. Replications of this study with an RCT design are warranted.

Keywords: nondirective meditation, stress management, stress tolerance, muscle pain, mental distress

Introduction

Methods for stress management are currently widely requested, and meditation is commonly used. Cramer et al. (2016) documented a high prevalence of meditation use in the general population, with evidence for many effects and broad indications of use. Ellingsen and Holen (2015) maintain:

When the physiological effects of meditation were identified in the 1970s and 1980s, the perspective changed completely. Herbert Benson described meditation as a particularly effective way of inducing an adaptive physiological response pattern that protects the organism from the negative consequences of stress, and coined it the Relaxation Response.

The physiological effects comprise heart rate, breathing, electric brain waves and skin conductance, which indicate the level of physiological relaxation.

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Various methods may be used for relaxation and reduction of psychological and bodily stress reactions (Goyal et al., 2014; Gu, Strauss, Bond, & Cavanagh, 2015; Khoury, Sharma, Rush, & Fournier, 2015). Several forms of meditation may contribute to reduced bodily pain (Bawa et al., 2015; Reiner, Tibi, & Lipsitz, 2013; Zeidan et al., 2016) and reduced sleep problems (Black, O'Reilly, Olmstead, Breen, & Irwin, 2015; Ong et al., 2014; Winbush, Gross, & Kreitzer, 2007). Studies and reviews have demonstrated that hypertension tends to be reduced, across methods (Brook et al., 2013; Nidich et al., 2009; Ospina et al., 2007).

Although several attempts have been made to define meditation within a health-related context and distinguish the techniques from other methods, there is currently no general agreement on classification (Cardoso, de Souza, Camano, & Leite, 2004; Ospina et al., 2007). In 2008, Lutz and co-workers suggested that various types of mindfulness meditation based on the breath, other body sensations or spontaneous mental activities could be classified either as focused attention or as open monitoring (Lutz, Slagter, Dunne, & Davidson, 2008). In contrast, several researchers have argued that other prevalent techniques, based on mental repetition of a meditation sound (short sequence of syllables), represent a distinctive type of nondirective meditation. The characteristics of such methods, their physiological effects and the similarities and differences with mindfulness types of meditation have been extensively described and discussed (Xu et al., 2014).

Two early studies investigated the effects of nondirective meditation among working professionals: (1) Peters, Benson, and Porter (1977) found significant differences between the group who learnt the Relaxation Response and the control group for the outcome indexes: Symptoms, Illness, Performance and Sociability-satisfaction; and (2) Carrington et al. (1980), who compared relaxation and control conditions in a stress-reduction programme in industry using clinically standardized meditation, respiratory one method meditation and progressive relaxation (PMR). Only the meditation groups (not the PMR group) showed significantly more reduction of stress symptoms. Carrington maintained that "the safe and inexpensive semi-automated meditation training has considerable value for stress-management programs in organizational settings". Meditation was deemed appropriate for the present study of stress management. Although the recent meditation research has mainly had a clinical focus, with a variety of patient groups, there is also a growing body of studies of non-treatment seeking, healthy individuals.

Nondirective techniques increase the ability to accept and tolerate stressful and emotional experiences as a normal part of meditation and everyday life (Davanger, Ellingsen, Holen, & Hugdahl, 2010). Nondirective meditation is characterized by an open attitude towards the spontaneous activity of the mind, comprising thoughts, images, sensations, memories and emotions. One neither attempts to control the spontaneous thoughts nor expects that they should abate. Spontaneously occurring contents of the mind is allowed to come and pass freely, without any preference for a specific state of mind (Holen, 2016). This is referred to by neuroscientists as "the wandering mind" – i.e. being absorbed in spontaneous activity unrelated to current volitional activity, more or less without really being aware of it (Xu et al., 2014). Ellingsen and Holen (2015) maintain: "Accepting mind wandering while practicing is a core element in some of the most prevalent nondirective meditation practices, including the Relaxation Response, Transcendental Meditation, Clinically Standardized Meditation, and Acem Meditation", and "Recent evidence suggests that differences in mode of attention, including attitude toward mind wandering, may explain diverging patterns of brain activation during meditation".

The role of mind wandering in meditation practice was discussed in the consensus process of an expert panel that was commissioned by the Agency for Healthcare Research and Quality in

Edmonton, Canada. The panel's task was to reach consensus on a definition of meditation, which they did, except: should the definition include "bringing about mental calmness and physical relaxation by suspending the stream of thoughts"? (Ospina et al., 2007) The lack of consensus on this question suggests that, across methods, the perception of, and attitude towards, mind wandering varies. In Acem Meditation, mind wandering is accepted, with an open attitude. It is neither a goal nor something to get actively involved in; rather a natural part of the spontaneous activity during the practice. In comparison, increased mindful awareness is a result of training during the meditation practice, to become more present in the moment, with enhanced self-awareness. Self-reported mindfulness is a common outcome variable in meditation research. Recent research suggests that the benefits of being more present comprise declines in mood disturbance and stress (Brown & Ryan, 2003; Jain et al., 2007), and less difficulties with emotion regulation processes (Feltman, Robinson, & Ode, 2009; Keng, Smoski, & Robins, 2011; Robins, Keng, Ekblad, & Brantley, 2012). Schoormans and Nyklíček (2011) compared TM and mindfulness meditation and found no difference between self-reported mindfulness, psychological well-being and lower perceived stress across techniques, suggesting that frequency of practice rather than method made a difference.

The choice of nondirective meditation as the method of investigation in this study was empirically based. One pilot study (Westlund & Holen, 2008) on a stress management programme for train drivers, found a stronger stress-reducing effect of Acem Meditation, a nondirective meditation, than progressive relaxation and not learning any technique – in line with Carrington. Another pilot study investigated the effects of a stress reduction programme for elderly employees, with significantly better results in the meditation group than the control group – regarding worries, sleep problems and coping with pressure (Hersoug, Smeby, Wærsted, & Holen, 2008). An advantage is that the method is simple without involvement outside meditation, whereas other techniques may involve some time for training in daily life outside meditation. An overview of different meditation techniques, including Acem Meditation, concluded that an exploration of effects using self-report questionnaires is warranted, as a supplement to fMRI studies (Gutierrez, Fox, & Wood, 2015). The present study is a contribution.

When the mind is at rest, stimulus independent thought activity takes place, and the default mode network (DMN) – a group of anatomically separate regions of the brain – is activated. Directive activity turns off the DMN of the brain, while the nondirective activities do not. In discriminating between directive and nondirective meditation, it may be helpful to keep these components in mind. Thought processes associated with the DMN includes processes such as mind wandering, autobiographical memory, self-reflective thought, envisioning the future and considering the perspective of others. Research has found DMN modulation to be associated with meditation practice (Simon & Engström, 2015). A number of brain imaging studies have shown that in the system of interacting cortical areas included in the DMN, activities are highly correlated with each other and distinct from other networks in the brain (Andrews-Hanna, 2012; Raichle et al., 2001). Its activation increases when the brain is not engaged in externally defined tasks. In an exploration of the DMN, a fMRI study made use of the distinction between two different ways of focusing attention (Xu et al., 2014): (1) *focused*, characterized by a concentrative attitude towards a specific meditation object, and (2) *nondirective*, characterized by a relaxed focus of attention during meditation, in which spontaneous activity of the mind may emerge and pass freely without pursuing them. In Acem Meditation, this is called "free mental attitude". It characterizes the meditation practice, as well as the attitude towards the spontaneous activity

during meditation, and should be accepting and allowing, in a non-judgmental way. In a sample of practitioners of Acem Meditation, they found that the activity of DMN increased with both ways of focusing attention, compared to regular rest, and to most extent with the nondirective relaxed focus and concluded that nondirective techniques increase the ability to accept and tolerate stressful and emotional experiences as a normal part of meditation and everyday life (Davanger et al., 2010).

A comprehensive review of the effects of mindfulness meditation in a non-clinical setting indicated that mindfulness based stress reduction (MBSR) and standard relaxation training were equally able to reduce stress for healthy subjects (Chiesa & Serretti, 2009). A RCT study (Wolever et al., 2012) yielded significant improvements for perceived stress, sleep quality and heart rate variability for MBSR and a yoga programme, compared to a passive control group. Eberth and Sedlmeier (2012) found widely differing effects between MBSR and “pure” meditation – which obtained the largest effects on mindfulness, suggesting that meditation specific concepts should be addressed in future research on non-treatment seeking samples. The reviews and meta-analyses do not give sufficient direct options for comparison of effects, which is an interesting area for further exploration. There are similarities and differences between types of meditation, and the concept “mindfulness” comprises various techniques and methods. A common concept in mindfulness meditation, “decentering”, is characterized by the ability to observe, with awareness of our thoughts and feelings as separate from us, in an accepting way, refraining from evaluation. It has some parallel connotations to the “free mental attitude” in Acem Meditation, and there are also differences. The scope of this paper limits the extent to which subtle nuances of differences can be explored in depth. Dimidjian and Segal (2015) maintain that the public health impact of mindfulness-based interventions may be enhanced significantly, suggesting seven recommendations to promote the approach to core research questions. Nyklíček and Kuijpers (2008) and Keng, Smoski, Robins, Ekblad, and Brantley (2012) address the mechanisms of change, which still is a question for further research.

Aims of study

The aim of the present study was to investigate the effects of a nondirective technique on stress reactions in working professionals without prior experience with meditation. While previous research on such techniques has largely focused on clinical samples of patient groups, there is a growing body of studies with a focus on healthy, non-treatment seeking populations. This is the first systematic study of employees at different worksites who learned Acem Meditation, in comparison to a control group who only learned about stress, stress reactions and stress management without learning any method. The hypothesis was that the practice of a nondirective meditation technique would yield more effects than only education on stress management. The outcome variables represent the most common areas of benefits from nondirective meditation: mental distress, worries, nervousness, musculoskeletal pain and quality of sleep.

Methods

Participants

The participants were active-working professionals ($N = 73$, age 29–59) who were recruited among employees in six large companies, comprising insurance, bank, labour and welfare

service and several commercial firms. The companies themselves were responsible for recruitment, by inviting employees to learn a nondirective relaxation technique as part of the companies' stress management programmes. The companies recruited participants in the control group ($N = 47$, age 27–64) among employees mainly from the same departments. In the context of this field study, a randomization procedure for allocating participants to intervention and control was not possible. However, the participants in the control group were informed that they might learn the technique after the six-month study period. In one of the companies, participants came from two geographically separated departments with identical functions where all employees had signed up for the full intervention. The employees in one of the departments received the intervention. The employees in the other department served as a control group and learned the meditation technique when the data collection to this research project was completed. In a couple of companies, the number of participants in the control groups were somewhat smaller than expected, and one of the first companies in the study had no control group, which explains the difference in sample size in the two groups.

Study design and procedures

The first step in the procedure was that both participants in the intervention group and the control group were at baseline invited to a two-hour lecture at their worksite, to learn about stress, stress reactions and stress management. This lecture was in each company a common event for the intervention and control groups. After this education, there was no further follow-up of the control group, who did not learn any method for stress management. They never belonged to a group or met as a group. They only filled in questionnaires at the remaining three time-points of the project period, according to the protocol. Only the participants of the intervention group were followed further. They attended a standard introductory course in Acem Meditation (a nondirective technique) (Holen, 2016) at their worksites, led by certified, experienced instructors. There were five two-hour meetings over a period of 8 weeks. The meetings included 30 min of meditation, followed by meditation guidance and discussion of the meditation experience. They were also taught about several aspects of the method to acquire basic knowledge and be prepared for self-administered practice of the technique. Regular, daily practice was recommended, either once daily for 45 min or twice daily for 30 min. The participants were informed that they might make adjustments and practice for a shorter time if they had less available time. After the completion of the course, the participants in the intervention group practiced the technique on their own with no further follow-up from the course instructors during the remaining study period.

Acem Meditation is a self-administered, nondirective meditation. The meditation object is a multi-syllable sound with no semantic, emotional or symbolic meaning. The attention shifts between the meditation object and spontaneously occurring contents. The practitioner uses the meditation sound as a tool and repeats it mentally with a resting focus of attention, in a gentle, effortless way intermittently interrupted by mind wandering. The meditation sound is "primarily a vehicle to focus internal processes of the mind in a specific way, which can be described either as a state of silent observation, focused attention, heightened awareness of the shifting thoughts and emotions" (Ellingsen & Holen, 2015). The technique is practiced with a "free mental attitude", which allows any thought, memory, emotion, sensation and mood to emerge spontaneously during meditation, whether they are positive or negative. The free mental attitude is open, accepting and non-judgmental, and enables the practitioner to deal with whatever comes

to their awareness in meditation. The instruction during the course included how to handle the spontaneous activity of the mind under changing inner circumstances. The training was primarily to learn how to practice the free mental attitude and to retrieve it when it was lost. The focus was how to do it, rather than a defined task or specific goal.

Self-report questionnaires for both groups were completed at baseline before attending the lecture, at two-months follow-up, at three-months follow-up and at six-months follow-up. The participants filled in the questionnaires as a web-based procedure. Anonymity vis a vis the research team and others was secured by a technical engineer, who administered the procedures providing individual codes delivered in personal letters to the participants at each time point. The engineer was the only person with access to this information. General reminders of the forms were sent to all participants to increase the completion percentage.

The questionnaires were identical at all four time points, apart from the first one, which also obtained background data on gender, age, level of education and civil status (single, married, cohabiting, widowed, divorced, separated). Besides, all follow-up questionnaires for the intervention group asked how much the participants had practiced the meditation technique.

Instruments

The selection of instruments for this study was empirically based. A pilot study, with a small intervention group of employees in a company learned Acem Meditation, whereas the control group did not learn any stress management method (Hersoug et al., 2008). In the pilot project, GHQ, Eysenck Personality Questionnaire, Neuroticism subscale (EPQ-N) and assessment of quality of sleep were used. GHQ and EPQ-N captured the level of mental distress, worries and nervousness. The instruments were deemed appropriate to capture the kind of changes that took place during the project period, which was of the same duration as the present study. In the pilot study, there was no assessment of musculoskeletal pain, which was, in hindsight, deemed desirable, and was therefore included in the present study. The questionnaires in this study comprise instruments that are widely used in studies with a variety of research questions. They have good psychometric properties, and both of these characteristics were deemed an advantage in the selection process.

General Health Questionnaire

General Health Questionnaire (GHQ-12), 12 item version (Norwegian version), is a self-report form (Goldberg et al., 1997) to assess levels of mental distress experienced during the previous 2 weeks. Responses are scored as "0" (much less than usual), "1" (less than usual), "2" (same as usual) or "3" (more than usual). The GHQ-12 yields an overall total score, maximum 36 (high distress). The GHQ-12, Norwegian version, has shown good psychometric properties (Nerdrum, Rustøen, & Rønnestad, 2006). We found Cronbach's alpha values between 0.86 and 0.89 at the different data collections, which is considered to be good (Nunnally & Bernstein, 1994).

Eysenck Personality Questionnaire, Neuroticism subscale

EPQ-N is a self-report form with 12 items measuring neuroticism – a personal style characterized by worries, nervousness, vulnerability and tenseness (Eysenck & Eysenck, 1969). This is one of the higher order factors which EPQ is built on. EPQ-N covers the 12 relevant items for this factor. The subject fills in "yes" (=1) or "no" (=0) for each item. The EPQ-N yields an overall total score,

maximum 12 (high neuroticism). We found acceptable Cronbach's alpha values at all data collections, ranging from 0.77 to 0.81 (Nunnally & Bernstein, 1994).

Bergen Insomnia Scale

Bergen Insomnia Scale (BIS) (Pallesen et al., 2008) is a self-report form comprising six items about sleep problems the last month, covering the quality of sleep and to what extent one is satisfied or dissatisfied with the quality of sleep. Each item is rated on an 8-point scale, ranging from 0 to 7, to indicate the number of days per week the sleep disturbance occurs. A total composite score is calculated by adding together the scores for each item, yielding a total score with a possible range of 0–42. We found high Cronbach alpha values on this scale, ranging from 0.83 to 0.87 on the different data collections (Nunnally & Bernstein, 1994).

Musculoskeletal pain

Self-reported intensity of muscle pain the preceding four weeks was scored independently for four different body regions: Neck, shoulders and upper back; Lower back; Upper extremities (arms and hands); Lower extremities (hips, legs, knees and feet). The participants rated pain intensity: no pain (0), mild pain (1), moderate pain (2) and severe pain (3) (Hanvold, Veiersted, & Wærsted, 2010). A sum score of the pain in the four body regions was used in the analyses.

Ethics

The study was approved by the Regional Committee for Medical Research Ethics in Eastern and Mid Norway. Informed consent was obtained from all participants before inclusion.

Statistical analyses

Linear Mixed Model analyses were used to study and to compare the development of the outcome variables in the intervention group and control group during follow-up. The analyses were done both unadjusted and with adjustments for age, gender, civil status and education. Random intercepts were added for company and person, with person nested in company. In the bivariate analyses, paired samples *T*-tests were performed. For all outcome variables, effect sizes were calculated using Cohen's *d*. StataSE version 14 for Linear Mixed Model analyses and IBM SPSS version 22 for bivariate analyses.

Results

There were no major differences between the intervention group and the control group regarding demographic data. There were similar distributions of gender, age and civil status, and the level of education was similar (see Table 1). Analyses that are not displayed in Table 1 showed that there were no significant differences between the groups.

Bivariate analyses

For each of the participating companies, statistical analyses of the data from their particular company were performed and presented at meetings at their sites after the six-month study period. Bivariate analyses with paired samples *T*-tests were performed for these occasions, because they

Table 1. Baseline data on age, gender distribution, civil status and level of education in the intervention group learning Acem Meditation and the control group only attending a common introductory lecture on stress, stress reactions and stress management.

	Intervention group (n = 73)	Control group (n = 47/42) ^a
Age (mean (sd))	45.4 (8.0)	41.8 (8.6)
Gender (% female participants)	74.0	70.2
Civil status (% married/cohabiting)	65.8	69.0
Education (% College/University)	82.2	88.1

^aData on civil status and level of education missing for five subjects in the control group.

were simple, easy to understand and present to the delegates and contact persons of the companies. The bivariate analyses yielded significant improvements of EPQ-N, GHQ-12, Musculoskeletal pain and Sleep problems at two-months follow-up in the intervention group. The gains were maintained at three-months and six-months follow-up. In the control group, there were no significant improvements, although there was a trend for EPQ-N. Only a trend towards improvement of sleep problems was observed at three-months follow-up, but disappeared at six-months follow-up. For all companies, including the company where the control group was very similar to the intervention group with respect to interest and motivation in learning the meditation technique, the results were very similar. The changes in scores in the meditation group showed the same trends and were often significant, despite the small number of participants in each company.

Linear Mixed Model analyses

Data from the complete database were investigated using Linear Mixed Model analyses. The findings were in line with the results of the bivariate analyses. The development in the intervention group versus the control group was also investigated. The analyses yielded significant differences between the groups regarding the development of EPQ-N, GHQ-12 and musculoskeletal pain. For BIS, sleep problems, the difference between the groups did not reach significance, which may be due to an observed improvement in the control group at three-months follow-up. The results are presented in Table 2.

Effect sizes

Effect sizes (ES) were calculated using Cohen's *d*, where $d = 0.2$ is small; $d = 0.5$ is medium and $d = 0.8$ is large. The results yielded moderate effect sizes at six-months follow-up; EPQ-N: ES = 0.64; GHQ-12: ES = 0.51; BIS: ES = 0.45; and musculoskeletal pain: ES = 0.43.

Discussion

The present study investigated the difference between practicing a nondirective relaxation technique in addition to receiving education about stress, stress reactions and stress management (intervention group), and only receiving the education (control group). The outcome variables comprised the most common kinds of complaints and daily hassles that may reduce the quality of life in periods of stress: bodily pain, sleep problems, mental distress, worries and nervousness.

Table 2. Change in score from baseline to follow-up of Bergen Insomnia Scale (BIS), Eysenck Personality Questionnaire subscale N (EPQ-N), General Health Questionnaire 12-item version (GHQ-12) and self-reported intensity of muscle pain last four weeks (Muscle pain) in an intervention group learning Acem Meditation and a control group only attending the common introductory lecture on stress, stress reactions and stress management.

	Intervention group			Control group			Comparison intervention and control ^a	
	n	Score (sd)	Change baseline to follow-up (beta and p-value from LMM)	n	Change baseline to follow-up (beta and p-value from LMM)		Change baseline to follow-up (beta and p-value from LMM)	
			Unadjusted ^b		Adjusted ^c	Unadjusted ^b	Adjusted ^c	Unadjusted ^b
Sleep (BIS)								
Baseline	72	15.3 (9.9)				12.5 (10.3)		
2-month follow-up	48	12.0 (9.3)	-3.4 (p < 0.001)	39	10.4 (8.5)	-1.1 (p = 0.32)	-2.3 (p = 0.13)	-2.3 (p = 0.13)
3-month follow-up	42	11.3 (8.2)	-3.4 (p = 0.001)	29	9.3 (8.6)	-2.6 (p = 0.04)	-0.8 (p = 0.64)	-1.1 (p = 0.53)
6-month follow-up	36	11.5 (6.9)	-3.5 (p = 0.001)	30	11.1 (10.3)	-0.9 (p = 0.48)	-2.6 (p = 0.12)	-2.4 (p = 0.16)
EPQ-N								
Baseline	73	5.0 (2.7)		43	3.1 (3.0)			
2-month follow-up	51	3.0 (3.0)	-1.7 (p < 0.001)	40	2.4 (2.4)	-0.5 (p = 0.10)	-1.1 (p = 0.007)	-1.1 (p = 0.010)
3-month follow-up	45	3.2 (2.8)	-1.8 (p < 0.001)	31	2.3 (2.5)	-0.6 (p = 0.11)	-1.2 (p = 0.007)	-1.3 (p = 0.005)
6-month follow-up	36	3.1 (3.2)	-2.4 (p < 0.001)	32	2.3 (2.6)	-0.5 (p = 0.18)	-1.9 (p < 0.001)	-1.9 (p < 0.001)
GHQ-12								
Baseline	72	25.6 (5.1)		42	24.2 (5.3)			
2-month follow-up	51	21.5 (4.3)	-3.9 (p < 0.001)	40	23.4 (5.0)	-0.5 (p = 0.55)	-0.4 (p = 0.64)	-3.5 (p = 0.001)
3-month follow-up	45	22.4 (4.8)	-3.3 (p < 0.001)	32	22.6 (4.8)	-1.2 (p = 0.17)	-1.1 (p = 0.23)	-2.3 (p = 0.051)
6-month follow-up	37	23.1 (4.8)	-2.9 (p < 0.001)	30	22.7 (5.3)	-1.2 (p = 0.19)	-0.7 (p = 0.44)	-2.2 (p = 0.071)
Muscle pain								
Baseline	73	3.3 (2.1)		43	2.3 (1.8)			
2-month follow-up	52	2.3 (2.2)	-0.9 (p < 0.001)	40	2.4 (2.1)	0.3 (p = 0.17)	0.4 (p = 0.08)	-1.2 (p < 0.001)
3-month follow-up	46	2.5 (1.8)	-0.7 (p < 0.001)	30	2.0 (1.8)	0.1 (p = 0.78)	0.2 (p = 0.49)	-0.8 (p = 0.011)
6-month follow-up	37	2.4 (2.1)	-0.7 (p = 0.001)	32	2.3 (1.9)	0.3 (p = 0.29)	0.2 (p = 0.41)	-1.0 (p = 0.003)

^aLinear mixed model testing whether there is a difference between the intervention group and the control group in the change from baseline to follow-up.

^bLinear mixed model controlling for dependency in data within company and within person (random effects).

^cLinear mixed model also adjusting for the covariates: age, gender, education level, living alone/cohabitating (fixed effects).

The findings supported the hypothesis: In the intervention group, there were significant improvements on all outcome variables: mental distress (GHQ-12), worries and nervousness (EPQ-N), sleep problems (BIS) and musculoskeletal pain, but not in the control group. Furthermore, there were significant differences between the groups regarding the developments of EPQ-N, GHQ-12 and Musculoskeletal pain, suggesting that Acem Meditation promotes specific effects in these areas.

Change of personal style

A personal style characterized by worries and nervousness is associated with emotional vulnerability, negative affect or neuroticism (Eysenck & Eysenck, 1969). The significant reduction of EPQ-N scores in the intervention group indicates that, with the practice of nondirective meditation, this kind of personal style was modified, into less worry and reduced stress. The finding is in line with studies by Feltman et al. (2009) and Halland et al. (2015). Halland et al. found: following mindfulness training, those students who had high neuroticism scores, developed more problem-solving coping and used less avoidance-focused coping, suggesting an interaction effect for this subgroup, and that emotional processing may change into a more adaptive coping style. A coping style characterized by nervousness and worries may be a vulnerability factor for negative emotional reactivity and a predictor of future stress.

A study by Desbordes et al. (2012) found longitudinal effects of meditation practice on amygdala responses even when participants were in an ordinary, non-meditative state, suggesting that such training may facilitate enduring changes in mental function like emotional processing. The participants were healthy adults with no prior experience. They practiced mindfulness meditation (Attention Training) or Cognitively-Based Compassion Training and obtained distinct effects. Whether such training may also have quantifiable effects on other areas of the brain is an interesting question for further research.

In nondirective meditation, acceptance of mind wandering contributes to the release of tension. Regular practice may loosen up fixed patterns of rumination, which is frequently associated with worries and mental distress, anxiety and depression (Nolen-Hoeksema, 2000). Ruminating is basically repeatedly going over a thought or problem without completion. Since other thoughts and feelings than those related to rumination will emerge in consciousness in nondirective meditation, a repetitive brooding mindset might be broken. This is also emphasized in metacognitive therapy, where reduction of rumination and worries is considered essential for the improvement of depression and anxiety disorders (Wells & Fisher, 2016). Both external and internal factors influence the perception and experience of stress. Training in stress tolerance enables better coping with the stressors of daily life. Stress appraisal and coping strategies, combined, determine whether we feel capable to cope with a situation or perceive it as threatening (Lazarus & Folkman, 1984).

In companies with high demands regarding achievement and productivity, coping skills is a central aspect of employees' competence. A recent study found that meditation practice positively influenced job performance, job satisfaction and work engagement (Shiba, Nishimoto, Sugimoto, & Ishikawa, 2015). A systematic relaxation method may be a tool both to reduce current stress, to recover from accumulated stress and to prevent future stress from building up. Performance under heavy stress among elite marksmen improved with nondirective meditation, whereas the performance in the control group, who did not learn the method, was not improved

(Solberg, Berglund, Engen, Ekeberg, & Loeb, 1996). Further documentation of the associations between reduced stress and improved performance in working professionals is warranted.

Strengths and limitations

Among the strengths of the present study was the computer-based administration of questionnaires, which secured anonymity and reduced the potential influence of assessor bias. The research team had no access to the links between the database and the individual participants. The questionnaires in the study are widely used, validated and well known in international research. In order to reduce the bias of variations in personality and skills, there were several teams of instructors who taught the courses at the different companies in the study. The participants comprised active working professionals at their companies' sites, which fitted well for the research questions of the study. They shared a situation with stress at work. Furthermore, the use of linear mixed models made the statistical analyses more robust for bias due to the dropout of subjects during follow-up.

Among the limitations was the lack of randomization. Due to the context and procedures of this field study, randomization was not possible. The intervention was implemented as a part of the companies' stress management programs and the companies themselves recruited the participants to both the intervention group and the control group. All participants in the control group were beforehand offered to receive the intervention after the study period, but an interest in learning the meditation technique was not a prerequisite for taking part in the control group. Thus, the control and intervention groups might differ with respect to motivation and interest in learning and practicing a meditation technique. We are not aware of any other, specific factors that might distinguish those who participated from those who did not, except for available time for the course and daily practice. In one company, both the control group and the intervention group had signed up for taking part in the intervention. The results in this company did not differ from the results in the other companies, suggesting that randomization might not make a major difference regarding the overall results. However, replications of this study, with a RCT design is warranted. Furthermore, we cannot entirely rule out that being in the control group may have a positive effect in itself. Non-specific factors like taking part in the project or expectation of a later positive effect when given the control condition may influence over and above the hypothesized "active" ingredient.

It would be desirable to examine whether any of the effects might be associated with the amount of practice of the technique. However, the sample size in the present study did not allow for separate analyses of subgroups. Some participants practiced the nondirective technique regularly, or relatively regularly, whereas others reported little practice. Therefore, this remains a question for further research with a larger sample, preferably with a controlled trial, including controlling for participants' expectations. This reflects that it would be desirable to have a larger sample size. With a small sample, we also risk unstable associations, as well as smaller differences not reaching significance. On the other hand, a smaller sample size entails that only major differences become significant, preventing less important differences from being ascribed too much importance.

Implications of the study

This study investigated the effects of nondirective meditation in non-clinical populations of employees in large companies. The intervention promoted better stress management,

suggesting that systematic use of such a technique may promote health benefits for active working professionals, and may be a useful supplement to other methods in the companies' tool-boxes for stress management.

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