IMPROVING MENTAL HEALTH OF DUTCH TEACHERS

by mindfulness-based stress reduction and an organizational health intervention

Math. Janssen

Improving mental health of Dutch teachers by mindfulness-based stress reduction and an organizational health intervention

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Voor pap en mam, die er nog graag bij hadden willen zijn

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I

Chapter I

General Introduction

My personal motivation and ambition

For almost 20 years, I have worked as a consultant/trainer/coach in work and health, including 10 years at a prestigious human resources management training and consultancy firm for business organisations in the Netherlands. There I worked on themes like stress, burnout, motivation, and work engagement. My challenging profession has involved coaching managers and employees, leading team training activities, and giving advice.

Several issues have surprised me in my work. Although there is a need for an integrated approach to work-related stress and work engagement that combines an individual-focused intervention and an organisation-focused intervention [1], most mental-health interventions I have encountered have not taken such an approach. Although I advised against it, many of my clients explicitly requested interventions oriented to the individual level instead of the organisational level.

Examples of individual-level interventions include training or coaching on time management, reducing stress complaints, relaxation, cognitive-behavioural change, mindfulness, personal effectiveness, and assertiveness. In contrast, organisational-level interventions are focused on improving job demands and job resources, like stimulating social support, increasing team functioning and decision making, changing the work environment, and management development.

Kompier and Bakker [2] and Schaufeli and Bakker [3] confirmed that stress management interventions are traditionally focused on the individual and on relieving and decreasing the negative effects of stress rather than on counteracting risk factors in work, according to 'the hierarchy of hazard controls' [4], a key element of the Dutch Working Conditions Act [5].

Another surprising issue in my business practice was the non-specific recruiting for many individual-focused mental-health interventions. Employees were invited to sign up if they were interested and there was less focus on reaching the employees who were very stressed and most needed the intervention. I also noted a remarkable lack of a serious evaluation of the intervention's effects in the short- and long-term, although it would make sense to assess the benefits of such expensive and time-consuming efforts.

Why did clients/employers prefer interventions focused on individuals? It is important to look for explanations through more and thorough research. Kompier and Bakker [2] mentioned some possible explanations: individual-oriented values of management in companies, the traditional focus of the occupational health and safety service on individual differences and personal treatment, and a lack of attention paid to possible business benefits.

Despite my reservations about the one-sided orientation on individual-focused interventions as a consultant/trainer/coach, I had good experiences with mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT). However, I sometimes noted an overestimation of mindfulness and exaggerated positive

claims (see also [6]) regarding mindfulness as a panacea for many problems: it was used as a corporate well-being tool, an alternative to psychotherapy, and a promising educational practice to improve learners' creativity. Another important issue was the media hype around mindfulness [7]. I agree with Goyal et al. [8] that the overestimation and media hype will lead to misinformation, disappointments and, eventually, the danger of 'throwing the baby out with the bathwater'.

These experiences inspired me to make three choices for my research. First, I chose to study the effectiveness of MBSR in the context of stress reduction for employees (see Chapter 4 in this dissertation) to distinguish illusions from tentative findings and firm empirical evidence. Second, I chose to investigate an additional organisational health intervention because stress results from a complex interaction between environmental factors (work and personal circumstances) and the individual (see Chapter 4). Third, I chose teachers in Dutch secondary vocational schools as my target group because they suffer from a lot of stress (see Chapter 4).

Work-related stress: definitions and models

Stress is an inherent feature of work and daily life [9], and the word is used as an umbrella term to refer to negative symptoms, feelings, causes, and impacts. In 1936, Selye [10] presented the first scientific (biologically oriented) stress theory and defined stress as a psychological or physiological response to a threatening situation, called a 'stressor'. Later, many other stress theories were developed, such as the Michigan model [11] and the Person-Environment-Fit model [12, 13]. These introduced psychological insights and considered the stress response to be a result of an interaction between an individual and their environment.

In a work situation, stress occurs when an employee cannot meet (or thinks they cannot meet) the job demands, which is perceived as threatening. Consistent with this description, the WHO [9] defined work-related stress as 'a pattern of reactions that occurs when workers are presented with work demands not matched to their knowledge, skills or abilities and which challenge their ability to cope' (p. 13).

One of the most important stress models, the Job Demand-Control model (JD-C model), was published by Karasek in 1979 [14]. The JD-C model assumes that perceived job demands, such as high work pressure and emotional strains, are only stressors if they coincide with little autonomy. That model was based on the above mentioned Michigan model [11] and Person-Environment-Fit model [12, 13]. In the 1980s, the factor 'social support' was added and the model was renamed the Job Demand Control-Support model (JD-CS model) [15]. Subsequently, Demerouti et al. [16, 17] formulated the Job Demands-Resources (JD-R) model based in part on inspiration from the JD-CS model.

The JD-R model suggests that job characteristics (i.e. job demands and job resources) can influence work stress via two processes. The first is a stress process in which high job demands exhaust workers' mental and physical resources and may lead to energy depletion, exhaustion, health problems, and, eventually, premature retirement from their profession [16]. The second is a motivational process in which job resources have motivational potential that is either intrinsic (because they foster growth, learning, and development) or extrinsic (because they are instrumental in achieving work goals) and lead to positive work outcomes [16]. Job resources and personal resources can buffer the effects of job demands [16].

In contrast to the JD-CS model, the JD-R model has been expanded to include not only job resources but personal resources (i.e. aspects of the self that refer to one's ability to influence the environment). Examples include emotional and mental competencies, hope, self-efficacy, low neuroticism, and resilience [18-20]. Unlike other stress models that propose a limited set of job demands and job resources, an important assumption of the JD-R model is that any job characteristic can be a demand or a resource [19].

In 2016, the International Labour Organization (ILO) [21] described stress as '... the harmful physical and emotional response caused by an imbalance between the perceived demands and the perceived resources and abilities of individuals to cope with those demands' (p. 2). In contrast to the WHO's definition [9], ILO's emphasises the role of job resources and views them as protective factors that make work more positive and meaningful and can help employees cope with job demands.

This dissertation focuses on interventions for improving the mental health, personal competencies, and work-related perceptions of teachers in secondary vocational schools. We used a conceptual (heuristic) model inspired by the JD-R model because of its distinction between person (personal resources) and job characteristics (job demands and job resources) and its generic applicability to work situations. Accordingly, we used the ILO's work stress definition as it was also based on this model.

Teachers and work-related stress

Education in the Netherlands is of generally high quality, as evidenced by the country's top 20 position in mathematics, science, and reading in the Program for International Student Assessment (Organisation for Economic Co-operation and Development [22]. Nevertheless, improving education was already a theme in the Netherlands when this PhD research began. In the education section of the October 2017 coalition agreement to form the Dutch government [23], the following key message reflects this:

> *'Good education brings out the best in people, reduces and prevents learning disadvantage and enables talent to flourish. Good education lays the foundations for a healthy and successful society. The government will therefore continue to invest in*

further improvements to education and research, and in the people working in this field.' (p. 12)

Almost five years later, the Dutch government published a new coalition agreement [24] that began its Education and Development section as follows:

Everyone in the Netherlands deserves to have a good life and should be able to participate. This starts by ensuring that all children, young people and students have equal opportunities for learning and personal development. We therefore want to strengthen the quality of education … This also means investing in the quality and number of teachers and school leaders… We will strengthen vocational and higher professional education as well as university education.' (p. 23)

As these ambitions suggest, maintaining and improving the quality of education requires healthy teachers [25]. Teachers have demanding jobs combined with few job resources [26]. A major threat to teachers' health is their high level of work stress [26, 27].

In 2017 and 2019, almost one in six Dutch employees, and one in five Dutch teachers, mentioned stress and burnout complaints [26, 27]. In 2019, health professionals and teachers (especially in secondary vocational schools), reported the highest work pressure of all Dutch employees, defined as a combination of high job demands and little professional autonomy [27]. They also experienced relatively high emotional strain. Teachers especially mentioned high job demands, and their limited autonomy can be partly attributed to their lack of influence on working times and rest periods [27]. Still, in industrialised countries like the Netherlands, work-related stress has become an inherent feature of the employment relationship in all sectors [9].

Work-related stress has many negative outcomes [26]. At the organisational level, it is associated with increased absenteeism and early retirement [26]. In 2014, the Netherlands Organisation for Applied Scientific Research (TNO) estimated that stress-related absenteeism cost employers in the Netherlands €1.8 billion each year [28]. These costs continued to increase from €2.5 billion in 2016 to €2.8 billion in 2017 and €3.1 billion in 2018 [27]. In 2017, the absenteeism rate of teachers in the Dutch education sector was relatively high (5.3%) [26] and the associated costs per employee were the highest on the labour market: almost €6,000 (number of days x costs per day) [29]. In 2019, teachers' absenteeism rate decreased to almost 4.8% [27].

Teachers are overloaded with work but receive no new job resources to draw on. This imbalance between job demands and resources and the associated risks to well-being may be an important reason why many novice teachers leave the education sector in the first five years of their career [30] and many experienced teachers retire early. In fact, in the Netherlands, 45–70% of early retirements in the education sector can be attributed to psychosomatic and psychological problems [31]. Therefore, it is extremely important to reduce and prevent stress and stimulate work pleasure in this sector.

Mental health interventions

Many social and governmental initiatives have tried to stimulate mental health and decrease work-related stress in the Netherlands. The National Prevention Agreement, for example, is a governmental initiative in which many organisations (e.g. the Netherlands Institute of Psychologists (NIP), Dutch Association of Mental Health and Addiction Care (GGZ)) work to foster mental health and prevent psychological problems [32]. Another example, the Think Tank Mental Progress, is a group of representatives from civil society organisations, mental health organisations, and companies. It was founded in 2019 to put the progress of mental health in the Netherlands on the political agenda [33].

Many Dutch employees (≥ 54.8% in the period from 2016-2019) would like to receive preventive stress-reduction interventions at work [27]. Depending on their specific aim, preventive interventions can be classified as primary, secondary, or tertiary. Primary interventions are oriented to the organisational level and aim to change the sources of work-related stress (e.g. high workload, little autonomy, inadequate leadership or management). Secondary and tertiary interventions are focused on the individual employee. Secondary interventions aim to decrease stress symptoms before they cause mental health problems, and tertiary interventions aim to treat mental health problems (e.g. burnout) [4].

According to 'the hierarchy of hazard controls' (an occupational health principle related to health interventions), when possible, primary interventions are preferable to secondary and tertiary interventions [4]. In their review of occupational stress interventions, Caulfield et al. [34] suggested that primary organisation-focused interventions generate more positive changes than individual-focused secondary or tertiary interventions. However, two meta-analyses on work-related stress interventions [35, 36] found no substantial differences between organisational-level and individual-level interventions. There are several possible reasons a primary stress-reduction intervention might prove ineffective: theory failure (the intervention is not built on a proper theory); implementation failure (e.g. lack of commitment by managers or employees, external events that disturb the implementation as intended); and the unsuitability of the study design (e.g., the 'gold standard', the randomized controlled trial, RCT), because of practical and ethical obstacles in organizations [37-39].

According to the JD-R model, personal resources and job characteristics (i.e. job demands and job resources) are the starting points for all stress-reduction interventions. A frequently heard (neo-liberal) narrative is that (work) stress is a self-imposed, private, subjective, and interior affair that individuals must deal with, and secondary/tertiary interventions (e.g. mindfulness, seen as the cure-all) reflect a one-sided ethos of self-responsibility and a risk of blaming the victim [40]. In her dissertation, however, Schelvis [39] mentioned that even in Karasek's JD-C(S) model, 'individual factors are disregarded

in order to avoid the inclination that an individual employee is held responsible for both his or her experience of work stress as well as for the solution of work stress' (p. 12).

Lamontagne et al. [41] and Van der Klink et al. [1] argued that an effective approach to work stress requires a combination of individual-focused (secondary/tertiary) and organisation-focused (primary) interventions. Necessary conditions are involvement of the director, managers, and teachers, teachers' participation in the development and implementation of appropriate actions, and transparent communication about the interventions in the organisation [42].

In this thesis, we use the WHO's 2001 definition of mental health: 'a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community' (p. 1). That definition has three main components: emotional or subjective well-being [43], psychological well-being (referring to optimal functioning in work and life; [44]), and social well-being (targeting optimal functioning in social groups and society; [45].

Mental health interventions in the education sector

Work-related stress in Dutch secondary vocational schools is especially concerning given the related burnout complaints and early retirements [46]. Thus it is understandable that many (mental) health initiatives are developed for these schools, such as 'Focus on Expertise 2011-2015' [47], an action plan for secondary vocational schools, the project 'Innovation from the bottom up: Working in a healthy and enjoyable way in secondary vocational education (MBO)' [48], the project 'Proud of our secondary vocational school' [49], and 'The Healthy School 2017-2020' programme to promote vital employees in secondary vocational schools [50].

Most mental health interventions in the education sector are secondary and targeted at enhancing the ability of teachers to cope with stressors in the workplace [51-57]. Examples include workshops on stress management skills and MBSR programmes. Despite the above initiatives, there is still a need to develop both organisational-level interventions (aimed at changing the sources of work-related stress) and individual-level interventions (aimed at enhancing the ability of teachers to cope with stressors in the workplace).

Interventions in this dissertation

In this PhD research, we conducted two stress-reduction interventions: 1) the main intervention, MBSR, an individual-focused secondary/tertiary health intervention, and 2) an additional primary organisational intervention.

Mindfulness-based stress reduction: the main intervention

Kabat-Zinn [58] describe mindfulness as 'the awareness that emerges through paying attention, on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment' (p. 145). This awareness can be aimed at internal experiences (bodily sensations, feelings/emotions, and thoughts) and external experiences (what one sees, hears, smells, tastes, and touches).

Shapiro and Carlson [59] define mindfulness as 'the awareness that arises through intentionally attending in an open, caring, and discerning way' (p. 12). This definition contains three interrelated elements: intention, attention, and attitude. Intention involves reflecting on one's personal goals and values and paying attention to the most important factors related to accomplishing and upholding them. Attention (i.e. attending to experiences in the here and now) is a prerequisite for seeing a situation clearly. While intention refers to why we are paying attention, the third element – attitude – relates to how we pay attention. In this dissertation, we have adopted Shapiro and Carlson's [59] definition of mindfulness, which is an elaboration of the commonly accepted definition by Kabat-Zinn [58].

Mindfulness-based stress reduction (MBSR) is the most common form of secular mindfulness-based training [60]. It was developed for patients with chronic pain by Kabat-Zinn [61], and it aims to reduce suffering or stress [62]. The training programme used in this study is primarily based on Kabat-Zinn's curriculum [61] but it adds elements of Mindfulness-based cognitive therapy (MBCT) [63]: in particular, a three-minute breathing space and psychoeducation about the nature of thoughts.

The MBSR programme in this study (see Chapter 4 in this dissertation) consisted of eight 2.5-hour weekly group sessions with 4 to 15 participants (teachers in Dutch secondary vocational schools from three courses: Care, Technology, and Economy) per group. The homework involved 45 minutes of daily home exercise six days a week, and one day with seven hours of silence. The group sessions were supervised by one of the four recruited qualified mindfulness trainers, who each received a training script.

The first session began with a short introduction to the programme and a meet and greet between participants. Each session involved different meditation exercises, enquiry, psychoeducation, and a specific theme. At the end of each session, participants were given homework that would be discussed in the subsequent session. The specific content of the MBSR group sessions is described extensively in Chapter 4 of this dissertation (Table 4.4).

Additional organisational health intervention

The additional organisational health intervention was developed in accordance with the key points of participatory action research [64] and grounded in the JD-R model ([16]; also see Chapter 4). It had two phases: needs assessment and implementation.

The needs assessment phase began with an assessment of needs for the implementation of work-oriented solutions in each participating secondary school. A participatory group was formed and used the knowledge, skills, and perceptions of teachers and educational managers from the school to investigate the positive points (job resources) and main difficulties (job demands) in the specific course (Care, Technology, or Economy).

In the implementation phase, the teachers and managers jointly determined the highest priorities and developed a feasible work-related action/implementation plan. The focus of the intervention was to stimulate dialogue between management and employees/teachers in which they could jointly investigate improvement opportunities and implement solutions aimed at reducing stress and improving work pleasure. The specific content of the organisational health intervention is described in Chapter 4.

Goals and research questions

Despite the substantial research on occupational stress interventions [34-36], there is still little evidence about the effectiveness of interventions intended to decrease work-related stress and improve work engagement and work performance in employees with a lot of stress, such as health care professionals and teachers.

Therefore, the overall goal of this dissertation is to contribute to the body of scientific and practical knowledge about MBSR/mindfulness and its effects on employees' mental health and other work-related variables (e.g. work performance, personal competencies, and work-related perceptions). The first subgoal is to increase scientific knowledge about the effectiveness of MBSR as an individual-focused intervention on employees' mental health (especially that of teachers in secondary vocational schools in the Netherlands) and on other work-related variables. The second subgoal is to provide insight into the additional effectiveness of a participatory, preventive organisational health intervention on individuals' mental health and other work-related variables. The third subgoal is to explore the effects of MBSR and an additional organisational health intervention on the personal competencies of teachers in secondary vocational schools.

Based on the overall goal and subgoals, we formulated five research questions:

1) According to the scientific literature, what are the effects of MBSR on employees' mental health and on other work-related variables (e.g. personal competencies)?
2) To what extent is MBSR training feasible and acceptable? What are meaningful mental health variables and other work-related variables (e.g. personal

competencies) to include in a large-scale randomised controlled trial on the effects of MBSR?

3) What is an appropriate study protocol for investigating the effects of MBSR and an additional organisational health intervention on the mental health of teachers in Dutch secondary vocational schools and on other work-related variables (work performance, personal competencies, work-related perceptions)?
4) What are the effects of MBSR and an organisational health intervention on the mental health of teachers in Dutch secondary vocational schools and on other work-related variables?
    a. What are the effects of an organisational health intervention on the mental health of teachers and on other work-related variables?
    b. What are the effects of MBSR on teachers' work-related perceptions?
    c. What are the effects of MBSR on teachers' mental health?
    d. What are the effects of MBSR on teachers' work performance?
5) What are the secondary vocational school teachers' expectations and short- and long-term experiences with regard to mental health and personal competencies as a result of MBSR?

Outline of the thesis

The five research questions presented above are answered in Chapters 2 through 6.

To answer *Research Question 1*, **Chapter 2** presents the results of a systematic review that investigated the effects of MBSR and MBCT on various aspects of employees' mental health and other work-related outcomes. The review involved the databases PsycINFO, PubMed, and CINAHL, and it excluded studies with a pre-post design (i.e. without a control group). We used nine criteria to assess the methodological quality of the selected studies and classified each as high quality, medium quality, or low quality. We used five levels of evidence to classify the outcomes.

Chapter 3 presents the results of a pilot study (a non-randomised pre-post intervention). Its aim was to measure the feasibility and acceptability of an MBSR training programme and examine its predictive validity in light of possible positive and negative mental health variables, and other work-related variables (*Research Question 2*). The pilot study was conducted with 30 health care professionals in a specialised hospital and it investigated two hypotheses. The first predicted that MBSR training would increase positive symptom-focused mental health outcomes, and the second predicted that MBSR training would decrease negative symptom-focused mental health outcomes. The subjects filled in a mental health questionnaire twice: at baseline and post-intervention. Baseline and post-intervention differences were tested with paired samples *t*-tests and Wilcoxon signed-rank tests.

Chapter 4 presents a study design for a cluster randomised controlled trial (CRCT) including a conceptual model that could be used to evaluate the short- and long-term effectiveness of MBSR, a person-focused intervention, both within and outside the context of an additional organisational health intervention on the mental health of teachers in Dutch secondary vocational schools and on other work-related variables (e.g. work performance, personal competencies, work-related perceptions) (*Research Question 3*). According to a power analysis, such a trial would require a sample size of 22 participants in each group (two intervention groups and one waiting list group). The quantitative short- and long-term effects of MBSR and an additional organisational health intervention were examined using a repeated measures between-subjects design (general linear model) with simple contrasts.

Chapter 5 presents the results of the CRCT with 120 teachers. It investigated the short- and long-term effects of MBSR and an organisational health intervention on Dutch teachers' mental health and other work-related variables (*Research Question 4*). The study was conducted in five Dutch secondary vocational schools. Quantitative data was collected before (T_0), immediately after (T_1), and three (T_2) and nine months (T_3) after the MBSR training, and it was analysed using repeated measures between-subjects designs.

Chapter 6 presents the results of interviews with teachers who participated in the CRCT. They were asked about their expectations and short- and long-term experiences regarding mental health and personal competencies as result of an MBSR course and an organisational health intervention (*Research Question 5*). The teachers were interviewed between September 2016 and June 2020. Thirty-two teachers were interviewed before beginning the MBSR course (T_0), 27 immediately after the course (T_1), and 16 nine months after finishing the course (T_3). No interviews were held at T_2, three months after finishing the course. We also interviewed 14 of the 27 teachers interviewed at T_1, six HR consultants, and the external facilitator of the organisational health intervention at T_1 about their experiences with this intervention. Qualitative data was analysed using directed content analysis.

Chapter 7 provides the general discussion of this dissertation. The main findings are discussed in light of the theoretical, methodological, practical, and ethical implications. Recommendations for future research are described.

References

1. Van der Klink JJL, Bültmann U, Burdorf A, Schaufeli WB, Zijlstra FRH, Abma FI, et al. Sustainable employability — definition, conceptualization, and implications: A perspective based on the capability approach. Scandinavian Journal of Work, Environment & Health. 2016; 42(1): 71-79.
2. Kompier M, Bakker A. Werk- en organisatiegerichte interventies [Work- and organization-oriented interventions] (Dutch). In Schaufeli W, Bakker A. De psychologie van arbeid en gezondheid [The psychology of work and health] (Dutch): Bohn Stafleu van Loghum; 175–193, 2020.
3. Schaufeli WB, Bakker A. Burn-out en bevlogenheid [Burn-out and engagement] (Dutch). In Schaufeli W, Bakker A. De psychologie van arbeid en gezondheid [The psychology of work and health] (Dutch): Bohn Stafleu van Loghum; 335–353, 2020.
4. National Institute for Occupational Safety and Health (NIOSH), The state of the national initiative on prevention through design: Progress report 2014 (Publication No. 2014–123). Centers for Disease Control and Prevention. 2013.
5. Dutch Government. Arbeidsomstandighedenwet [Working Conditions Act] (Dutch). Laws 14 December 2022]; Available from: https://wetten.overheid.nl/BWBR0010346/2022-05-20.
6. Gunderson G. The science is in, and meditation may be the next big business opportunity. Forbes. 2016 15 October 2022]; Available from: http://www.forbes.com/sites/garrettgunderson/2016/06/28/the-science-is-in-and-meditation-may-be-the-next-big-business-opportunity/#2f729c7123c0.
7. Van Dam NT, van Vugt MK, Vago DR, Schmalzl L, Saron CD, Olendzki A, et al. Mind the Hype: A Critical Evaluation and Prescriptive Agenda for Research on Mindfulness and Meditation. Perspectives on Psychological Science. 2018; 13(1): 36-61.
8. Goyal M, Singh S, Sibinga EMS, Gould NF, Rowland-Seymour A, Sharma R, et al. Meditation programs for psychological stress and well-being: a systematic review and meta-analysis. JAMA Internal Medicine. 2014; 174(3): 357-368.
9. World Health Organization (WHO). Raising awareness of stress at work in developing countries: a modern hazard in a traditional working environment. Advice to employers and worker representatives. Protecting Workers' Health Series No. 6. 2007 5 December 2018]; Available from: http://apps.who.int/iris/bitstream/10665/42956/1/924159165X_eng.pdf.
10. Selye H. A syndrome produced by diverse nocuous agents. 1936. The Journal of Neuropsychiatry and Clinical Neurosciences. 1998; 10(2): 230-231.
11. Kahn RL, Wolfe DM, Quinn RP, Snoek JD, Rosenthal RA. Organizational stress: Studies in role conflict and ambiguity. 1964: Wiley.
12. Edwards JR, Cooper CL. The Person-Environment Fit Approach to Stress: Recurring Problems and Some Suggested Solutions. Journal of Organizational Behavior. 1990; 11(4): 293-307.
13. French JRPJ, Rodgers WL, Cobb S. Adjustment as person-environment fit. In Coelho G, Hamburg D, Adams J. Coping and adaptation: Basic Books; 316–333, 1974.
14. Karasek RA. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. Administrative Science Quarterly. 1979; 24(2): 285-308.
15. Johnson JV, Hall EM. Job Strain, Work Place Social Support, and Cardiovascular Disease: A Cross-Sectional Study of a Random Sample of the Swedish Working Population. American Journal of Public Health. 1988; 78(10): 1336-1342.
16. Demerouti E, Bakker AB, de Jonge J, Janssen PPM, Schaufeli WB. Burnout and engagement at work as a function of demands and control. Scandinavian Journal of Work, Environment & Health. 2001; 27(4): 279-286.
17. Demerouti E, Bakker AB, Nachreiner F, Schaufeli WB. The job demands-resources model of burnout. Journal of Applied Psychology. 2001; 86(3): 499-512.

18. Bakker AB, Boyd CM, Dollard M, Gillespie N, Winefield AH, Stough C. The role of personality in the job demands-resources model A study of Australian academic staff. Career Development International. 2010; 15(6-7): 622-636.
19. Bakker AB, Demerouti E. Job demands-resources theory: Taking stock and looking forward. Journal of Occupational Health Psychology. 2017; 22(3): 273-285.
20. Schaufeli WB, Taris TW. A Critical Review of the Job Demands-Resources Model: Implications for Improving Work and Health. Bridging Occupational, Organizational & Public Health. 2014: 43-68.
21. International Labour Organization, Workplace stress. A collective challenge. 2016.
22. Organisation for Economic Co-operation and Development, PISA 2018 results. OECD Programme for International Student Assessment (PISA). 2018.
23. Government of the Netherlands, 2017–2021 coalition agreement: Confidence in the future. VVD, CDA, D66 and CU. 2017.
24. Government of the Netherlands, 2021–2025 coalition agreement: Looking out for each other, looking ahead to the future. VVD, CDA, D66 and CU. 2021.
25. Van der Steeg M, Gerritsen S. Teacher evaluations and pupil achievement: evidence from classroom observations [CPB Discussion Paper 230]. 2013: CPB Netherlands Bureau for Economic Policy Analysis.
26. Douwes M, Hooftman W. Arbobalans 2018: Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of working conditions 2018. Quality of work, impacts and measures in the Netherlands] (Dutch). 2019, Leiden: TNO.
27. Venema A, Hooftman W, Fijan D, Swart C, Jansse EE. Arbobalans 2020. Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of Working Conditions 2020. Quality of work, impacts and measures in the Netherlands] (Dutch). 2020: TNO (Netherlands Organisation for Applied Scientific Research).
28. Van der Ploeg K, Van der Pal S, De Vroome E, Van den Bossche S. De kosten van ziekteverzuim voor werkgevers in Nederland [The costs of absenteeism for employers in the Netherlands] (Dutch). 2014, Leiden: TNO.
29. Boonstra W. Het onderwijs brandt mensen op [Education burns people out] (Dutch). 2015 Accessed 5 Dec. 2018]; Available from: https://www.intermediair.nl/werk-privebalans/burn-out/het-onderwijs-brandt-mensen-op.
30. Pas ET, Bradshaw CP, Hershfeldt PA. Teacher- and school-level predictors of teacher efficacy and burnout: identifying potential areas for support. Journal of School Psychology. 2012; 50(1): 129-145.
31. Schelvis RMC, Oude Hengel KM, Wiezer NM, Blatter BM, van Genabeek JAGM, Bohlmeijer ET, et al. Design of the Bottom-up Innovation project - a participatory, primary preventive, organizational level intervention on work-related stress and well-being for workers in Dutch vocational education. BMC Public Health. 2013; 13(1): 1-15.
32. Shields-Zeeman L, Van Bon-Martens M, Smit F, Samenvattend rapport. Samen werken aan een mentaal gezonde samenleving: Bouwstenen voor mentale gezondheidsbevordering en preventie [Summary report. Working together on a mentally healthy society: Elements for promoting good mental health and prevention] 2021, Trimbos-instituut (Netherlands Institute of Mental Health and Addiction).
33. Kraaijeveld K, Halink S, Verbugt J. Mentale vooruitgang. Hoe vergroten we de mentale kracht van Nederland? [Mental progress. How can we increase the mental power of the Netherlands?]. 2021: De Argumentenfabriek.
34. Caulfield N, Chang D, Dollard MF, Elshaug C. A Review of Occupational Stress Interventions in Australia. International Journal of Stress Management. 2004; 11(2): 149-166.

35. Richardson KM, Rothstein HR. Effects of occupational stress management intervention programs: a meta-analysis. Journal of Occupational Health Psychology. 2008; 13(1): 69-93.
36. Van der Klink JJL, Blonk RWB, Schene AH, Van Dijk FJH. The benefits of interventions for work-related stress. American Journal of Public Health. 2001; 91(2): 270-276.
37. Cox T, Karanika M, Griffiths A, Houdmont J. Evaluating organizational-level work stress interventions: beyond traditional methods. Work & Stress. 2007; 21(4): 348-362.
38. Kristensen TS, Intervention studies in occupational epidemiology. 2005, BMJ Publishing Group Ltd. p. 204.
39. Schelvis RMC, Decreasing work stress in teachers (Doctoral dissertation). 2017, VU Amsterdam
40. Purser RE. McMindfulness. How mindfulness became the new capitalist spirituality. 2019: Repeater Books.
41. LaMontagne AD, Keegel T, Louie AM, Ostry A, Landsbergis PA. A systematic review of the job-stress intervention evaluation literature, 1990-2005 [corrected] [published erratum appears in Int J Occup Environ Health 2008 Jan-Mar;14(1):24]. International Journal of Occupational & Environmental Health. 2007; 13(3): 268-280.
42. Westgaard RH, Winkel J. Occupational musculoskeletal and mental health: Significance of rationalization and opportunities to create sustainable production systems - A systematic review. Applied Ergonomics. 2011; 42(2): 261-296.
43. Diener E, Suh EM, Lucas RE, Smith HL. Subjective well-being: Three decades of progress. Psychological Bulletin. 1999; 125(2): 276-302.
44. Ryff CD. Happiness is everything, or is it? Explorations on the meaning of psychological well-being. Journal of Personality and Social Psychology. 1989; 57(6): 1069.
45. Keyes CLM. Social well-being. Social Psychology Quarterly. 1998; 61(2): 121-140.
46. Schelvis RMC, Wiezer NM, Blatter BM, van Genabeek JAGM, Oude Hengel KM, Bohlmeijer ET, et al. Evaluating the implementation process of a participatory organizational level occupational health intervention in schools. BMC Public Health. 2016; 16(1).
47. MBO Digitaal, Focus op vakmanschap 2011–2015 [Focus on expertise 2011–2015]. 2022.
48. ZonMW. Innovatie van onderop: Gezond en met plezier werken in het MBO [Innovation from the bottom up: Working in a healthy and enjoyable way in secondary vocational education (MBO)] (Dutch). 2022.
49. CNV Onderwijs. Trots op ons MBO [Proud of our secondary vocational school] (Dutch). 2015.
50. Gezonde School. Evaluatie programma Gezonde School 2017–2020 [Evaluation of the Healthy School programme, 2017–2020] 2021; Available from: https://www.gezondeschool.nl/documenten/factsheet-evaluatie-programma-gezonde-school-2017-2020.
51. Beshai S, McAlpine L, Weare K, Kuyken W. A non-randomised feasibility trial assessing the efficacy of a mindfulness-based intervention for teachers to reduce stress and improve well-being. Mindfulness. 2016; 7(1): 198-208.
52. Frank JL, Reibel D, Broderick P, Cantrell T, Metz S. The effectiveness of mindfulness-based stress reduction on educator stress and well-being: Results from a pilot study. Mindfulness. 2015; 6(2): 208-216.
53. Jennings PA, Frank JL, Snowberg KE, Coccia MA, Greenberg MT. Improving classroom learning environments by Cultivating Awareness and Resilience in Education (CARE): results of a randomized controlled trial. School Psychology Quarterly. 2013; 28(4): 374-390.
54. Roeser RW, Jha A, Wallace L, Wilensky R, Schonert-Reichl KA, Cullen M, et al. Mindfulness training and reductions in teacher stress and burnout: results from two randomized, waitlist-control field trials. Journal of Educational Psychology. 2013; 105(3): 787.

55. Taylor C, Harrison J, Haimovitz K, Oberle E, Thomson K, Schonert-Reichl K, et al. Examining ways that a mindfulness-based intervention reduces stress in public school teachers: A mixed-methods study. Mindfulness. 2016; 7(1): 115-129.
56. Unterbrink T, Pfeifer R, Krippeit L, Zimmermann L, Rose U, Joos A, et al. Burnout and effort-reward imbalance improvement for teachers by a manual-based group program. International archives of Occupational and Environmental Health. 2012; 85(6): 667-674.
57. Zołnierczyk-Zreda D. An intervention to reduce work-related burnout in teachers. International Journal of Occupational Safety and Ergonomics. 2005; 11(4): 423-430.
58. Kabat-Zinn J. Mindfulness-based interventions in context: Past, present, and future. Clinical Psychology-Science and Practice. 2003; 10(2): 144-156.
59. Shapiro SL, Carlson LE. The art and science of mindfulness: integrating mindfulness into psychology and the helping professions. 2009, Washington, DC: American Psychological Association Publications.
60. Chaskalson M, Hadley SG. Mindfulness: historical and contemplative context and recent developments. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 42 - 66, 2015.
61. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. 1990, New York: Delacorte.
62. Reb J, Atkins PWB. Introduction. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 1-16, 2015.
63. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for depression; a new approach to preventing relapse. 2002, New York: Guilford Press.
64. McVicar A, Munn-Giddings C, Seebohm P. Workplace stress interventions using participatory action research designs. International Journal of Workplace Health Management. 2013; 6(1): 18-37.

2

Chapter 2

Effects of mindfulness-based stress reduction on employees' mental health: A systematic review

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Abstract

Objectives: The purpose of this exploratory study was to obtain greater insight into the effects of Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) on the mental health of employees.

Methods: Using PsycINFO, PubMed, and CINAHL, we performed a systematic review in October 2015 of studies investigating the effects of MBSR and MBCT on various aspects of employees' mental health. Studies with a pre-post design (i.e. without a control group) were excluded.

Results: 24 articles were identified, describing 23 studies: 22 on the effects of MBSR and 1 on the effects of MBSR in combination with some aspects of MBCT. Since no study focused exclusively on MBCT, its effects are not described in this systematic review. Of the 23 studies, 2 were of high methodological quality, 15 were of medium quality and 6 were of low quality. A meta-analysis was not performed due to the emergent and relatively uncharted nature of the topic of investigation, the exploratory character of this study, and the diversity of outcomes in the studies reviewed. Based on our analysis, the strongest outcomes were reduced levels of emotional exhaustion (a dimension of burnout), stress, psychological distress, depression, anxiety, and occupational stress. Improvements were found in terms of mindfulness, personal accomplishment (a dimension of burnout), (occupational) self-compassion, quality of sleep, and relaxation.

Conclusion: The results of this systematic review suggest that MBSR may help to improve psychological functioning in employees.

Introduction

Given their potential benefits for physical and mental health as well as social relations [1, 2], interest is increasing internationally in mindfulness interventions in the workplace [3]. This is also true for the Netherlands, where many work environments are characterized by high productivity targets, overtime, high work pressure, customer aggression, temporary employment contracts, continuous organizational changes, job uncertainty, employee shortages, and little autonomy [4].

Mindfulness is related to meditation, but the terms are not synonymous. Moreover Mindfulness consists of formal meditation exercises (e.g., paying attention to the body, lying on the ground, or walking slowly with a sense of awareness of one's surroundings) as well as informal exercises (e.g., paying full attention to what one is doing or experiencing at a certain moment) [5].

Mindfulness interventions vary in delivery mode (face-to-face, online) and target population (clinical populations with major depression, anxiety disorders, borderline personality disorders, chronic pain, or eating disorders [6] and non-clinical populations such as students and employees seeking to enhance their subjective well-being). They can range in duration from long term (e.g., eight weekly 2.5-hour sessions, eight-hour daylong retreats, one 2.5-hour session per month for 10 months [7]) to short term (e.g., four weekly 30-minute sessions [8]). The intensity of interventions can vary too, from high dose (e.g., eight weekly 3-hour sessions and 45 minutes of daily mindfulness practice [9]) to low dose (e.g., 30-minute sessions and 15–20 minutes of daily mindfulness practice [8]).

Mindfulness interventions in the workplace target workplace functioning: reducing stress and improving decision-making, productivity, resilience, interpersonal communication, organizational relationships, perspective-taking, and self-care [10]. This great diversity in mindfulness interventions makes it difficult to compare the efficacy of such interventions.

There are many hypotheses about the mechanisms underlying mindfulness practice that lead to different mental health outcomes. One hypothesis is that exposure to or willingness to experience difficult emotions (e.g., anxiety, distress, anger), awareness of these emotions, and observation of these emotions allow people to dis-identify with and better regulate difficult emotions [5, 11]. Another is that awareness of thoughts, awareness of bodily sensations, and self-compassion help people to deal with stress [5].

This systematic review will evaluate the effects of two types of group-based mindfulness interventions – Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) – on employees' mental health.

Definition of mindfulness

The concept of mindfulness has existed in Buddhist traditions for 2,500 years. Mindfulness meditation is an attitude and a method for reducing personal suffering and developing insight, compassion, and wisdom [12]. In contemporary psychology, mindfulness is seen as a means of increasing awareness and responding optimally to mental processes that contribute to emotional distress and maladaptive behavior [6].

Many definitions of mindfulness have been posited in the psychological literature [6, 13-15]. Marlatt and Kristeller [13] described mindfulness as "bringing one's complete attention to the present experience on a moment-to-moment basis." According to Brown and Ryan [14], "mindfulness can be considered an enhanced attention to and awareness of current experience or present reality." 'Awareness' refers to the individual's consciousness of what they are experiencing, without those experiences being the center of attention. 'Attention' is the process of focusing conscious awareness on specific experiences.

Bishop et al. [6] proposed a working definition of mindfulness with two components. The first concerns the self-regulation of attention, which is focused on the immediate experience in the present. The second involves having an open, curious, and accepting attitude towards that experience. Kabat-Zinn [15] described mindfulness as "the awareness that emerges through paying attention, on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (p. 145). This awareness can be aimed at internal experiences (bodily sensations, feelings/emotions, and thoughts) and external experiences (what one sees, hears, smells, tastes, and touches).

Shapiro and Carlson [16] defined mindfulness as "the awareness that arises through intentionally attending in an open, caring, and discerning way." This definition contains three interrelated elements. The first element – intention – involves reflecting on one's personal goals and values, and paying attention to the most important things in accomplishing and upholding them. The second element, attention (i.e., attending to experiences in the here and now) is a prerequisite for seeing clearly. Finally, while intention refers to *why* we are paying attention, the third element – attitude – relates to *how* we pay attention. It refers not to an attempt to change things, but to an effort to relate to them in a non-judgmental way, with curiosity and compassion [10].

In this review article, we adopt Shapiro and Carlson's [16] definition, which is an elaboration of the commonly accepted definition by Kabat-Zinn [15].

Interventions based on Kabat-Zinn's mindfulness training

The most common form of secular mindfulness-based training is Mindfulness-Based Stress Reduction (MBSR) training [17], developed by Kabat-Zinn [18]. MBSR aims to alleviate suffering [19] and was originally developed for patients with chronic pain. It

consists of eight 2.5-hour weekly sessions and one 7-hour day of silence. A very important part of the training is the homework: 45 minutes of daily exercise at home, 6 days a week, with the support of CDs and set tasks. MBSR includes:

- the body scan (paying attention to what the body is feeling);
- sitting meditation (paying attention to breathing, sounds, thoughts, bodily sensations, feelings/emotions);
- simple movement exercises such as walking or standing meditation, or lying yoga exercises (paying attention to what the body is feeling; exploring and accepting borders);
- informal meditation exercises: paying full attention to daily activities (e.g., brushing one's teeth, taking a shower, eating).

Mindfulness-Based Cognitive Therapy (MBCT), which was developed by the cognitive behavior therapists Segal, Williams, and Teasdale [20] on the basis of MBSR, is often used to prevent relapse into depression [21-23]. In workplace settings, the focus is on distressing emotional states rather than on clinical depression (e.g., see the pre-post study by Ruths et al. [24]). MBCT has become the most important adaptation of MBSR [25], to which it is closely allied, although there are a few differences. The CT component of the program includes psycho-education about the nature of thoughts as mental events rather than facts, which fosters a decentered attitude towards one's own thoughts: thoughts are not facts; I am not my thoughts. The link between thought and mood is made explicit in MBCT. Moreover, MBCT also introduces a 'mini-meditation', known as the three-minute breathing space.

Other interventions incorporate mindfulness training as well, including Dialectical Behavior Therapy for the treatment of clients with a borderline syndrome [26], Acceptance and Commitment Therapy [27], and Mindfulness-Based Relapse Prevention [28]. As mindfulness is only one component of the treatment in these interventions, they are not included in this review.

MBSR and MBCT interventions are typically modified to suit the context in which they are delivered (Table 1). Sessions can vary in number and duration; they may be face-to-face or online, and involve less or more homework; and the retreat day may be dropped. In this study, we include MBSR and MBCT interventions conducted in groups with at least four face-to-face 30-minute sessions.

Effects of mindfulness interventions on patients

Previous research on the effects of group-based mindfulness interventions has focused on benefits for various patients groups (e.g., those with chronic pain, anxiety, eating and major depressive disorders, fibromyalgia, psoriasis, or cancer [29]). These studies found that mindfulness decreases stress sensitivity [30-33], increases stress management

[34], improves concentration [35], improves physical resilience [36-38], and reduces symptoms of anxiety and depression [39-41]. More recent studies have reported positive effects of mindfulness interventions on chronic pain [42], immunity [43], generalized anxiety disorders [44], eating disorders [45], depression relapse [21, 46], addiction [47], and fibromyalgia [48, 49]. In their meta-analysis, Strauss et al. [50] identified potential benefits for depression, but not for anxiety disorders.

Effects of mindfulness interventions on healthy people and professionals

Following on from the promising results for patients, MBSR and MBCT have recently also been used for healthy people [51] and for employees and managers in a healthcare setting [52]. A meta-analysis by Chiesa and Serretti [51] focusing on healthy participants (not explicitly on employees) identified ten studies on MBSR, most of them of low methodological quality. The most striking outcome was the reduction of stress levels.

Employees and managers in a healthcare setting are regularly confronted with stress in the form of physical and mental suffering as well as strong emotions (their own or those of their patients) [53]. Adequate stress management can improve the health of these professionals [54] and the quality of care they provide to patients [55].

Mindfulness training is assumed to also have potential for other demanding work environments, as a means of improving employees' health and work engagement and, consequently, the quality of services provided to clients. To date, however, there has been no systematic review of studies investigating the effects of mindfulness training on the mental health of employees across different occupational sectors.

The most commonly studied group of employees are healthcare professionals: four reviews [52, 56-58] and two reviews/meta-analyses [59, 60] focused exclusively on healthcare professionals and students. Escuriex and Labbé [56] found no clear correlation between a therapist's mindfulness and treatment outcomes. Irving et al. [52] reported that MBSR benefits the physical and mental health of clinicians. Morgan et al. [57] discussed 14 qualitative studies and concluded that the benefits of MBSR "ranged from increased personal well-being and self-compassion to enhanced presence when relating to others, leading to enhanced compassion and a sense of shared humanity" (p. 744). Smith [58], who examined nurses, concluded that MBSR helps them deal with work-related stress. The meta-analysis by Regehr et al. [59] supports the idea that mindfulness interventions reduce stress, anxiety, and burnout among medical students and practicing physicians. Similarly, Burton et al.'s [60] meta-analysis suggests that mindfulness training can significantly decrease stress levels among healthcare professionals.

Virgili [61] performed a meta-analysis involving three subgroups of employees: healthcare professionals, teachers, and general/office employees. The aim was to

examine the effect of a mindfulness-based intervention on a single outcome: employees' psychological distress. Unfortunately, the composition of the outcome 'psychological distress' was not explained and no other outcomes, positive or negative, were considered [61].

Two other meta-analyses [51, 62] did not explicitly focus on employees. Grossman et al. [62] examined a relatively small number of clinical and stressed non-clinical participants and found possible benefits of MBSR. Finally, another recent review [63] provided strong evidence that mindfulness-based interventions can reduce occupational burnout among healthcare professionals and teachers.

Aim of the study

The aim of this systematic review is to gain deeper insight into the effects of two mindfulness interventions – MBSR and MBCT training – on employees' mental health across different occupational sectors. Looking at different occupational sectors gives us an opportunity to draw general conclusions about the effects of the interventions on employees and to identify potential differences between sectors.

This review uses the World Health Organization's (WHO) definition of mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" [64]. The WHO definition has three main components: emotional or subjective well-being [65], psychological well-being (referring to optimal functioning in work and life) [66], and social well-being (targeting optimal functioning in social groups and society) [67].

Method

We conducted a systematic search of the literature with three rounds of screening. The flow chart in Fig 1 outlines our review process and findings.

Search strategy

We searched three electronic databases (PsycINFO, PubMed, and CINAHL) for scientific studies examining the efficacy of MBSR and MBCT on employees' mental health and well-being. We used the following search string in each database: *(Employees OR workers OR managers OR professionals OR work OR labour OR labor OR job* OR employ* OR vocational*) AND (mindfulness OR mbsr OR mbct).*

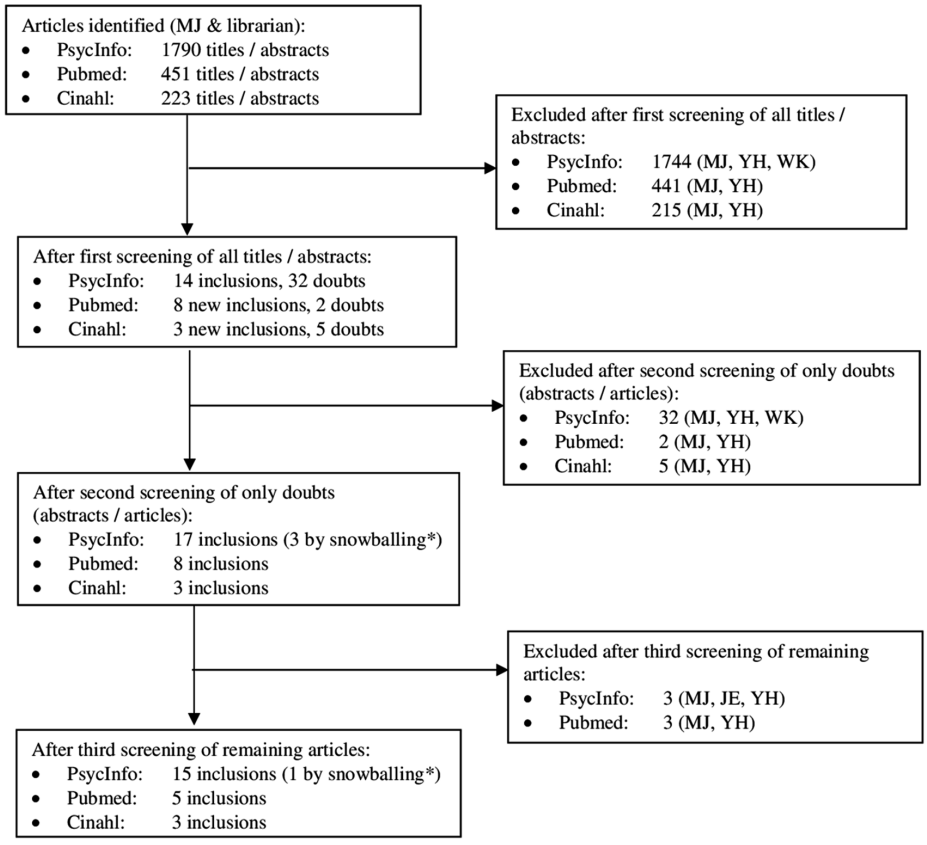

Fig 1: Flow chart showing the review process and results

Search

All searches were performed in October 2015. The search in PsycINFO yielded 1790 articles. The following procedure was used to screen them:

1. First screening of the titles/abstracts. Independent categorization (include, exclude, or unclear) by three authors, as follows:
   - The first author (MJ) screened all 1790 articles based on the titles and abstracts.
   - To check the quality of this screening, the second (YH) and third (WK) authors independently screened random samples from the 1790 articles; specifically, from every five articles, one abstract was randomly selected and screened. Any differences in opinion among the three authors were discussed until consensus was reached.
2. Second screening of articles whose relevance was classed as 'unclear'. All 32 articles were independently screened by the first three authors as follows:
   - Each author assessed each abstract and, if necessary, the entire article.

- Any differences in categorization were discussed until consensus was reached.

3. Third screening of all remaining articles. The first, second, and fifth authors (MJ/YH/JE) assessed the full texts of the 18 articles initially labelled 'include' as follows:
   - Each author independently assessed the articles.
   - They then discussed each article until consensus was reached as to their in-/exclusion.

The same search string and screening procedure were used for the 451 and 223 articles obtained from PubMed and CINAHL, respectively.

Inclusion and exclusion criteria

The following inclusion criteria were used for articles in the first and second screenings:

- Full text was available.
- Published in English.
- Mindfulness training (MBSR or MBCT) was operationalized as "moment to moment awareness to be cultivated with a nonjudgmental attitude; teaching of formal meditation techniques; and stressing the importance of daily and systematic practice" [16]. Once we had compiled a set of eligible studies, we searched their reference lists for additional relevant studies ('snowball' method). For articles that did not provide a definition of mindfulness training, two criteria had to be met:
  - References to relevant authors (e.g., Jon Kabat-Zinn, Ruth Baer, Mark Williams, John Teasdale, Zindel Segal).
  - Presence of the following elements in the mindfulness training: a focus on the 'here and now', an emphasis on increasing consciousness, learning to use a nonjudgmental attitude, learning formal meditation techniques, and daily and systematic practice.
- Study population: employees or managers in workplace settings.
- Group-based rather than individual interventions (i.e., no individual therapy or coaching).
- At least four face-to-face 30-minute sessions.
- Qualitative and/or quantitative work-related outcomes, including psychological/mental factors.

The following exclusion criteria was used in the first and second screenings:

- Dissertations, conference papers, reviews, chapters in handbooks, editorials.
- Studies on forms of meditation that do not emphasize mindfulness, such as transcendental meditation. In some meditation approaches, attention is directed towards one object or stimulus, such as a word (a mantra), sound, or sensation.

In contrast, mindfulness meditation emphasizes the observation of constantly changing internal and external stimuli [29].

- Studies on the cognitive model of mindfulness developed by Ellen Langer [68, 69], which involves working with external material such as information and includes active, goal-oriented cognitive tasks, such as problem solving. We consider her approach to be distinct from that used by other mindfulness studies.
- Studies on interventions that included mindfulness training as a component of a broader treatment program, such as Dialectical Behavior Therapy [26], Acceptance and Commitment Therapy [27], and Mindfulness-Based Relapse Prevention [28].
- Population: employees with a specific mental or physical disorder and students/trainees.
- Pre-post design (i.e., without a control group) (see e.g. Bazarko et al. [70]).

The inclusion criteria for the third screening were:

- Description of qualitative and/or quantitative psychological/mental outcomes.
- Research design:
  - Randomized controlled trial (RCT), or
  - Quasi-experimental design with an intervention group and a control group, where the control group comprised those on a waiting list or those receiving treatment as usual (e.g., relaxation practices, Jacobson relaxation, or an attention placebo) (quasi-RCT).

Methodological quality and levels of evidence

As indicated above, we included two types of research design – RCT and quasi-RCT – and excluded pre-post studies. In RCT and quasi-RCT studies, participants in the control group (CG) were compared with those in the treatment group (TG) both before and after the treatment (T1 vs. T2, between-group analysis).

The methodological quality of the selected studies was assessed using the nine criteria outlined in a paper entitled 'Assessment of a randomized controlled trial' by the Dutch public health institute Kwaliteitsinstituut voor de Gezondheidszorg CBO [71]. The studies were classified as 'high quality' if they met ≥ 7 of the criteria, as 'medium quality' if they met 5 or 6 of the criteria, and as 'low quality' if they met ≤ 4 of the criteria.

The nine criteria were formulated as closed questions with three possible answers: (1) yes, (2) no, or (3) not enough information. The questions were as follows:

1) Were the participants randomly assigned to the intervention?
2) Was the researcher (or research assistant) who assigned the participants blinded to the randomization order?
3) Were the participants blinded to the treatment?
4) Were the practitioners blinded to the treatment?

5) Were the assessors who evaluated the effects (i.e., mental health outcomes) of the treatment blinded to the treatment?
6) Were the control and intervention groups comparable at the beginning of the trial?
7) Were enough participants available for follow-up after the intervention(s)?
8) Were the participants analyzed in the group in which they were randomized?
9) Were the groups treated in the same manner, except for the intervention(s)?

Domusmedica [72] outlines three levels for assessing the importance of outcomes. An outcome can be classified as Level 1 ('there is evidence for …' / 'it has been proven that …') if at least two high-quality RCTs show significance between groups (change in TG versus change in CG). An outcome can be classified as Level 2 ('it is plausible that …') if at least two medium-quality RCTs show significance between groups. Finally, an outcome can be classified as Level 3 ('there are indications that …') if at least one medium-quality RCT shows significance.

We used five levels of evidence based on the levels described above. Our definitions of Levels 1 and 2 were the same as the Domusmedica definitions, although we found no outcome that could be classified as Level 1 [72]. Our definition of Level 3 was slightly different: we classified an outcome as Level 3 if at least one medium-quality RCT or three low-quality experiments (RCT, quasi-RCT) showed significance between groups (change in TG versus change in CG). Level 4 ('the evidence is weak') outcomes refer to one or two low-quality experiments (RCT, quasi-RCT) with significance between groups (change in TG versus change in CG). Level 5 ('there is no evidence') indicates that there are no studies with significant results between groups for the relevant outcome.

Results

Studies included

The results of the review process are shown in Fig 1. The PsycINFO search and three screenings yielded 16 articles. The PubMed and CINAHL searches and screenings resulted in five and three additional articles, respectively. We thus assessed 24 articles in total, describing 23 studies.

Characteristics of studies

Table 1 presents an overview of the 24 articles, including the number of participants and their characteristics, the research design, treatment method, assessment instruments, and outcomes. The 24 articles refer to 23 studies as two articles described the same study, presenting the quantitative [73] and qualitative [74] data separately.

All studies primarily focused on MBSR. One study used MBSR in combination with some aspects of MBCT [75]. As this modified MBSR program was developed for

healthy rather than depressive teachers, this study was nevertheless included. The MBSR program of the other 22 studies varied: 1 used an extended MBSR program [7], 8 used a shortened MBSR program [8, 76-82], 2 studies also used a modified MBSR program [83, 84], and the other 11 used the usual MBSR program [9, 53, 73, 85-92]. As no study concentrated exclusively on MBCT, we will not address MBCT in the rest of this paper.

Of the 23 studies, 13 were RCTs [7, 53, 73, 76, 78-82, 84, 87-89] and 10 were quasi-RCTs [8, 9, 75, 77, 83, 85, 86, 90-92]. Three [77, 86, 90] had no intervention for the control group. One study [8] had two control groups: one with an additional treatment and one with no intervention. Another study had three treatment groups and a control group with no intervention [82]. The other 18 studies [7, 9, 53, 73, 75, 76, 78-81, 83-85, 87-89, 91, 92] had a 'waiting-list control' (i.e., they did not include an additional treatment intervention to control for factors such as trainer support, group support, and home practice).

Sample sizes and composition also varied. The sample sizes in 11 studies [7, 8, 53, 73, 76-79, 81, 85, 92] were relatively small: the group sizes (TG and CG) ranged from 10 to 24 participants. The most frequently studied research populations were healthcare professionals (12 studies) [7, 53, 73, 76, 77, 79-81, 84, 86, 90, 91] (e.g., nurses, nurse aides, nursing leaders, physicians, social workers, psychologists, psychotherapists, physical therapists, psychiatrists) and teachers (five studies) [75, 83, 85, 88, 89]. Five studies [7, 8, 79, 81, 85] involved participants with the same occupation; four studies [83, 85, 88, 89] investigated respondents from related occupations (i.e., elementary, secondary, or high school teachers). In the other studies, the participants' occupations varied.

Participants' personal characteristics were also diverse. Twenty of the 23 studies included more female than male participants; only Huang et al. [87] reported more male participants, while the other two studies did not indicate the gender of the participants [53, 84]. The mean age of participants was over 40 years in 15 studies [7-9, 73, 76, 78, 79, 81, 82, 85-90], less than 40 years in four studies [80, 83, 91, 92], and not stated in four studies [53, 75, 77, 84]. Twenty studies were primarily quantitative, and only three contained a substantial amount of qualitative data [73, 89, 92].

Quality of the studies

Table 2 shows the classification of the studies as 'high quality,' 'medium quality,' or 'low quality.' Two studies were of high quality [76, 87], 15 were of medium quality [7, 9, 53, 73, 78-83, 85, 88-91], and six were of low quality [8, 75, 77, 84, 86, 92].

Table 1: Summary of studies that examined the impact of Mindfulness-Based Stress Reduction (MBSR)

Study:	Characteristics:	Research:	Assessment instruments used	Outcomes
1) Author(s)	**1) N / amount of participants**	**1) Research design**		
2) Quality	**2) Type of non-clinical participant**	**2) Treatment group (TG) after drop out / Control group(s) (CG) after drop out / Drop-outs**		
	3) Mean age	**3) Moments of measurement**		
	4) % male	**4) Treatment given**		
1) Duchemin et al. [76]	1) N = 32	1) Randomized controlled study	1) Five Facets Mindfulness Questionnaire (FFMQ). Five subscales: observing; describing; acting with awareness; non-judging; non-reactivity (1)[1]	Significant increase in mindfulness: not reported. (1)
2) High Quality	2) Personnel from a surgical intensive care unit (SICU) of a large academic medical center: 69% are nurses.	2) TG: n = 16 / CG: n = 16, waiting-list control / Drop-outs: n = 0	2) Perceived Stress Scale (PSS) (3)	No significant changes. (3)
	3) Mean age TG and CG: 44.2	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2)	3) Depression Anxiety Stress Scale (DASS-21), stress subscale (3)	DASS stress scores decreased 25% in the TG (significant) compared to a non-significant 13% decline in the CG. (3)
	4) % male: 12.5%	4) Shortened MBSR program (mindfulness combined with yoga and music): 8 weekly 1 h sessions, except week 5 session 2 hours; daily 20 minutes exercise	4) Maslach Burnout Inventory (MBI). Three subscales: emotional exhaustion; personal accomplishment; depersonalization (2)	No significant changes between pre- and post-intervention. (2)
			5) Professional Quality of Life (ProQOF) (11)	No significant changes between pre- and post-intervention. (11)
1) Huang et al. [87]	1) N = 144	1) Randomized controlled study	1) Chinese Health Questionnaire (CHQ-12): adapted from the General Health Questionnaire (GHQ-12): measure of psychological well-being (4)	Significant decrease in psychological distress in the TG compared to the CG on T2 and T3. The positive effects in the TG remained at T4 and T5. (4)[1]
2) High Quality	2) Employees of two large-scale manufacturing factories (inclusion criterion: poor mental health, defined by exhibiting three criteria: in the top tertile of the distribution in the CHQ for psychological distress; in the bottom tertile for the subscale of job control and in the top tertile for the subscale of job demands in the JCQ for job strain)	2) TG: n = 58 / CG: n = 54, waiting-list control / Drop-outs: n = 32	2) Checklist Individual Strength (CIS)	Significant reduction in prolonged fatigue in the TG compared to the CG on T3. The positive effects in the TG remained at T4 and T5.
	3) Mean age TG: 42.4 / CG: 42.7	3) Moments of measurement: 1. at baseline (T1); 2. at mid-intervention (T2); 3. post class (T3); 4. 4 weeks post-intervention (T4); 5. 8 weeks post-intervention (T5)	3) Perceived Stress Scale (PSS-10) (3)	Significant reduction in perceived stress in the TG compared to the CG on T3. The positive effects in the TG remained at T4 and T5. (3)

	4) % male TG: 50.0%; CG: 68.1%	4) MBSR program: 8 weekly 2 h sessions; daily 45 minutes home practice, 7 days per week; no daylong retreat	4) Job Content Questionnaire (JCQ): only the subscales of job control and job demands	Significant differences in job strain (increase in job control and decrease in job demands) between the TG and CG on T3. Only job demands showed a significant difference between TG and CG at T5.
1) Amutio et al. [7]	1) N = 42	1) Randomized controlled study	1) Five Facets Mindfulness Questionnaire (FFMQ) (1)	1) Significant increase in mindfulness in the TG compared to the CG on T2: mindfulness total; observing; describing; non-judging; non-reactivity. Significant improvement in the TG between T2 and T3. (1)
2) Medium Quality	2) Physicians, actively employed in public (42.9%) or private (52.4%) practice. 66.7% of the sample had a work experience of at least 10 years.	2) TG: n = 21 / CG: n = 21, waiting-list control / Drop-outs: n = 2	2) Smith Relaxation States Inventory (SRSI-3). Four subscales: basic relaxation; positive energy; mindfulness; transcendence (8)	2) Significant increase in all the relaxation dimensions in the TG compared to the CG on T2. Relaxation levels increased around 30% between T1 and T3. (8)
	3) Mean age TG and CG: 47.3	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2) (TG and CG measures); 3. 10 months post-intervention (T3): no CG measures!		
	4) % male: 42.9%	4) Extended MBSR program: First phase: 8 weekly 2.5 h sessions; 8 h daylong retreat (28 h); Second phase: next ten months, one session of 2.5 h per month (25 h)		
1) Taylor et al. [89]	1) N = 59	1) Randomized controlled study	1) Program Evaluation Survey (formal presentations; group mindfulness practices; group discussions)	'Moderate' to 'quite a lot' of benefit regarding regulating emotions and understanding / practicing forgiveness, kindness and compassion
2) Medium Quality	2) Elementary (39) and secondary school (21) teachers. Years of teaching experience ranged from 3 to 35 years (M= 15.2)	2) TG: n = 26 / CG: n = 30, waiting-list control / Drop-outs: n = 3	2) Occupational stress (9 items); an additional single item to assess state-changes in teachers' occupational stress over the course of the program (10)	Significant reduction in occupational stress in the TG compared to the CG at T2. The effect size at T2 was large (Cohen's d=0.90); a medium effect size at T3 (Cohen's d=0.61). Teachers in the TG compared to the CG reported greater stress reduction at T2. (10)
	3) Mean age TG and CG: 47	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2); 3. 4-month post-intervention (T3)	3) Efficacy for regulating emotion at work (set of 9 items to assess teachers' perceived self-efficacy) (13)	Efficacy beliefs changed from pre/post for teachers in the TG. Efficacy beliefs partially mediated reduction in occupational stress from T1 to T3. (13)
	4) % male: 10.0%	4) Mindfulness training program: 9 weeks, 11 separate sessions for 36 total contact hours; 16 h home practice	4) Santa Clara Brief Compassion Scale (4 items)	No significant results.
			5) Tendency to Forgive scale (TFF; 4 items; teachers' general tendency to forgive others)	Tendency to forgive changed from pre/post for teachers in the TG. Tendency to forgive partially mediated reduction in occupational stress from T1 to T3.
			6) Situation-Specific Forgiveness	No significant results.

			7) Efficacy for Forgiving Others at Work (2 items)	No significant results.
			8) Qualitative data 'Teachers' Coping at Work'	A trend that teachers in the TG reported more adaptive strategies for coping with occupational stress.
			9) Qualitative data 'Teacher Compassion for Challenging Student'	A trend that teachers in the TG evaluate challenging students in a more positive affective light.
1) Roeser et al. [88]	1) N = 113	1) Randomized controlled study (two combined studies)	1) Five Facets Mindfulness Questionnaire (FFMQ) (1)	Significant increase in mindfulness in the TG compared to the CG (at T2 and T3). (1)
2) Medium Quality	2) Elementary and secondary school teachers. Years of teaching experience ranged from 1 to 35 years (M= 14.9)	2) TG: n = 54 / CG: n = 59, waiting-list control / Drop-outs: n = 0	2) Focused attention and Working Memory Capacity (automatic version of the Operation Span Task)	Significant increase in focused attention and working memory capacity in the TG compared to the CG at T2 and T3.
	3) Mean age TG and CG: 46.9	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2); 3. 3-month post-intervention (T3)	3) Occupational self-compassion. Modification of Neff's global self-compassion items to teachers: including self-kindness, self-judgment, common humanity, isolation and over-identification; excluding mindfulness items (6)	Significant increase in occupational self-compassion in the TG compared to the CG (at T2 and T3). (6)
	4) % male: 11.0%	4) Mindfulness training program: 8 weeks, 11 separate sessions for 36 total contact hours; home practice	4) Occupational stress (9 items) (10)	Significant decrease in occupational stress in the TG compared to the CG (at T2 and T3). (10)
			5) Maslach Burnout Inventory (MBI) (2)	Significant decrease in burnout in the TG compared to the CG at T2 and T3. (2)
			6) State-Trait Anxiety Inventory (STAI), State subscale (9)	Significant decrease in anxiety in the TG compared to the CG at T2 and T3. (9)
			7) Beck Depression Inventory (BDI) (5)	Significant decrease in depression in the TG compared to the CG at T2 and T3. (5)
			8) Program evaluation	87% found it beneficial.
1) Wolever et al. [82]	1) N = 239	1) Randomized controlled study	1) Perceived Stress Scale (PSS) (3)	Significant reductions in perceived stress in the TG mindfulness (= TG1 + TG2) compared to the CG. Significant reductions in perceived stress in the TG3 compared to the CG. No significant differences between the TG mindfulness and the TG3 in perceived stress. (3)
2) Medium Quality	2) Employees of a national insurance carrier (inclusion criterion: 16 or higher on the 10-item Perceived Stress Scale)	2) TG1 (In-person mindfulness; conventional classroom): n = 32 / TG2 (Online mindfulness; virtual classroom): n = 50 / TG3 (Yoga): n = 76 / CG: n = 47 / Drop-outs: 34 (TG1: n = 12; TG2: n = 2; TG3: n = 14; CG: n = 6)	2) Pittsburgh Sleep Quality Index (PSQI): general sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbances; the use of medication to sleep; daytime sleep-related dysfunction over the past month (7)	Significant reductions in sleep difficulty in the TG mindfulness (= TG1 + TG2) compared to the CG. Significant reductions in sleep difficulty in the TG3 compared to the CG. No significant differences between the TG mindfulness and the TG3 in sleep difficulty. (7)
	3) Mean age TG1, TG2, TG3 and CG: 42.9; TG1: unknown; TG2: unknown; TG3: unknown; CG: unknown	3) Moments of measurement: 1. at baseline; 2. post class	3) Center for Epidemiological Studies Depression Scale (CES-D) (5)	No significant results in depression were found. The TG3 reported significant less current pain than the CG. (5)

	4) % male: 23.4%	4) Shortened MBSR program, Mindfulness at work: 12 weekly 1 h sessions; 2 hours mindfulness practice intensive at week 10	4) Work Limitations Questionnaire (WLQ): a measure of health-related decrements in ability to perform job roles	No significant results were found.
			5) Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) (1)	Significant increases in mindfulness in the TG mindfulness (= TG1 + TG2) compared to the CG. No significant differences between the TG3 and the CG, or between the TG mindfulness and the TG3. (1)
1) Pipe et al. [81]	1) N = 33	1) Randomized controlled study	1) Symptom Checklist 90-Revised (SCL-90-R) Three global distress indices: Global Severity Index (GSI: assessing overall psychological distress); Positive Symptom Distress Index (PSDI: assessing symptom intensity); Positive Symptom Total (4)	A significant reduction between T1 and T2 in psychological distress (stress, anxiety, mood) in the TG. No significant decrease in the CG. Significant improvement in the PSDI (assessing symptom intensity) and GSI (assessing overall psychological distress) in the TG compared to the CG. (4)
2) Medium Quality	2) Nursing leaders from a healthcare system	2) TG: n = 15 / CG: n = 17, waiting-list control / Drop-outs: n = 1	2) Caring Efficacy Scale: measure about one's ability to express a caring orientation and establish a caring environment with patients	No significant difference in change from baseline caring efficacy between the TG and the CG.
	3) Mean age TG: 50,2; CG: 49,4	3) Moments of measurement: 1. at baseline (T1); 2. weeks post-intervention (T2); 3. 1 year post-intervention (eliminated, making it possible for CG to follow the training) (T3)		
	4) % male: 3,3%	4) Shortened MBSR program: 5 weekly 2 h sessions; daily 30 minutes exercise		
1) Klatt et al. [78]	1) N = 45	1) Randomized controlled study	1) Mindfulness Attention Awareness scale (MAAS) (1)	Significant increase in mindfulness in the TG compared to the CG. (1)
2) Medium Quality	2) Healthy working adults at a university: research assistants (31%), midlevel management (29%) and faculty employed (13%)	2) TG: n = 22 / CG: n = 20, waiting-list control / Drop-outs: n = 3	2) Perceived Stress Scale (3)	Significant reductions in perceived stress in the TG compared to the CG. (3)
	3) Mean age TG: 43.41; CG: 46.50	3) Moments of measurement: 1. at baseline; 2. post class	3) Pittsburgh Sleep Quality Index (PSQI) (7)	Subjective sleep quality, sleep latency, sleep disturbances and daytime dysfunction significantly improved in the TG; positive changes in subjective sleep quality, sleep disturbances and daytime dysfunction, although not significant (respectively: $p = 0.07$; $p = 0.06$; $p = 0.07$), for the CG; significant changes in the global sleep scores for the TG and for the CG. (7)
	4) % male: ± 25%	4) Shortened MBSR program: 6 weekly 1 h sessions; daily 20 minutes exercise, 6 days per week		

1) Cohen-Katz et al. Part II [73]: **the same study as Cohen-Katz et al. Part III [74]**	1) N = 27	1) Randomized controlled study	1) Mindfulness Attention Awareness Scale (MAAS) (1)	Significant increase in mindfulness in the TG compared to the CG between T1 and T2. Significant changes in the TG between T1 and T2, and between T1 and T3. (1)
2) Medium Quality	2) Nurses (90%); persons employed in pastoral care, respiratory therapy and social work	2) TG: n = 12 (T2) / CG: n = 13 (T2); waiting-list control / Drop-outs: n = 2	2) Maslach Burnout Inventory (MBI) (2)	Significant reduction of emotional exhaustion in the TG compared to the CG between T1 and T2. Also a significant reduction of emotional exhaustion in the TG between T1 and T2, and between T1 and T3. Lower depersonalization for the TG compared to the CG between T1 and T2, almost significantly (p = 0.06). Significant higher levels of personal accomplishment in the TG than in the CG between T1 and T2. (2)
	3) Mean age TG and CG: 46; TG: unknown; CG: unknown	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2); 3. 3-month post-intervention (T3)	3) Brief Symptom Inventory (BSI) (psychological distress) (4)	No significant results were found. (4)
	4) % male: 0%	4) MBSR program: 8 weekly 2.5 h sessions; daily home practice, 6 days per week; daylong retreat		
1) Cohen-Katz et al. Part III [74]: **the same study as Cohen-Katz et al. Part II [73]**	1) N = 27	1) Randomized controlled study	Qualitative data: Getting to know you (15 participants): *questions about challenges / stressors; relaxation; medical, behavioral, emotional or mental problems; abuse*	Increased relaxation / calmness; less restlessness.
2) Medium Quality	2) Nurses (90%); persons employed in pastoral care, respiratory therapy and social work	2) TG: n = 12 (T2) / CG: n = 13 (T2); waiting-list control / Drop-outs: n = 2	Qualitative data: Weekly and final evaluation forms during the program and on the last night of the program: *questions about the results and importance of the MBSR program*	Improvement of self-care.
	3) Mean age TG and CG: 46; TG: unknown; CG: unknown	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2); 3. 3-month post-intervention (T3)	Qualitative data: E-mails (received from 7 participants) during the program and several months afterwards	Better work and family relationships.
	4) % male: 0%	4) MBSR program: 8 weekly 2.5 h sessions; daily home practice, 6 days per week; daylong retreat	Qualitative data: 2 types of depth Interviews: first with 4 graduates; second with the Vice President for Clinical Services, the fourth author, about her motivation for supporting and her impression of the results.	Improvement of dealing with difficult emotions (mood / resilience).
			Qualitative data: Focus group (7 graduates) about changes	A decrease of physical pain.
1) Martín Asuero et al. [90]	1) N = 68	1) Quasi randomized controlled study	1) Maslach Burnout Inventory (MBI) (2)	Significant reduction of emotional exhaustion and depersonalization and total in the TG compared to the CG. A significant increase of personal accomplishment in the TG. (2)

2) Medium Quality	2) Primary health care professionals: physicians (60%); nurses (33.3%); social workers and clinical psychologists (6,7%)	2) TG: n = 43 / CG: n = 25 / Drop-outs: n = 0	2) Profile of Mood States (POMS), short version. Five subscales: tension-anxiety; depression-dejection; anger-hostility; vigor-activity; fatigue-inertia (5; 12)	Significant reduction in the TG in total mood disturbance and in the following subscales: depression, anger, tension and fatigue; no significant change in the vigor scale. Significant reduction in the TG compared to the CG: total mood disturbance; tension and fatigue. (5; 12)
	3) Mean age TG and CG: 47	3) Moments of measurement: 1. at baseline; 2. post class	3) Jefferson Scale of Physician Empathy. Three subscales: compassionate care; perspective taking; "standing in the patient's shoes"	Significant increase of compassionate care in the TG. A significant increase in empathy and "standing in the patient's shoes" in the TG compared to the CG.
	4) % male: 8%	4) MBSR program: 8 weekly 2.5 h sessions; daily home practice, 6 days per week; day-long retreat of 8 hours	4) Five Facets Mindfulness Questionnaire (FFMQ) (1)	Significant increase in the TG in all subscales except for describing. Significant increase in observing, non-reactivity and total in the TG compared to the CG. (1)
			5) Questionnaire on changes in personal habits and mindfulness practice	All participants in the intervention group reported feeling better after the intervention.
1) Vega et al. [91]	1) N = 103	1) Controlled study	1) Attentional measure: Continuous Performance Test (CPT)	1) No important significant changes.
2) Medium Quality	2) Psychotherapists: psychiatrists and clinical psychologists	2) TG: n = 58 / CG: n = 43; waiting-list control / Drop-outs: n = 2	2) Attentional measure: Stroop Task	2) Significant increase in attentional control (specifically, task switching) in the TG compared to the CG.
	3) Mean age TG: 29.6; CG: 28.4	3) Moments of measurement: 1. at baseline; 2. post class	3) Emotional measure: State-Trait Anxiety Inventory (STAI) (9)	3) Significant decrease in anxiety state in the TG compared to the CG. (9)
	4) % male: 26%	4) MBSR program: 8 weekly 2.5 h sessions	4) Emotional measure: State-Trait Anger Expression Inventory-2 (STAXI-2); many subscales	4) Significant decrease in Angry Reaction subscale in the TG compared to the CG.
			5) Emotional measure: Beck Depression Inventory (BDI) (5)	5) Significant decrease in depression scores in the TG compared to the CG (limited clinical significance). (5)
			6) Mindfulness scale: Attention Awareness scale (MAAS) (1)	6) Significant increase in mindfulness in the TG compared to the CG. (1)
1) Frank et al. [85]	1) N = 36	1) Quasi randomized controlled study	1) Brief Symptom Inventory (BSI) (psychological distress) with the following subscales: anxiety; somatization; depression; Global Severity Index (GSI) (4)	No significant changes in anxiety, somatization, depression and general symptoms were revealed. (4)
2) Medium Quality	2) High school educators: full time employed; 94.4% had completed 18 or more years of education	2) TG: n = 18 / CG: n = 18, waiting-list control / Drop-outs: n = 0	2) Pittsburgh Sleep Quality Index (PSQI): general sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbances; the use of medication to sleep; daytime sleep-related dysfunction over the past month (7)	Significant improvements in all aspects, except for sleep efficiency and the use of medication to sleep, in the TG compared to the CG. (7)
	3) Mean age TG and CG: 40.72	3) Moments of measurement: 1. at baseline; 2. post class	3) Self-compassion Scale (SCS). Subscales (self-kindness; self-judging; common humanity; isolation; mindfulness; over-identification) and total self-compassion (6)	Significant improvements in all subscales, except for common humanity and isolation, in the TG compared to the CG. (6)

	4) % male: 22.2%	4) MBSR program: 8 weekly 2 h sessions; 25-30 min daily home practice, 6 days per week	4) Maslach Burnout Inventory (MBI) (2)	No significant changes. (2)
			5) Five Facets Mindfulness Questionnaire (FFMQ) (1)	Significant improvements in all subscales, except for describing, in the TG compared to the CG. (1)
			6) Affective Self-Regulatory Efficacy Scale (AS-RES). Subscales: calmness; acknowledgement; present moment; acceptance (13)	Improvements in all subscales, except for acceptance, in the TG compared to the CG. (13)
1) Jennings et al. [83]	1) N = 53	1) Randomized controlled study	1) General well-being scale: Positive and Negative Affect Schedule (PANAS): positive and negative affect subscales (12)	No significant changes. (12)
2) Medium Quality	2) Teachers in (sub)urban public schools: 72% had a graduate degree; average years of teaching, 11.7; 47% taught at the elementary level; the remaining teachers taught at the preschool, middle or high school; or in mixed grade settings	2) TG: n = 25 / CG: n = 25, waiting-list control / Drop-outs: n = 3	2) General well-being scale: Emotion Regulation Questionnaire (ERQ). Two subscales: cognitive reappraisal; expressive suppression	Significant increase in cognitive reappraisal in the TG compared to the CG.
	3) Mean age TG and CG: 36	3) Moments of measurement: 1. at baseline; 2. post class	3) General well-being scale: Center for Epidemiologic Studies Depression Scale (CES-D-20) (5)	No significant changes. (5)
	4) % male: 11%	4) Modified MBSR program (CARE): 30-hr program in 4 day-long sessions over 4-6 weeks; intersession 20-to-30-min phone coaching; 1-day booster two months later	4) General well-being scale: Daily Physical Symptoms (DPS)	Significant decrease in daily symptoms in TG compared to the CG.
			5) Teachers' Sense of Efficacy Questionnaire (TSES). Total score and three subscales: instructional strategies; student engagement; classroom management (14)	Significant increase in total sense of self-efficacy, instructional strategies and student engagement in the TG compared to the CG. (14)
			6) Maslach Burnout Inventory (MBI) (2)	Significant increase in personal accomplishment in the TG compared to the CG. (2)
			7) Time Urgency Scale (TUS). A total scale score and 5 subscales: speech patterns; eating behavior; task-related hurry; general hurry; competitiveness	Significant improvement in general hurry in the TG compared to the CG.
			8) Five Facets Mindfulness Questionnaire (FFMQ) (1)	Significant increase in the subscales observing, non-reactivity and in the total mindfulness score in the TG compared to the CG. (1)
			9) Program evaluation: Care Acceptability Questionnaire (CAQ)	87% of the teachers (strongly) agreed.
1) Leroy et al. [9]	1) N = 90	1) Controlled study	1) Mindfulness Attention Awareness scale (MAAS) (1)	A significant increase in mindfulness for the group as a whole between T1 and T2; the increase in TG is however significantly higher. (1)

2) Medium Quality	2) Employees in the area of telecommunication, consulting and architecture (for profit) and parliamentary services, public services and health insurance (not-for-profit)	2) TG: n = 76 (before drop-out!) (six groups); TG after drop out unknown; CG: n = 14 (before drop-out!) (two groups), waiting-list control; CG after drop out unknown / Drop-outs at T1: 7 of 90; at T2: 14 of 90; at T3: 22 of 90	2) Authentic functioning index of Leroy et al (in a work related setting)	A significant increase in authentic functioning for the group as a whole between T1 and T2; the increase in TG is however significantly higher. Authentic functioning mediates the relationship between mindfulness and work engagement, partially for the static relationship (at one specific point in time) and fully for the dynamic relationship (different points in time).
	3) Mean age TG and CG: 42; TG: unknown; CG: unknown	3) Moments of measurement: 1. before training (T1); 2. 2 month post-intervention (T2); 3. 4 month post-intervention (T3)	3) Measure of work engagement (15)	A significant increase in work engagement for the group as a whole between T1 and T2; the increase in TG is however significantly higher. (15)
	4) % male: ± 25%	4) MBSR: 8 weekly 3 h sessions; exercise at home or at work	4) Amount of days meditating each week (at T2 and T3) (control variable)	A significant interaction effect between time and meditation practice during training in TG. The amount of meditation practice has a significant positive effect on mindfulness and authentic functioning but not on work engagement.
1) Manotas et al. [80]	1) N = 131	1) Randomized controlled study	1) Five Facets Mindfulness Questionnaire (FFMQ) (1)	Significant increase in observing, non-judging and in the total mindfulness score in the TG compared to the CG. (1)
2) Medium Quality	2) Colombian health care professionals: medical doctors (16.9%); nurses (45.8%); scientists (14.5%); other helping professionals (18.1%); 4 participants without employment data (4.7%)	2) TG: n = 40 (26 drop-outs) / CG: n = 43 (22 drop-outs); waiting-list control / Drop-outs: 48	2) Brief Symptom Inventory (BSI) (psychological distress) (4)	Significant decrease in the GSI and in the three subscales for the TG compared to the CG. (4)
	3) Mean age TG and CG: 39.05	3) Moments of measurement: 1. at baseline; 2. post class	3) Perceived Stress Scale (PSS-14) (3)	Significant decrease in perceived stress for the TG compared to the CG. (3)
	4) % male: 9.6%	4) Shortened MBSR program: 4 weekly 2h sessions; daily homework		
1) Mackenzie et al. [79]	1) N = 30	1) Randomized controlled study	1) Maslach Burnout Inventory (MBI) (2)	Significant reduction of emotional exhaustion in the TG compared to the CG. Depersonalization remains stable in the TG and increases significantly in the CG. A significant increase of personal accomplishment in the TG compared to the CG. (2)
2) Medium Quality	2) Nurses and nurse aides	2) TG: n = 16 / CG: n = 14, waiting-list control / Drop-outs: n = 0	2) The Smith Relaxation Dispositions Inventory (8)	Significant increases in relaxation in the TG compared to the CG. (8)
	3) Mean age TG: 48.62; CG: 44.78	3) Moments of measurement: 1. at baseline; 2. post class	3) The Intrinsic Job Satisfaction subscale from the Job Satisfaction Scale	A clear, although not significant improvement (p = 0.06), in the TG
	4) % male: 3%	4) Shortened MBSR program:4 weekly 30 min sessions; daily at least 10 minutes exercise, 5 days per week	4) The Satisfaction with Life Scale (12)	Significant positive changes in life satisfaction in the TG compared to the CG. (12)

			5) The 13-item version of Antonovsky's Orientation to Life Questionnaire (Sense Of Coherence: the ability to view life as meaningful, comprehensible and manageable)	The sense of coherence doesn't improve more in the TG than in the CG.
1) Shapiro et al. [53]	1) N = 38	1) Randomized controlled study	1) Maslach Burnout Inventory (MBI) (2)	No significant reduction of job burnout in the TG compared to the CG. (2)
2) Medium Quality	2) Health-care professionals: physicians, nurses, social workers, physical therapists, psychologists	2) TG: n = 10 (8 drop-outs) / CG: n = 18 (2 drop-outs), waiting-list control / Drop-outs: n = 10	2) Perceived Stress Scale (3)	A significant stress reduction in the TG compared to the CG. (3)
	3) Mean age TG: unknown; CG: unknown	3) Moments of measurement: 1. at baseline; 2. post class	3) Satisfaction With Life Scale (SWLS) (11)	Clear, although not significant (p = 0.06), improvements in the TG compared to the CG. (11).
	4) % male: unknown	4) MBSR program: 8 weekly 2 h sessions; daily home practice, 6 days per week; daylong retreat	4) Self-compassion Scale (6)	A significant increase in self-compassion in the TG compared to the CG. (6)
			5) Brief Symptom Inventory (BSI)(psychological distress) (4)	No significant decrease in the TG compared to the CG. (4)
			6) Open ended question (qualitative data)	
1) Klatt et al. [84]	1) N = unknown	1) Randomized controlled study	1) Connor-Davidson Resiliency Scale (CD-RISC), 10-items version	Significant increase in resilience in the TG (compared to the CG?)
2) Low Quality	2) Employees of Intensive Care Units	2) TG: n = 34 / CG: n = unknown, waiting-list control / Drop-outs: unknown	2) Utrecht Work Engagement Scale (UWES), 9-items version. Subscales: vigor; dedication; absorption (15)	Significant increase in work engagement in the TG (compared to the CG?) (mostly induced by the vigor subscale). (15)
	3) Mean age TG and CG: unknown	3) Moments of measurement: 1. at baseline; 2. post class	3) Number of Breaths/30 sec (self-measured) at the beginning and the end of each session	Significant decrease in the pre-post breath counts in weeks 1-3, 5-6 and week 8 of the intervention in the TG.
	4) % male: unknown	4) Modified MBSR program (Mindfulness In Motion): 8 weekly 1 h sessions; 20 min daily home practice, at least 5 days per week; 2 h 'retreat'	4) Program evaluation	Highly valued.
1) Beshai et al. [75]	1) N = 89	1) Non-randomized study	1) Perceived Stress Scale (PSS) (3)	Significant reduction in perceived stress in the TG compared to the CG. (3)
2) Low Quality	2) Secondary school teachers and staff	2) TG: n = 49 / CG: n = 40, waiting-list control / Drop-outs: n = 0	2) Warwick-Edinburgh Mental Well-being Scale (WEMWBS) (11)	Significant increase in well-being in the TG compared to the CG. (11)
	3) Mean age TG: unknown; CG: unknown	3) Moments of measurement: 1. at baseline; 2. post class	3) Five Facets Mindfulness Questionnaire (FFMQ) (1)	Significant increase in mindfulness in the TG compared to the CG. (1)
	4) % male: 30.34%	4) Modified MBSR program with aspects of MBCT: 9 sessions during 8 weeks: a presentation and eight 75 min sessions; 10-40-minute home practice, 6 days per week	4) Neff Self-Compassion Scale (SCS), using two of the six subscales: self-judgment and self-kindness. Self-compassion: the two subscales combined (6)	Significant increase in self-compassion in the TG compared to the CG. (6)
			5) Teachers Feedback: acceptability / enjoyment and learning	95% of the participants who attended the course found it to be acceptable.

1) Geary and Rosenthal [86]	1) N = 108	1) Between group; quasi random	1) Cohen's Perceived Stress Scale (PSS) (3)	A significant stress reduction in the TG compared to the CG between T1 and T2, and between T1 and T3. (3)
2) Low Quality	2) Academic healthcare employees or relatives of employees	2) TG: n = 59 / CG: n = 49 / Drop-outs: n = 0	2) SCL-90-R (psychological distress) (4)	A significant reduction in psychological distress in the TG compared to the CG between T1 and T2, and between T1 and T3. (4)
	3) Mean age TG: 48; CG: 42	3) Moments of measurement: 1. at baseline; 2. post class; 3. 1-year post-intervention measurement	3) SF-36 Measure of Health and Well-Being (11)	Significant positive changes in life satisfaction or general wellbeing in the TG compared to the CG between T1 and T2, and between T1 and T3. (11)
	4) % male: 8%	4) MBSR program: 8 weeks program; class meeting each week 3 hours; between class 5 and class 7 an 8-hour retreat	4) Daily Spiritual Experiences Scale DSES)	A significant increase of daily spiritual experiences in the TG compared to the CG between T1 and T2, and between T1 and T3.
1) Poulin et al. [8]	1) N = 40	1) Between group; quasi random	1) Maslach Burnout Inventory (MBI) (2)	A significant reduction of emotional exhaustion in the TG compared to the CG. (2)
2) Low Quality	2) Nurses or nurse aides	2) TG: n = 16; brief MBSR / CG bIPMR: n = 10 / CG 2 (no intervention): n = 14 / Drop-outs: n = 0	2) Satisfaction With Life Scale (SWLS) (11)	Significant positive changes in life satisfaction or general well-being in the TG compared to the CG. (11)
	3) Mean age TG: 48.6; CG bIPMR (brief Imagery and Progressive Muscle Relaxation): 46.0; CG 2 (no intervention): 44.8	3) Moments of measurement: 1. at baseline; 2. post class	3) Smith Relaxation Disposition Inventory (SRDI) (8)	Significant changes in relaxation in the TG compared to the CG. (8)
	4) % male: 5%	4) Brief MBSR program: four 30-minute training sessions; home practice 15 to 20 minutes per day. The control bIPMR: matched to the bMBSR intervention (length; the balance of didactic and experiential focus, homework and support material)		
1) Walach et al. [92]	1) N = 29	1) Between group; quasi random	1) Interviews (qualitative)	**Qualitative data**: increased awareness of work-related problems contributing to stress; more critical toward the work environment
2) Low Quality	2) Workers in a service center	2) TG: n = 11 (T2; T3) / CG: n = 16 (T2; T3); waiting-list control / Drop-outs: n = 2	2) Coping with stress (SVF 120, Germany)	Significant increase of positive coping strategies in the TG compared to the CG between T1 and T2; no significant group differences for negative coping strategies
	3) Mean age TG: 41.3; CG: 33.7	3) Moments of measurement: 1. at baseline (T1); 2. post class (T2); 3. 2-month post-intervention measurement (T3)	3) SALSA (Salutogenetic Subjective Analysis of the Workplace): used one part of the battery covering job characteristics; job demand and stress; organizational resources; social resources in the work place	No significant changes
	4) % male: 41%	4) MBSR program: 8 weekly 2,5 h sessions; 30 min daily home practice, 6 days per week; daylong retreat	4) Locus of control (the Fragebogen zu Kontrollüber-zeugungen: FKK) (14)	No significant changes. (14)

			5) Freiburg Complaint List ((FBL): subscales General Complaints; Tension; Tiredness (4)	No significant changes. (4)
			6) Satisfaction with Life (the Fragebogen zur Lebenszufriedenheit: FLZ): subscales Health, Financial Satisfaction, Leisure, Own Person, and Friends and Social Relations (11)	No significant changes. (11)
1) Horner et al. [77]	1) N = 74	1) Quasi randomized controlled study	1) Professional Quality of Life (ProQOL) Scale Version 5[c]. Two subscales: compassion satisfaction; burnout (11)	No significant changes. (11)
2) Low Quality	2) Workers in two medical-surgical units: staff nurses; nurse aides; clinical secretaries; unit manager; supervisor	2) TG: n = 31 (15 drop-outs) / CG: n = 12 (16 drop-outs) / Drop-outs: n = 31	2) Mindful Attention Awareness Scale (MAAS) (1)	No significant changes. (1)
	3) Mean age TG and CG: unknown	3) Moments of measurement: 1. at baseline; 2. post class	3) Self-reports of individual and unit stress levels (3)	No significant changes. (3)
	4) % male: unknown (primarily female)	4) Shortened MBSR program: weekly 30 min sessions	4) Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)	Patient satisfaction scores in the TG increased on 'overall rating' and 'communication with nurses'. No significant changes.

[1] Number corresponds with the results in the chapter: *The effects of MBSR on employees' mental health*

Table 2. Quality criteria and quality of the selected studies

Quality criteria: 1) Assignment intervention randomized; 2) Includer blinded for randomization order; 3) Employees blinded for treatment; 4) Practitioner blinded for treatment; 5) Assessor blinded for treatment (mental health outcomes); 6) Groups comparable at the start of the trial; 7) Follow up available of enough included employees at T1, etc. [l]; 8) Included employees analyzed in randomized group; 9) Same treatment of groups except the intervention

Quality criteria / Studies	1	2	3	4	5	6	7	8	9		Total quality score	Quality label
Duchemin et al. [76]	+	+	-	-	+	+	+	+	+		7	HQ
Huang et al. [87]	+	+	-	-	+	+[a]	+	+	+		7	HQ
Amutio et al. [7]	+	+	-	-	+	?	+	+	+		6	MQ
Taylor et al. [89]	+	?	-	-	+[b]	+[c1]	+	+	+		6	MQ
Roeser et al. [88]	+	?	-	-	+	+[c2]	+	+	+		6	MQ
Wolever et al. [82]	+	?	-	-	+	+	+	+	+		6	MQ
Pipe et al. [81]	+	?	-	-	+	+	+	+	+		6	MQ
Klatt et al. [78]	+	?	-	-	+	+	+	+	+		6	MQ
Cohen-Katz et al. Part II [73]; Cohen-Katz et al. Part III [74]	+	?	-	-	+[b]	+[d]	+	+	+		6	MQ
Martín-Asuero et al. [90]	-[e]	-	-	-	+	+	+	+	+		5	MQ
Vega et al. [91]	-	-	-	-	+	+	+	+	+		5	MQ
Frank et al. [85]	-[e]	-	-	-	+	+	+	+	+		5	MQ
Jennings et al. [83]	+	?	-	-	+	+	?	+	+		5	MQ
Leroy et al. [9]	-	?	-	-	+	+	+	+	+		5	MQ
Manotas et al. [80]	+	?	-	-	+	+	-	+	+		5	MQ
Mackenzie et al. [79]	-[f]	?	-	-	+	+[g]	+	+	+		5	MQ
Shapiro et al. [53]	+	?	-	-	+	+[h]	-[i]	+	+		5	MQ
Klatt et al. [84]	+	?	-	-	+	?	?	+	+		4	LQ
Beshai et al. [75]	-	-	-	-	+	-	+	+	+		4	LQ
Geary and Rosenthal [86]	-[e]	-	-	-	+	-[j]	+	+	+		4	LQ
Poulin et al. [8]	-[e]	-	-	-	+	-[k]	+	+	+		4	LQ
Walach et al. [92]	-[e]	-	-	-	+	-[g]	+	+	+		4	LQ
Horner et al. [77]	-[e]	-	-	-	+	?	-	+	+		3	LQ

HQ = high quality (meets ≥ 7 of the criteria), MQ = medium quality (meets 5 or 6 of the criteria), LQ = low quality (meets ≤ 4 of the criteria).
Criteria are based on an assessment guide titled 'assessment of a randomized controlled trial' by the Dutch public health institute 'Kwaliteitsinstituut voor de Gezondheidszorg CBO' [71].

a: except gender
b: not for the interviews
c1: except occupational stress; c2: except burnout
d: unknown for age
e: quasi random
f: 'Because the study was conducted during the summer, however, several exceptions were made ……' (p. 106)
g: except 'emotional exhaustion' (p. 107)
h: corrected for 'distress' (p. 169)
i: many dropouts (p. 170)
j: not corrected
k: corrected (Tables 2 and 3, p. 38 – 40)
l: + < 33% drop outs.

The effects of MBSR on employees' mental health

This section describes the effects of MBSR on employees' mental health in the 23 studies reviewed. Several studies, e.g., Klatt et al. [78], Wolever et al. [82] and Geary and Rosenthal [86], also measured stress biomarkers (e.g., salivary cortisol, pulse rate and heart rate variability), but the effects of MBSR on such biomarkers fall outside the scope of our discussion. The mental health outcomes are presented in order of importance, taking into account two criteria. First and foremost is the level of evidence; the second criterion refers to the number of studies reporting a particular (significant or non-significant) result. When two effects have the same level of evidence from the same number of studies, they are described in alphabetical order.

Almost 35 mental/psychological outcomes were identified, some of them overlapping (e.g., stress and occupational stress, or mood and depression). Some outcomes were measured using different assessment instruments: e.g., stress level by the Perceived Stress Scale (PSS) and the Depression Anxiety Stress Scale (DASS); burnout by the Maslach Burnout Inventory (MBI) and the Professional Quality of Life (ProQOF) scale.

All results are presented in Table 3. Results classified as Levels 3, 4, or 5 and reported in a single study only are mentioned in Table 3, but not discussed further in the text.

1. Mindfulness

Fourteen of the studies reviewed measured the effect of MBSR on mindfulness [7, 9, 73, 75-78, 80, 82, 83, 85, 88, 90, 91] (see Table 3). In three studies [7, 9, 73], mindfulness significantly increased in the TG (within-group) and in the TG compared to the CG (between-groups). One study [77] reported no significant results; another [76] reported no results. The other nine studies mentioned a significant increase in the TG compared to the CG.

Nine studies [8, 53, 79, 81, 84, 86, 87, 89, 92] did not include a measure of mindfulness. In summary, it is plausible that MBSR significantly increases the amount of mindfulness (evidence Level 2).

2. Burnout

Nine studies examined the effects of MBSR on burnout symptoms [8, 53, 73, 76, 79, 83, 85, 88, 90]. The three main symptoms of burnout are emotional exhaustion, (job-related) personal accomplishment, and depersonalization. Three of the studies [53, 85, 88] only reported on burnout in general. Five [8, 73, 76, 79, 83] reported the effects of MBSR on the three symptoms, but not on burnout in general. One study [90] dealt both with burnout in general and with the individual symptoms.

- Burnout in general: two studies reported a significant reduction in the TG [88, 90]; two reported no significant outcome [53, 85].
- Emotional exhaustion: two studies [8, 73] reported a significant reduction in the TG and in the TG compared to the CG. Two studies [79, 90] showed a

significant reduction in the TG compared to the CG after the intervention. Two studies [76, 83] reported no significant outcome.

- (Job-related) personal accomplishment: levels increased significantly within-group and between-groups in three studies [73, 79, 83]. One study identified a significant increase in the TG [90], while two studies [8, 76] reported no significant differences.
- Depersonalization: one study [90] showed a significant reduction after the treatment in the TG and in the TG compared to the CG. In another study [79], depersonalization remained stable in the TG before and after the intervention (positive result), and increased significantly in the CG. Three other studies [73, 76, 83] reported no significant changes in depersonalization.

In summary, it is plausible that MBSR results in increased (job-related) personal accomplishment and decreased burnout in general and emotional exhaustion (evidence Level 2). There are indications that MBSR causes a decrease in depersonalization (cynicism and lack of empathy) (evidence Level 3).

3. *Stress level*

Stress level, measured as perceived stress (mostly by the PSS), was investigated in nine studies [53, 75-78, 80, 82, 86, 87]. Eight studies reported a significant reduction in stress level after the intervention in the TG compared to the CG; one study [77] found no significant outcome. In summary, it is plausible that MBSR helps to reduce stress levels (evidence Level 2).

4. *Psychological distress*

Eight studies investigated the effects of MBSR on psychological distress [53, 73, 80, 81, 85-87, 92]. Psychological distress was mostly measured by the Brief Symptom Inventory (BSI), which consists of 10 subscales reflecting different mood states (e.g., anxiety, depression, total mood disturbance). Three studies [80, 86, 87] showed a significant reduction in psychological distress in the TG and in the TG compared to CG; one study [81] mentioned a significant reduction in the TG. The other four studies reported no significant differences. In summary, it is plausible that MBSR results in a decrease of psychological distress (evidence Level 2).

5. *Depression*

Depression was examined in five studies [82, 83, 88, 90, 91]. Two studies [88, 91] found a significant decrease of depression in the TG and in the TG compared to CG, one study [90] reported a significant reduction in the TG, and the other two studies [82, 83] mentioned no significant results. In summary, it is plausible that MBSR results in decreased levels of depression (evidence Level 2).

Table 3. Outcomes/results

Studies: 1) Duchemin et al. [76]; 2) Huang et al. [87]; 3) Amutio et al. [7]; 4) Taylor et al. [89]; 5) Roeser et al. [88]; 6 Wolever et al. [82]; 7) Pipe et al. [81]; 8) Klatt et al. [78]; 9) Cohen-Katz et al. Part II [73]; Cohen-Katz et al. Part III [74]; 10) Martín-Asuero et al. [90]; 11) Vega et al. [91]; 12) Frank et al. [85]; 13) Jennings et al. [83]; 14) Leroy et al. [9]; 15) Manotas et al. [80]; 16) Mackenzie et al. [79]; 17) Shapiro et al. [53]; 18) Klatt et al. [84]; 19) Beshai at al. [75]; 20) Geary and Rosenthal [86]; 21) Poulin et al. [8]; 22) Walach et al. [92]; 23) Horner et al. [77]

Studies	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	***Evidence level of outcome***	***Number of studies (outcome)***
Quality label of studies	HQ	HQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	MQ	LQ	LQ	LQ	LQ	LQ	LQ		
Outcomes/results (numbered and described in the text)																									
1 mindfulness	?		+		+	+		+	+	+	+	+	+	+	+				+				0	2	14
2 burnout[1]					+					+		0					0							2	9
emotional exhaustion	0								+	+			0			+					+			2	
personal accomplishment	0								+	0			+			+					0			2	
depersonalization	0								0	+			0			0								3	
3 stress level	+[a]	+				+		+							+		+		+	+			0	2	9
4 psychological distress		+					0		0			0			+		0			+		0		2	8
5 depression					+	0				0	+		0											2	5
6 (occupational) self-compassion					+							+					+		+					2	4
7 quality of sleep						+		0				+												2	3
8 relaxation			+													+					+			2	3
9 anxiety					+						+													2	2
10 occupational stress				+	+																			2	2
11 life satisfaction	0															+	0		+	+	+	0	0	3	8
12 mood										+			0											3	3

13 efficacy for regulating emotion at work				0								+											3	2
14 self-efficacy / locus of control													+									0	3	2
15 work engagement														+				0					3	2
Outcomes/results (not numbered and not discussed in the text)																								
angry reaction											+												3	1
attentional control											+												3	1
authentic functioning														+									3	1
daily physical symptoms													+										3	1
emotion regulation: cognitive reappraisal													+										3	1
Empathy										+													3	1
focused attention and working memory capacity					+																		3	1
general hurry													+										3	1
job strain: job control and job demands		+																					3	1
subjective fatigue		+																					3	1
positive coping strategies																					+		4	1
spiritual experiences																			+				4	1
caring efficacy							0																5	1
compassion towards others				0																			5	1
job satisfaction																0							5	1
negative coping strategies																					0		5	1

resilience (= emotional stability)																		0						5	1
ruminating and negative affects													0											5	1
sense of coherence																0								5	1
tendency to forgive				0																				5	1
work limitation						0																		5	1
work relationships									0															5	1

0 no significance between-groups (TG and CG)
+ significance between-groups (TG and CG)
..... Discussed in the text, chapter 'the effects of MBSR on the mental health of employees'
Cohen-Katz et al. Part II [73] and Cohen-Katz et al. Part III [74]: one study, two articles

1: burnout and the three dimensions of burnout.
a: not significant on the Perceived Stress Scale (PSS); significant on the DASS (Depression Anxiety Stress Scale) stress subscale.

6. (Occupational) Self-compassion

Three studies addressed self-compassion, measured by the Self-Compassion Scale (SCS) [53, 75, 85], and one study addressed occupational self-compassion, measured by a modification of the SCS for teachers [88]. All four studies reported a significant increase in self-compassion in the TG and in the TG compared to the CG. Cohen-Katz et al.'s [74] qualitative study described an improvement in self-care resulting from MBSR: "I'm worrying about my own needs first, and trying to take care of them" (p. 82). Self-care can lead to feelings of guilt [74]: "they want to fix everyone else in the group!", as one participant stated, "it's the nurse in me!" (p. 85). In summary, it is plausible that MBSR leads to a significant increase in self-compassion (evidence Level 2).

7. Quality of sleep

Three studies [78, 82, 85] investigated quality of sleep using the Pittsburgh Sleep Quality Index (PSQI), which consists of seven subscales: general (subjective) sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of medication to sleep, and daytime sleep-related dysfunction. Frank et al. [85] reported significant improvements in the TG compared to the CG in all aspects except for sleep efficiency and the use of medication to sleep. Wolever et al. [82] reported significant reductions in sleep difficulty in the TG compared to the CG.

Klatt et al. [78] found a significant improvement in the TG in terms of subjective sleep quality, sleep latency, sleep disturbances, and daytime dysfunction (i.e., four of the seven components of sleep quality). Changes in global sleep scores (PSQI) were significant for both the TG and the CG. Klatt et al. [78] suggested that the improvements in subjective sleep quality may be the study's most important result.

In summary, it is plausible that MBSR gives rise to a significant increase in quality of sleep (evidence Level 2). However, it is not possible to provide insight into the different components of sleep quality.

8. Relaxation

Three studies measured relaxation [7, 8, 79] and all found significant changes in relaxation in the TG compared to the CG. Cohen-Katz et al.'s [74] qualitative data also showed an increase in relaxation/calmness: "I'm feeling a greater calm and peace" (p. 82). Thus, it is plausible that MBSR produces a significant increase in relaxation (evidence Level 2).

9. Anxiety

Two studies measured anxiety [88, 91] and both showed a significant decrease in anxiety in the TG compared to the CG. It is therefore plausible that MBSR causes a significant decrease in anxiety (evidence Level 2).

10. Occupational stress

Two studies [88, 89] specifically measured occupational stress (i.e., stress employees experience on the job). Both reported a significant reduction in occupational stress after the intervention in the TG compared to the CG. In summary, it is plausible that MBSR causes a reduction in occupational stress level (evidence Level 2).

11. Life satisfaction

Eight studies examined the effects of MBSR on general life satisfaction [8, 53, 75-77, 79, 86, 92]. Four [8, 75, 79, 86] reported significant positive changes in life satisfaction or general well-being in the TG compared to the CG. By contrast, four studies [53, 76, 77, 92] reported no significant improvement in terms of life satisfaction. In summary, there are indications that MBSR leads to an increase in life satisfaction (evidence Level 3).

12. Mood

Mood was examined in two of the studies [83, 90]. Martín-Asuero et al. [90] used a short version of the Profile of Mood States (POMS), which consists of five subscales that measure negative emotions. They reported a significant reduction of total mood disturbance in the TG and in the TG compared to the CG. Jennings et al. [83] used the Positive and Negative Affect Schedule (PANAS), which measures positive and negative effects, and found no significant outcomes.

One qualitative study [74] described an improved ability to deal with difficult emotions following MBSR. In summary, there are indications that MBSR has a positive effect on mood (evidence Level 3).

13. Efficacy in regulating emotions at work

Two studies [85, 89] measured employees' perceived self-efficacy regarding their ability to regulate their emotions on the job. Frank et al. [85] reported a significant improvement in the TG compared to the CG; Taylor et al. [89] showed a significant increase in the TG. In summary, it is plausible that MBSR improves efficacy in regulating emotions at work (evidence Level 3).

14. Self-efficacy/locus of control

Self-efficacy was investigated in two studies [83, 92]. Jennings et al. [83] mentioned a significant increase in the TG compared to the CG, while Walach et al. [92] reported no significant changes. In summary, there are indications that MBSR causes an increase in self-efficacy in general (evidence Level 3).

15. Work engagement

Work engagement was measured in two studies [9, 84]. Leroy et al. [9] showed a significant increase in work engagement for the group as a whole between T1 and T2;

the increase in the TG compared to the CG appeared to be significantly higher. Klatt et al. [84] reported a significant increase in work engagement in the TG, mostly induced by the vigor subscale (a subscale of the Utrecht Work Engagement Scale, UWES). In summary, there are indications that MBSR produces a significant increase in work engagement (evidence Level 3).

Discussion

To the best of our knowledge, this is the first review of the mental health of employees across different occupational sectors. We identified 24 articles representing 23 studies on the effects of MBSR (2 high quality, 15 medium quality, and 6 low quality) published before October 2015.

Demanding workplace challenges can produce stress and symptoms of burnout [93]. In the Netherlands, the professionals reporting the highest levels of work pressure and stress are teachers and healthcare providers [94], and teachers appear to have the highest burnout percentage in the Dutch workforce [95]. Burnout is a major cause of loss of engagement, disease, and disability [96].

There is a great need for useful, practical workplace interventions that could reduce stress and enhance work engagement. Kabat-Zinn [18], who introduced the concept of mindfulness, suggested its possible use as a person-centered intervention. This study was aimed at investigating empirically whether MBSR and MBCT indeed contribute to employees' mental health.

General findings

Measuring mindfulness

Fourteen of the 23 studies reviewed [7, 9, 73, 75-78, 80, 82, 83, 85, 88, 90, 91] measured levels of mindfulness; 9 did not. This is striking because, as Cohen-Katz et al. [73] points out, measuring mindfulness is important to determining whether an MBSR program has successfully taught what it was designed to teach. Mindfulness skills may be the mediating factor for individual outcomes such as stress reduction, relaxation, and empathy [97]. Indeed, Baer [29] highlighted several mechanisms that might account for how mindfulness skills can reduce symptoms and bring about behavioral change: exposure, cognitive change, self-management, relaxation, and acceptance.

Three different mindfulness measures were used in the studies we reviewed: five used the Mindfulness Attention Awareness Scale (MAAS), eight used the Five Facets Mindfulness Questionnaire (FFMQ) with five subscales, and one used the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). These three scales correspond with different definitions of mindfulness. In the MAAS, mindfulness is operationalized as a one-dimensional construct involving attention and awareness. The FFMQ, which

encompasses five dimensions of mindfulness, also includes an attitudinal component. The CAMS-R, which assesses four elements of mindfulness, yields only one score [98]. The use of different ways of operationalizing mindfulness makes it difficult to compare its effects. In addition, mindfulness can be said to be both an outcome variable of interest and an important mechanism of the therapeutic agent.

The advantage of the FFMQ is the fact that Baer's [29] five subscales result in a sophisticated measurement of mindfulness. As it is based on a factor analysis of items from the five most widely used mindfulness questionnaires, it can also be considered particularly robust [99, 100].

Other outcomes

Most of the variables were assessed using negative symptom-focused outcome measures (e.g., burnout, stress level, psychological distress, depression, anxiety), while some used positive symptom-focused outcome measures (e.g., quality of sleep, relaxation, work engagement, job satisfaction). There were hardly any symptom-focused outcome measures relating to work performance (e.g., caring efficacy, work behavior, work performance, workability).

Few variables, except for mindfulness skills (observing, describing, acting with awareness, non-judging, non-reactivity), were assessed using process-focused measures. They may have been more suitable for capturing the mechanisms by which mindfulness practice leads to specific outcomes (e.g., (occupational) self-compassion, (occupational) self-efficacy, sense of coherence, coping strategies, ruminating). Specifically, four of the studies [53, 75, 85, 88] reported a significant increase in self-compassion in the TG compared with the CG. In another study, Shapiro et al. [11] reported that MBSR weakens stimulus-response relationships, thereby reducing reflexive behavior. This was associated with increased levels of self-management, self-efficacy, and self-care.

Self-care can be challenging for healthcare professionals and others engaged in people-centered work (e.g., teachers), as their job is to care for others. A lack of self-care can eventually undermine health and, as a result, sustainable employability [101]. Thus, employees' self-care is a highly important topic that deserves more attention within organizations. Our findings suggest that it might be increased by means of mindfulness training.

Behavioral variables, such as assessments of the quality and quantity of formal and informal meditation (e.g., frequency and intensity of practice) were measured in only three studies [9, 74, 92].

Self-reported measures are inherently biased because participants who have invested a lot of time and energy in a treatment program, such as MBSR, are less likely to give negative evaluations [102]. Therefore, behavioral reports by relevant others may be a useful addition.

A few outcomes in our review refer to perceptions of work characteristics (e.g., work relationships, job control, job demands). However, many other possible work-related perceptions were not measured (e.g., work pressure, emotional load, feedback, autonomy, learning opportunities). Further empirical work on the effects of mindfulness on perceptions of work could be revealing.

Future research on mindfulness treatments for employees may benefit from assessing a diversity of outcomes: negative and positive symptom-focused measures of mental health (mood, recovery need, job satisfaction, work engagement) and work performance (positive and negative work behavior, absence from work); process-focused outcome measures; behavioral measures of (in)formal practices; behavioral reports by relevant others (e.g., colleagues); and outcomes on work-related perceptions. Finally, future research may include outcomes differentiating between elements of mindfulness interventions, as these remain something of a black box thus far in terms of their working mechanisms.

MBCT

Our search method, which included both MBSR and MBCT programs, uncovered only one study [75] exploring the effects of a modified MBSR program in combination with some aspects of MBCT on employees. MBCT is often used in clinical settings to prevent depression relapse [20]. However, it could also be useful for employees, especially those who experience non-productive or irrational thoughts, which can cause stress. Two examples of excluded pre-post studies focusing exclusively on the effects of MBCT on employees are Ruths et al. [24] and Schenström et al. [103]. Future research on the impact of MBCT on employees is needed to compare its efficacy to that of MBSR.

Contraindications

None of the studies we reviewed reported that MBSR training negatively affected employees. The absence of empirical evidence on potentially harmful effects of MBSR [104] does not mean it is good for everyone in every situation; instead, potentially harmful effects should be thoroughly evaluated in future work. Ruths et al. [24], who investigated the effects of MBCT on 27 mental-health professionals in a pre-post study (which was therefore excluded from our study), mentioned depersonalization and initial mood deterioration as potentially harmful effects of meditation. Participants with severe trauma or those at risk for psychosis might be at elevated risk [49]. Dobkin et al. [104] made several recommendations in this regard, including pre-program screening to "assess the patient's ability to: (1) contain affect; (2) listen and respond in the present; (3) utilize instructional audio tapes and follow classroom instruction; (4) remain in the classroom; (5) practice yoga or equivalent; and (6) organize thoughts, manage logistics, and time commitment" (p. 4). Nonetheless, there is little empirical research on and evidence for the harmful effects of mindfulness training [49].

Methodological issues

Despite the promising findings of the studies in our review, our approach has some limitations which make it difficult to draw strong conclusions about the effects of MBSR on employees.

Meta-analysis versus systematic review

We chose to conduct a systematic review instead of a meta-analysis for four reasons. First, the quality of the studies conducted so far is limited; we only found 2 studies that could be classified as of high methodological quality, while 15 were of medium quality and 6 were of low quality (Table 2).

Second, mindfulness training is an emergent, relatively uncharted field of investigation, with a broad variety of outcome measures. Only 7 variables were examined in four or more studies, 8 in two or three studies, and 22 in one study only (Table 3). We intended to explore several negative and positive symptom-focused outcomes on mental health and work performance; in particular, positive and negative process-focused outcomes and positive and negative outcomes related to work characteristics. Furthermore, we wanted to use quantitative and qualitative data.

Third, the samples in 11 of the studies reviewed were relatively small, ranging from just 10 to 24 participants.

Finally, the 2 high-quality studies and 15 medium-quality studies appeared to have similar outcome variables in a few cases (as shown in Table 1).

The (lack of) clarity around the outcome variables

We identified many mental/psychological outcomes which sometimes partly overlapped (e.g., stress and occupational stress; mood and depression; efficacy in regulating emotions at work and self-efficacy/locus of control). Occupational stress refers to only one cause of stress, while depression is just one aspect of mood, measured by five subscales (tension-anxiety, depression-dejection, anger-hostility, vigor-activity, and fatigue-inertia) of the Profile of Mood States (POMS). In a similar vein, efficacy in regulating emotions at work appears to be a single dimension of self-efficacy/locus of control.

In some cases, outcomes were measured using different assessment instruments. For example, mood was measured by the POMS, which consists of five subscales, and by the Positive and Negative Affect Scale (PANAS), which consists of two corresponding subscales. Mindfulness was measured by the one-dimensional MAAS, the five-dimensional FFMQ or the CAMS-R, with its four elements of mindfulness.

Sometimes the distinction between outcomes was unclear. For example, there is no clear distinction between mood, measured by a short version of the POMS [90], and psychological distress, measured by the Brief Symptom Inventory (BSI). The BSI consists of 10 subscales reflecting different mood states, such as anxiety, depression, and total mood disturbance. The POMS consists of five subscales measuring negative emotions.

As already mentioned, three of the studies reviewed [53, 85, 88] reported only on burnout in general. Five studies [8, 73, 76, 79, 83] reported on the three dimensions of burnout but not on burnout in general. One study [90] dealt with both types of outcomes.

There is a need for unambiguous, clear outcomes that are logically clustered (e.g., process and effect outcomes; mental-health and work-performance outcomes; positive and negative outcomes; work-related perceptions outcomes; individual and organizational outcomes) and measured by reliable and valid assessment instruments.

Publication bias

All the studies except one [77] reported statistically significant outcomes (Table 3). Three studies (12.9%) [76, 81, 92] mentioned only one significant outcome, three (12.9%) [7, 53, 84] mentioned two significant outcomes, and the other 16 studies (68.8%) reported at least three significant outcomes. The multitude of significant results ought to be seen in the context of the small sample sizes used in most of the studies, and the medium and low methodological quality of 15 and 6 studies, respectively, leaving them with relatively low statistical power. It may also reflect some form of publication bias, as studies with positive results tend to be published more easily than studies with negative results [105].

Short- and long-term effects

Little research has considered the long-term effects of mindfulness interventions. Fourteen of the studies reviewed measured short-term effects only [8, 53, 75-80, 82-85, 90, 91], as their final measurements were conducted immediately after the intervention. The other nine studies measured the effects over a longer period: eight weeks to four months post-intervention for six studies [9, 73, 87-89, 92], and almost one year post-intervention in three studies [7, 81, 86]. Mindfulness training for employees should ideally result in sustainable long-term effects. Therefore, both short- and long-term effects of the MBSR program for employees need to be considered in future research.

Length of treatment program

Nine of the studies reviewed [8, 75-82] used shortened MBSR treatment programs. Two used a modified MBSR program [83, 84], and one used an extended MBSR program [7]. The other 11 studies used the usual MBSR program [9, 53, 73, 85-92].

Due to the different lengths of the programs, we cannot safely conclude anything about the effects of program length on the results. However, it is important to note that seven of the eight shortened MBSR studies (all except Pipe et al. [81]) only measured short-term effects. As Carmody and Baer [106] stated, "the effect of variation in class hours on outcomes has not been systematically studied" (p. 627). They did not find a significant correlation between the number of in-class hours and the mean effect size in clinical or non-clinical samples. Studies on very brief mindfulness interventions in lab

settings found temporary effects on emotion [107], mood, and stress [108, 109]. Increases tend to be found in state (present) mindfulness rather than trait (more permanent) mindfulness [5]. Bear, Carmody, and Hunsinger [110] revealed that structural changes in perceived stress did not occur until week four of the mindfulness training. Changing problematic, automatic patterns of thought and behavior takes time, and mindfulness is no quick solution.

Carmody and Bear suggested that "adaptations that include less class time may be worthwhile for populations for whom reduction of psychological distress is an important goal and for whom longer time commitment may be a barrier to their ability or willingness to participate" [106]. In Shapiro et al.'s [53] study, 8 of the 18 participants dropped out of the treatment group. The authors concluded that "adding a 2-hour intervention plus daily home practice to an already demanding schedule may not be feasible for a substantial number of health care professionals" (p. 172). Kabat-Zinn [111] emphasized the importance of flexibility in the MBSR program in different contexts. The original MBSR program with eight 2.5-hour sessions, a 7-hour day of silence, and 45 minutes of daily practice at home seems to be too demanding for busy workers [17]. Chaskalson et al. [17] indicated that although the number of organizations offering MBSR is increasing, they all use a format with fewer and shorter sessions. There is a growing need to adapt the duration and dose of the MBSR program to different workplace contexts, in order to better get to grips with its effectiveness.

Another consideration regarding the treatment schedule is whether parts of the program are difficult to adhere to (e.g., regular class attendance, daily home practice, formal and informal meditation exercises). Only Cohen-Katz et al. [74] collected qualitative data to this end. More research is needed on this issue, and to determine whether a shortened version of the MBSR program would produce the same short- and long-term effects.

Level of evidence

The level of evidence that we were able to obtain was based on the number of studies investigating a certain variable (see Table 3) and the quality of those studies (see Table 2). Only seven variables were examined in four or more studies, eight variables in two or three studies, and 22 variables in just one study (Table 3). We only found evidence that met the requirements for Levels 2 through 5; we found no evidence meeting the requirements for Level 1. Future studies should seek to generate Level 1 evidence from high-quality RCTs.

Small sample sizes

The sample sizes of 11 studies [7, 8, 53, 73, 76-79, 81, 85, 92] were relatively small: the group sizes (TG and CG) ranged from 10 to 24 non-clinical participants. As statistical

significance is essential to the interpretation of findings, future empirical work should be conducted using larger sample sizes.

Homogeneous and heterogeneous samples

The research populations included in our review mainly comprised healthcare professionals (12 studies) [7, 53, 73, 76, 77, 79-81, 84, 86, 90, 91]. Five studies examined teachers [75, 83, 85, 88, 89].

Five studies [7, 8, 79, 81, 85] had homogeneous participant samples in terms of occupation. Three studies [83, 88, 89] had broadly homogeneous samples, in that they investigated related occupations (i.e., elementary, secondary, and high school teachers). The other studies [9, 53, 73, 75-78, 80, 82, 84, 86, 87, 90-92] had mixed/heterogeneous samples with various participant occupations.

Future research may benefit from using more homogeneous samples (e.g., workers in healthcare, education, or finance), as these groups have specific demands and challenges with respect to the outcomes of MBSR treatment.

Employees

As previously mentioned, the samples in the studies reviewed largely consisted of healthcare professionals and elementary, secondary, and high school teachers. They do not represent the target population of employees in general. Therefore, more research across different occupational sectors is needed to generalize our conclusions. It may be that including terms such as 'business' or 'corporate' in our search string would have yielded additional references.

Self-selection bias

A major limitation of all the studies reviewed is self-selection, as voluntary participation by employees may result in somewhat biased samples. Specifically, the characteristics of employees who participate in such research (e.g., motivation, sensitivity to the MBSR program, discipline) may differ from those who do not. Self-selection bias thus complicates the evaluation of the MBSR program and the interpretation of results.

Quantitative and qualitative data

Future research may benefit from mixed-methods approaches that combine quantitative and quantitative data. To date such a combination is lacking in the literature.

Twenty of the studies reviewed contained mostly quantitative data, while only three [73, 89, 92] contained a substantial amount of qualitative data. We found one qualitative review, by Morgan et al. [57], which synthesized 14 qualitative studies on the experiences of health-care professionals and students with mindfulness training and discussed issues such as self-compassion, initial challenges to practice, training focus, and participant motivation.

Since mindfulness research on employees across occupational sectors is a relatively new phenomenon, qualitative data are needed to be able to investigate in depth whether an intervention significantly affects process-focused personal measures (e.g., mindfulness skills, coping strategies) and to capture the mechanisms by which mindfulness practice leads to specific outcomes. For example, unresolved or suppressed emotions may resurface during mindfulness training, contributing to self-consciousness. As Cohen-Katz et al. [74] write, "For the participants (i.e. nurses), becoming aware of the wound was both painful and ultimately extremely useful, helping them to move forward in their lives" (p. 86).

Qualitative data are also needed to thoroughly investigate key aspects of the mindfulness training program and to examine those factors that lead to successful implementation in an organization (e.g., allocating staff time to participate, support of superiors).

Additional organizational intervention

Stress is the result of a complex interaction between environmental factors (work and personal circumstances) and the individual [96, 112]. Interventions designed to reduce stress have generally targeted either the relevant environmental factors or the individual, personal factors.

Person-centered interventions seem to be only partly effective in influencing mental health and well-being [113]. An integrated approach is needed that considers not only the person, but the work context as well [114]: for instance, by combining a person-centered intervention such as mindfulness with an additional organizational intervention. None of the studies reviewed used such an additional intervention, which may enhance the effects of the mindfulness intervention.

MBSR program and instructor skill

Specific characteristics of the programs used, such as the instructors' skill levels, may influence the efficacy of MBSR treatment. None of the 23 studies described the MBSR program in terms of its form, content, procedures, or material. Several studies described the instructors as "experienced," but the term was not well-defined. Future studies would benefit from a full explanation of both the MBSR program and the instructors' skill levels.

Conclusions

Our systematic literature search of PsycINFO, PubMed and CINAHL resulted in 24 articles representing 23 studies on the effects of MBSR and MBCT. Their methodological quality varied: 2 were of high quality, 15 of medium quality and 6 of low quality. Given the low number of studies and relatively low methodological quality, it is clear that research on the effects of mindfulness on employees remains a relatively uncharted area.

The outcomes of the studies reviewed suggest that MBSR may help to improve employees' psychological functioning. However, no firm conclusions can be drawn about the effects of specific mindfulness programs for different groups and/or under specific conditions.

The strongest outcomes were decreased levels of emotional exhaustion (a dimension of burnout), stress, psychological distress, depression, anxiety, and occupational stress.

We also found a significant increase in mindfulness, personal accomplishment (a dimension of burnout), (occupational) self-compassion, quality of sleep, and relaxation.

References

1. Brown KW, Creswell JD, Ryan RM. Handbook of Mindfulness: Theory, Research, and Practice. New York: Gilford Publ.; 2015.
2. Ludwig DS, Kabat-Zinn J. Mindfulness in medicine. Journal American Medical Association. 2008; 300(11): 1350-1352.
3. Good DJ, Lyddy CJ, Glomb TM, Bono JE, Brown KW, Duffy MK, et al. Contemplating mindfulness at work: an integrative review. Journal of management. 2015. Doi: 10.1177/0149206315617003.
4. Hooftman W, Klauw van der M, Klein Hesselink J, Terwoert J, Jongen M, Kraan K, et al. Arbobalans 2011. Kwaliteit van de arbeid, effecten en maatregelen in Nederland. Hoofddorp: TNO; 2012
5. Alberts HJEM, Hülsheger UR. Applying mindfulness in the context of work: mindfulness-based interventions. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 100-132, 2015.
6. Bischop SR, Lau M, Shapiro S, Carlson L, Anderson ND, Carmody J, et al. Mindfulness: a proposed operational definition. Clinical Psychology: Science and Practice. 2004; 11: 230-241.
7. Amutio A, Martínez-Taboada C, Hermosilla D, Delgado LC. Enhancing relaxation states and positive emotions in physicians through a mindfulness training program: a one-year study. Psychology, Health & Medicine. 2015; 20(6): 720-731.
8. Poulin PA, Mackenzie CS, Soloway G, Karayolas E. Mindfulness training as an evidenced-based approach to reducing stress and promoting well-being among human services professionals. International Journal of Health Promotion & Education. 2008; 46(2): 35-43.
9. Leroy H, Anseel F, Dimitrova NG, Sels L. Mindfulness, authentic functioning, and work engagement: a growth modeling approach. Journal of Vocational Behavior. 2013; 82: 238-247.
10. Shapiro SL, Wang MC, Peltason EH. What is mindfulness, and why should organizations care about it? In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 17-41, 2015.
11. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. Journal of Clinical Psychology. 2006; 62(3): 373-386.
12. Silananda U. The four foundations of mindfulness. Boston, MA: Wisdom Publications; 1990.
13. Marlatt GA, Kristeller JL. Mindfulness and meditation. In WR Miller (Ed.). Integrating spirituality into treatment (pp 67-84). Washington, DC: American Psychological Association; 1999.
14. Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. Journal of Personality and Social Psychology. 2003; 84(4): 822-848.
15. Kabat-Zinn J. Mindfulness-based interventions in context: past, present and future. Clinical Psychology: Science and Practice. 2003; 10(2): 144-156.
16. Shapiro SL, Carlson LE. The art and science of mindfulness: integrating mindfulness into psychology and the helping professions. Washington, DC: American Psychological Association Publications; 2009.
17. Chaskalson M, Hadley SG. Mindfulness: historical and contemplative context and recent developments. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 42 - 66, 2015.
18. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. New York: Delacorte; 1990.
19. Reb J, Atkins PWB. Introduction. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 1-16, 2015.
20. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for depression; a new approach to preventing relapse. New York: the Guilford Press; 2002.

21. Chiesa A, Serretti A. Mindfulness based cognitive therapy for psychiatric disorders: a systematic review and meta-analysis. Psychiatry research. 2011; 187: 441- 453.
22. Gu J, Strauss C, Bond R, Cavanagh K. How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and well-being? A systematic review and meta-analysis of mediation studies. Clinical Psychology Review. 2015; 37: 1-12.
23. National Institute of Health and Care Excellence (NICE). Depression: the treatment and management of depression in adults (update). London: Author; 2009.
24. Ruths FA, de Zoysa N, Frearson SJ, Hutton J, Williams JMG, Walsh J. Mindfulness-based cognitive therapy for mental health professionals, a pilot study. Mindfulness. 2013; 4: 289-295. doi 10.1007/s12671-012-0127-0.
25. Williams JMG. Mindfulness, depression and modes of mind. Cognitive Therapy and Research. 2008; 32: 721-733.
26. Linehan MM. Cognitive-behavioral treatment of borderline personality disorder. New York: Guilford Press; 1993.
27. Hayes SC, Strosahl K, Wilson KG. Acceptance and commitment therapy. New York: Guilford Press; 1999.
28. Marlatt GA. Addiction, mindfulness and acceptance. In SC Hayes, NS Jacobson, VM Follette, MJ Dougher (Eds.). Acceptance and change: content and context in psychotherapy (pp 175-197). Reno, NV: Context Press; 1994.
29. Baer RA. Mindfulness training as a clinical intervention: a conceptual and empirical review. Clinical Psychology: science and practice. 2003; 10(2): 125-143.
30. Astin JA. Stress reduction through mindfulness meditation. Psychotherapy and Psychosomatics. 1997; 66: 97-106.
31. Goleman D, Schwarz G. Meditation as an intervention in stress reactivity. Journal of Consulting and Clinical Psychology. 1976; 44(3): 456-466.
32. Shapiro SL, Schwartz GE, Bonner G. Effects of mindfulness-based stress reduction on medical and premedical students. Journal of Behavioral Medicine. 1998; 21: 581-599.
33. Williams KA, Kolar MM, Reger BE, Pearson JC. Evaluation of a wellness-based mindfulness stress reduction intervention: A controlled trial. American Journal of Health Promotion. 2001; 15: 422-432.
34. Rosenzweig S, Reibel DK, Greeson JM, Brainard GC, Hojat M. Mindfulness-based stress reduction lowers psychological distress in medical students. Teaching and learning in medicine. 2003; 15(2): 88-92.
35. Valentine E, Sweet P. Meditation and attention: A comparison of the effects of concentrative and mindfulness meditation on sustained attention. Mental Health, Religion and Culture. 1999; 2(1): 31-46.
36. Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, et al. Alterations in brain and immune function produced by mindfulness meditation. Psychosomatic Medicine. 2003; 5(4): 564-570.
37. Massion AO, Teas J, Hebert JR, Wertheimer MD, Kabat-Zinn J. Meditation, melatonin, and breast/prostate cancer: Hypothesis and preliminary data. Medical Hypothesis. 1995; 44: 39-46.
38. Robinson FP, Mathews HL, Witek-Janusek L. Psycho-endocrine-immune response to mindfulness-based stress reduction in individuals infected with the human immunodeficiency virus: a quasi-experimental study. Journal of Alternative and Complementary Medicine: Research on paradigm, practice and policy. 2003; 9(5): 683-694.
39. Kabat-Zinn J, Massion AO, Kristeller J, Peterson LG, Fletcher KE, Pbert L, et al. Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. American Journal of Psychiatry. 1992; 149(7): 936-943.

40. Miller J, Fletcher K, Kabat-Zinn J. Three-year follow-up and clinical implications of a mindfulness-based stress reduction intervention in the treatment of anxiety disorders. General Hospital Psychiatry. 1995; 17: 192-200.
41. Reibel DK, Greeson JM, Brainard GC, Rosenzweig S. Mindfulness-based stress reduction and health-related quality of life in a heterogeneous patient population. General Hospital Psychiatry. 2001; 23: 183-192.
42. Davis MC, Zautra AJ, Wolf LD, Tennen H, Yeung EW. Mindfulness and cognitive-behavioral interventions for chronic pain: differential effects on daily pain reactivity and stress reactivity. Journal of Consulting and Clinical Psychology. 2015; 83(1): 24 – 35.
43. Black DS, Slavich GM. Mindfulness meditation and the immune system: a systematic review of randomized controller trials. Annals of the New York Academy of Sciences. 2016; 1373: 13 – 24.
44. Hoge EA, Bui E, Marques L, Metcalf CA, Morris LK, Robinaugh DJ, et al. Randomized controlled trial of mindfulness meditation for generalized anxiety disorder: effects on anxiety and stress reactivity. Journal of Clinical Psychiatry. 2013; 74(8): 786 – 792.
45. Mason AE, Epel ES, Kristeller J, Moran PJ, Dallman M, Lustig RH, et al. Effects of a mindfulness-based intervention on mindful eating, west consumption, and fasting glucose levels in obese adults: data from the SHINE randomized controlled trial. Journal Behavioral Medicine. 2016; 39(2): 201-213.
46. McCarney RW, Schulz J, Grey AR. Effectiveness of mindfulness-based therapies in reducing symptoms of depression: A meta-analysis. European Journal of Psychotherapy & Counselling. 2012; 14: 279–299.
47. Witkiewitz K, Warner K, Sully B, Barricks A, Stauffer C, Thompson BL, et al. Randomized trial comparing mindfulness-based relapse prevention with relapse prevention for women offenders at a residential addiction treatment center. Substance Use and Misuse. 2014; 49(5): 536-546.
48. Schmidt S, Grossman P, Schwarzer B, Jena S, Naumann J, Walach H. Treating fibromyalgia with mindfulness-based stress reduction: results from a 3-armed randomized controlled trial. Pain. 2011; 152(2): 361-369.
49. Creswell JD. Mindfulness interventions. Annual Review of Psychology. 2017; 68: 18.1-18.26. doi: 10.1146/annurev-psych-042716-051139.
50. Strauss C, Cavanagh K, Oliver A, Pettman D. Mindfulness-based interventions for people diagnosed with a current episode of an anxiety or depressive disorder: a meta-analysis of randomized controlled trials. PLOS one. 2014; 9 4: e96110.
51. Chiesa A, Serretti A. Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. Journal of Alternative and Complementary Medicine. 2009; 15(5): 593-600.
52. Irving JA, Dobkin PL, Park J. Cultivating mindfulness in health care professionals: a review of empirical studies of mindfulness-based stress reduction (MBSR). Complementary Therapies in Clinical Practice. 2009; 15: 61-66.
53. Shapiro SL, Astin JA, Bischop SR, Cordova M. Mindfulness-based stress reduction for health care professionals: results from a randomized trial. International Journal of Stress Management. 2005; 12(2): 164-176.
54. Schaufeli WB, Salanova M. Enhancing work engagement through the management of human resources. In K Naswall, J Lellgren, M Sverke (Eds). The individual in the changing working life. Cambridge: Cambridge University Press; 2007.
55. Shanafelt TD, Bradley KA, Wipf JE, Back AL. Burnout and self-reported patient care in an internal medicine residency program. Annals of Internal Medicine. 2002; 136: 358-367.
56. Escuriex BF, Labbé EE. Health care providers' mindfulness and treatment outcomes: a critical review of the research literature. Mindfulness. 2011; 2: 242-253.

57. Morgan P, Simpson J, Smith A. Health care workers' experiences of mindfulness training: a qualitative review. Mindfulness. 2015; 6: 744-758.
58. Smith SA. Mindfulness-based stress reduction: an intervention to enhance the effectiveness of nurses' coping with work-related stress. International Journal of Nursing Knowledge. 2014; 25(2): 119-130.
59. Regehr C, Glancy D, Pitts A, LeBlanc VR. Interventions to reduce the consequences of stress in physicians. A review and meta-analysis. The Journal of Nervous and Mental Disease. 2014; 202(5): 353-359.
60. Burton A, Burgess C, Dean S, Koutsopoulou GZ, Hugh-Jones S. How effective are mindfulness-based interventions for reducing stress among healthcare professionals? A systematic review and meta-analysis. Stress and Health. 2016. doi: 10.1002/smi.2673.
61. Virgili M. Mindfulness-based interventions reduce psychological distress in working adults: a meta-analysis of intervention studies. Mindfulness. 2013; 6: 326-337. doi: 10.1007/s12671-013-0264-0.
62. Grossman P, Niemann L, Schmidt S, Walach H. Mindfulness-based stress reduction and health benefits. A meta-analysis. Journal of Psychosomatic Research. 2004; 57: 35-43.
63. Luken M, Sammons A. Systematic review of mindfulness practice for reducing job burnout. The American Journal of Occupational Therapy. 2016; 70: 7002250020.
64. World Health Organization. Promoting mental health: concepts, emerging evidence, practice. Genéve: WHO; 2005.
65. Diener E, Suh EM, Lucas RE, Smith HL. Subjective well-being: three decades of progress. Psychological Bulletin. 1999; 125: 276 – 302.
66. Ryff CD. Happiness is everything, or is not? Explorations of the meaning of psychological well-being. Journal of Personality and Social Psychology. 1989; 57: 1069 – 1081.
67. Keyes CLM. Social well-being. Social Psychology Quarterly. 1998; 61: 121 – 140.
68. Langer EJ. The power of mindful learning. Reading, MA: Addison Wesley; 1997.
69. Langer EJ. Mindfulness. Reading, MA: Addison Wesley; 1989.
70. Bazarko D, Cate RA, Azocar F, Kreitzer MJ. The impact of an innovative mindfulness-based stress reduction program on the health and well-being of nurses employed in a corporate setting. Journal of Workplace Behavioral Health. 2013; 28: 107-133.
71. http://netherlands.cochrane.org/beoordelingsformulieren-en-andere-downloads. This link refers to the most recent version of this paper in Dutch, now entitled 'assessment of the quality of a randomized controlled trial'.
72. http://www.domusmedica.be/documentatie/richtlijnen/ebp-guidelines/194-kwaliteit/richtlijnen/richtlijnen-algemeeen/513-niveaus-van-bewijskracht.html. This link refers to a document in Dutch in which three levels of evidence for assessing the importance of outcome variables are distinguished. A certain outcome can be classified as being on Level 1 ('there is evidence for …' / 'it has been proven that …') if at least two high-quality RCTs show significance between-groups (change in TG versus change in CG). An outcome can be classified as being on Level 2 ('it is plausible that …') if at least two medium-quality RCTs show significance between-groups. An outcome can be classified on Level 3 ('there are indications that …') if at least one medium-quality RCT shows significance.
73. Cohen-Katz J, Wiley SD, Capuano T, Baker DM, Shapiro S. The effects of mindfulness-based stress reduction on nurse burnout and stress: a quantitative and qualitative study, Part II. Holistic Nursing Practice. 2005a; 19(1): 26-35.
74. Cohen-Katz J, Wiley SD, Capuano T, Baker DM, Deitrick L, Shapiro S. The effects of mindfulness-based stress reduction on nurse burnout and stress: a quantitative and qualitative study, Part III. Holistic Nursing Practice. 2005b; 19(2): 78-86.

75. Beshai S, McAlpine L, Weare K, Kuyken W. A non-randomised feasibility trial assessing the efficacy of a mindfulness-based intervention for teachers to reduce stress and improve well-being. Mindfulness. 2015. doi: 10.1007/s12671-015-0436-1.
76. Duchemin A, Steinberg BA, Marks DR, Vanover K, Klatt M. A small randomized pilot study of a workplace mindfulness-based intervention for surgical intensive care unit personnel: effects on salivary a-amylase levels. Journal of Occupational Environmental Medicine. 2015; 57(4): 393-399. doi: 10.1097/JOM.0000000000000371.
77. Horner JK, Piercy BS, Eure L, Woodward EK. A pilot study to evaluate mindfulness as a strategy to improve inpatient nurse and patient experiences. Applied nursing research. 2014; 27: 198-201.
78. Klatt MD, Buckworth J, Malarkey WB. Effects of low-dose mindfulness-based stress reduction (mbsr-ld) on working adults. Health Education & Behavior. 2009; 20: 1-14.
79. Mackenzie CS, Poulin PA, Seidman-Carlson R. A brief mindfulness-based stress reduction intervention for nurses and nurse aides. Applied Nursing Research. 2006; 19: 105-109.
80. Manotas M, Segura C, Eraso M, Oggins J, McGovern K. Association of brief mindfulness training with reductions in perceived stress and distress in Colombian health care professionals. 2013. doi: 10.1037/a0035150.
81. Pipe TB, Bortz JJ, Dueck A. Nurse leader mindfulness meditation program for stress management. The Journal of Nursing Administration. 2009; 39(3): 130-137.
82. Wolever RQ, Bobinet KJ, McCabe K, Mackenzie ER, Fekete E, Kusnick CA. Effective and viable mind-body stress reduction in the workplace: a randomized controlled trial. Journal of Occupational Health Psychology. 2012; 17(2): 246-258.
83. Jennings PA, Frank JL, Snowberg KE, Coccia MA, Greenberg MT. Improving classroom learning environments by cultivating awareness and resilience in education (CARE): results of a randomized controlled trial. School Psychology Quarterly. 2013; 28(4): 374-390.
84. Klatt M, Steinberg B, Duchemin A. Mindfulness in Motion (MIM): an onsite mindfulness based intervention (MBI) for chronically high stress work environments to increase resiliency and work engagement. Journal of Visualized Experiments. 2015; 101: 1-11.
85. Frank JL, Reibel D, Broderick P, Cantrell T, Metz S. The effectiveness of mindfulness-based stress reduction on educator stress and well-being: results from a pilot study. Mindfulness. 2013. doi: 10.1007/s12671-013-0246-2.
86. Geary C, Rosenthal SL. Sustained impact of MBSR on stress, well-being and daily spiritual experiences for 1 year in academic health care employees. The Journal of Alternative and Complementary Medicine. 2011; 17(10): 939-944.
87. Huang S-L, Li R-H, Huang F-Y, Tang F-C. The potential for mindfulness-based intervention in workplace mental health promotion: results of a randomized controlled trial. PLOS ONE. 2015; 10(9): e0138089. doi: 10.1371/journal.pone.0138089
88. Roeser RW, Schonert-Reichl KA, Jha A, Cullen M, Wallace L, Wilensky R, et al. Mindfulness training and reductions in teachers stress and burnout: results of two randomized, waitlist-control field trials. Journal of Educational Psychology. 2013. doi: 10.1037/a0032093.
89. Taylor C, Harrison J, Haimovitz K, Oberle E, Thomson K, Schonert-Reichl K, et al. Examining ways that a mindfulness-based intervention reduces stress in public school teachers: a mixed-methods study. Mindfulness. 2015. doi: 10.1007/s12671-015-0425-4.91.
90. Martín-Asuero A, Queraltó JM, Pujol-Ribera E, Berenguera A, Rodriguez-Blanco T, Epstein RM. Effectiveness of a Mindfulness Education Program in Primary Health Care Professionals: A Pragmatic Controlled Trial. Journal of continuing education in the health professionals. 2014; 34(1): 4-12.

91. Vega BR, Melero-Llorente J, Perez CB, Cebolla S, Mira J, Valverde C, et al. Impact of mindfulness training on attentional control and anger regulation processes for psychotherapists in training. Psychotherapy Research. 2014; 24(2): 202-213.
92. Walach H, Nord E, Zier C, Dietz-Waschkowski B, Kersig S, Schüpbach H. Mindfulness based stress reduction as a method for personnel development: a pilot evaluation. International Journal of Stress Management. 2007; 14(2): 188-198.
93. Maslach C, Jackson SE. Maslach Burnout Inventory: Manual. Palo Alto, CA: Consulting Psychologists Press; 1986.
94. Douwes M, Hooftman W, Kraan K, Steenbeek R, Venema A, Vroome de, et al. Arbobalans 2014. Kwaliteit van de arbeid, effecten en maatregelen in Nederland. Hoofddorp: TNO; 2014.
95. Van Zwieten MHJ, Vroome de EMM, Mol MEM, Mars GMJ, Koppes LLJ, Bossche van den SNJ. Nationale Enquête Arbeidsomstandigheden 2013. Methodologie en globale resultaten. Hoofddorp/Heerlen: TNO/CBS; 2014
96. Demerouti E, Bakker AB, De Jonge J, Janssen PPM, Schaufeli WB. Burnout and engagement at work as a function of demands and control. Scandinavian Journal of Work, Environment and Health. 2001; 27: 279-286.
97. Dobkin PL. Mindfulness-based stress reduction: what processes are at work? Complementary Therapies in Clinical Practice. 2008; 14: 8-16.
98. Choi E, Leroy H. Methods of mindfulness: how mindfulness is studied in the workplace. In: Reb J, Atkins PWB, editors. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 2015.
99. Baer RA, Smith GT, Lykins E, Button D, Krietemeyer J, Sauer S, et al. Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. Assessment. 2008; 15: 329-342.
100. De Bruin EI, Topper M, Muskens GAM, Bögels SM, Kamphuis JH. Psychometric properties of the Five Facets Mindfulness Questionnaire (FFMQ) in a meditating and a non-meditating sample. Assessment. 2012; 19(2): 187-197.
101. Van der Heijden BIJM, De Vos A. Sustainable careers: introductory chapter. In A De Vos & BIJM Van der Heijden (Eds). Handbook of Research on Sustainable Careers (pp. 1-19). Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing; 2015.
102. Brock TC, Green MC, Reich CA, Evans LM. The consumer reports study of psychotherapy: invalid is invalid. American Psychologist. 1996; 51: 1083.
103. Schenström A, Rönnberg S, Bodlund O. Mindfulness-based cognitive attitude training for primary care staff: a pilot study. Complementary Health Practice Review. 2006; 11, 144. doi: 10.1177/1533210106297033.
104. Dobkin PL, Irving JA, Amar S. For whom may participation in a mindfulness-based stress reduction program be contraindicated? Mindfulness. 2011. doi: 10.1007/s12671-011-0079-9.
105. Coronado-Montoya S, Levis AW, Kwakkenbos L, Steele RJ, Turner EH, Thombs BD. Reporting of positive results in randomized controlled trials of mindfulness-based mental health interventions. PLOS one. 2016; 11(4): e0153220. doi: 10.1371/journal.pone.0153220.
106. Carmody J, Baer RA. How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. Journal of Clinical Psychology, 2009; 65(6): 627-638.
107. Campbell-Sills L, Barlow DH, Brown TA, Hoffmann SG. Effects of suppression and acceptance on emotional responses on individuals with anxiety and mood disorders. Behavior Research and Therapy. 2006; 44: 1251 – 1263.

108. Erisman SM, Roemer L. A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. Emotion. 2010; 10: 72 – 82.
109. Feldman G, Greeson J, Senville J. Differential effects of mindful breathing, progressive muscle relaxation, and loving-kindness meditation on decentering and negative reactions to repetitive thoughts. Behavior Research and Therapy. 2010; 48: 1002 – 1011.
110. Baer R, Carmody J, Hunsinger M. Weekly changes in mindfulness and perceived stress in a mindfulness-based stress reduction program. Journal of Clinical Psychology. 2012; 68: 755 -765.
111. Kabat-Zinn J. Mindfulness meditation. What it is, what it isn't, and its role in health care and medicine. In Haruki Y, Suzuki M (eds.). Comparative and psychological study on meditation. Delft: Eburon Publishers; 1996.
112. Bakker AB, Demerouti E. The Job Demands-Resources model: state of the art. Journal of Managerial Psychology. 2007; 2(3): 309-328.
113. Schelvis RMC, Oude Hengel KM, Wiezer NM, Blatter BM, Genabeek van JAGM, Bohlmeijer ET, et al. Design of the bottom-up innovation project – a participatory, primary preventive, organizational level intervention on work-related stress and well-being for workers in Dutch vocational education. BMC Public Health 2013; 13: 760.
114. Klink van der JJL, Burdorf A, Schaufeli WB, Wilt van der GJ, Zijlstra FRH, Brouwer S, et al. Duurzaam inzetbaar: werk als waarde. Den Haag: ZonMw; 2010.

3

Chapter 3

Effects of mindfulness-based stress reduction training on healthcare professionals' mental health: Results from a pilot study testing its predictive validity in a specialized hospital setting

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Abstract

Objectives: This pilot study aimed to evaluate the feasibility and acceptability of a Mindfulness-Based Stress Reduction (MBSR) training and to examine positive and negative symptom-focused mental health variables.

Methods: The mental health variables were used to test the predictive validity of the training among healthcare professionals. Thirty healthcare professionals participated in this non-randomized pre-post intervention pilot study. The questionnaire on mental health was filled in twice. Baseline and post-intervention differences were tested with paired samples t-tests and Wilcoxon signed-rank tests. The participants' evaluation of the training was assessed with a 5-item questionnaire.

Results: The recruitment and retention were successful, and participants' evaluation of the training was positive. In comparison with baseline at post-intervention participants showed significant improvements in general mindfulness, the burnout dimension personal accomplishment, quality of sleep, positive emotions, and self-efficacy. A significant decrease was found for stress level, negative emotions at word, and worrying. No significant changes were found for the burnout dimensions emotional exhaustion and mental distance, and work engagement. The measures showed ample within-person differences and low, medium, or high effect sizes. The current trial approach of the MBSR training seems feasible and acceptable.

Conclusion: Our results suggest that mindfulness, burnout, stress level, quality of sleep, positive emotions at work, negative emotions at work, self-efficacy and worrying are meaningful mental health variables for inclusion in a larger-scale Randomized Controlled Trial on the effects of MBSR.

Introduction

Work-related stress is an inherent feature of industrialized nations [1]. The World Health Organization (WHO) [1] p. 13 defines work-related stress as "a pattern of reactions that occurs when workers are presented with work demands not matched to their knowledge, skills or abilities and which challenge their ability to cope." According to the European Agency for Safety and Health at Work [2], 51% of the workers in Europe consider work-related stress to be common in their workplace. In the Netherlands, 59% of workers believe that work-related stress is prevalent [2]. In European workplaces, the most commonly perceived causes of work-related stress are job reorganization or job insecurity (72%) and workload or hours worked (66%) [2]. Empirical research has found that work-related stress has effects like decreased productivity at work and increased absenteeism and work-related turnover [3, 4].

Working in healthcare is particularly stressful, which is reflected in the fact that 61% of European healthcare professionals experience work-related stress [2]. In comparison with other categories of workers, healthcare professionals are more likely to indicate that workload/working hours (77%), unacceptable behavior, such as mobbing and coercion (64%), and lack of support from colleagues or superiors to fulfill their role (61%), are causes of work-related stress [2].

The situation in healthcare can be harmful for healthcare professionals and their organizations [5-7]. In particular earlier research in the Netherlands [8] mentioned that the most burnout complaints occur in the occupational sectors education (22.1%) and healthcare (17.9%) and that these are caused by little autonomy, high workload, lack of support, and unacceptable behaviors. Work-related stress has also a distressing economic impact: The Netherlands Organisation for Applied Scientific Research (TNO) [9] estimated the costs of stress-related absenteeism for employers in the Netherlands to be €1.8 billion each year.

Amanullah, McNally, Zelin, Cole, and Cernovsky [10] concluded that hospital physicians who had significantly higher average scores on two subscales of the Maslach Burnout Inventory (emotional exhaustion and mental distance) benefited from prevention programs, such as those based on mindfulness or Cognitive Behavior Therapy. McCain, McKinley, Dempster, Campbell, and Kirk [11] confirmed the need for interventions to help doctors acquire appropriate coping mechanisms. They also reported high levels of burnout in primary and secondary care doctors, despite high levels of resilience. Yang, Meredith, and Kahn's study [12] showed that higher levels of mindfulness among mental health professionals are associated with lower levels of stress and burnout (i.e., emotional exhaustion and mental distance).

Mindfulness-Based Stress Reduction (MBSR) [13], originally developed to relieve the suffering or stress of patients with chronic pain [14], is the most common form of secular mindfulness-based training [15]. Mindfulness is defined as the awareness that

arises through intentionally attending in an open, caring, and discerning way [16]. This definition integrates three elements. The first element is intention, referring to one's personal goals and values, and reflecting *why* individuals pay attention. The second element is attention, i.e., attending to experiences in the here and now. The third element, attitude, relates to *how* individuals pay attention: in a non-judgmental way, with curiosity and compassion [17].

The literature demonstrates that mindfulness meditation has a positive impact on health and well-being in different populations, e.g., patients, healthy participants, students, and employees. Research initially reported positive benefits for various patient groups (e.g., those with chronic pain, anxiety, eating and major depressive disorders, fibromyalgia, psoriasis, or cancer) [18].

In a meta-analysis, Chiesa and Serretti [19] focused on the effects of MBSR on healthy participants and showed that mindfulness caused a significant reduction in stress levels. A more recent systematic review of the effects of MBSR on employees' mental health (see Chapter 2) reported reduced levels of emotional exhaustion (a dimension of burnout), stress, psychological distress, depression, anxiety, and occupational stress. In addition, improvements were found for mindfulness, personal accomplishment (a dimension of burnout), (occupational) self-compassion, quality of sleep, and relaxation.

In research on the relationship between MBSR and employees' mental health, the most commonly studied group of employees are healthcare professionals (see Chapter 2). Six reviews [20-25] and three reviews/meta-analyses [26-28] focused exclusively on healthcare professionals and students. MBSR benefits the physical and mental health of different groups of healthcare professionals in various ways (e.g., decreasing stress levels, burnout and anxiety, increasing personal well-being and self-compassion, enhancing presence when relating to others, compassion, and a sense of shared humanity). In line with these findings, Lamothe, Rondeau, Malboeuf-Hurtubise, Duval, and Sultan [22] showed that MBSR decreases burnout, stress, anxiety, and depression, and improves empathy in healthcare professionals.

Another systematic review about mindfulness-based interventions in the workplace, performed by Lomas, Medina, Ivtzan, Rupprecht, and Eiroa-Orosa [23], examined the impact of mindfulness on the well-being of healthcare professionals. Although the results of some outcomes, such as burnout, are equivocal, overall, their review suggests that mindfulness improves the well-being of healthcare professionals: it decreases mental health issues (e.g., anxiety, burnout, depression, distress and anger, stress and strain), increases well-being-related outcomes (e.g., compassion and empathy, emotional intelligence and regulation, health, mindfulness and awareness, relationships, resilience, well-being/satisfaction, and flourishing), and improves aspects of job performance.

The objective of this study was to evaluate the feasibility and acceptability of the MBSR training and to explore both its positive and negative effects on symptom-focused mental health variables. In view of this, we studied a group of healthcare professionals

(*N = 30*) at a hospital specialized in orthopedics, rheumatology and rehabilitation. As such, we investigated the predictive validity of the MBSR training for this group of professionals.

With respect to the positive and negative symptom-focused mental health variables, two expectations were investigated. The first expectation was that MBSR training would increase positive symptom-focused mental health outcomes: total mindfulness, the five dimensions of mindfulness (observing, describing, acting with awareness, non-judging, and non-reactivity), personal accomplishment (a dimension of burnout), quality of sleep, positive emotions at work, self-efficacy, and work engagement. The second expectation was that the MBSR training would decrease negative symptom-focused mental health outcomes: emotional exhaustion, mental distance (two dimensions of burnout), stress, negative emotions at work, and worrying.

Methods

Study design

This pilot study was designed as a non-randomized pre-post intervention aimed at evaluating the feasibility and acceptability of the training and examining within-person differences in healthcare professionals' mental health. A questionnaire was administered one week prior to the start of the intervention (baseline: T_0) and after the eight-week MBSR intervention period (post-intervention: T_1). The study has been carried out in the Netherlands in accordance with the Declaration of Helsinki of 1975. All participants gave their informed consent for inclusion before they participated in this study.

As our psychological intervention approach has low risk for the participants, it was not required - in the period of the pilot study (2011-2012) - to send the protocol to a Research Ethics Committee. However in 2015 the PhD plan of the first author (MJ), including the pilot study, was approved by the Ethical Committee of the HAN University of Applied Sciences (Registration no. ACPO 07.12/15). The randomized controlled trial is registered with the Dutch Trial Register (www.trialregister.nl): NL5581 (September 2016).

For feasibility reasons, we deviated from the original study protocol that included a control group as well, and conducted a quasi-randomized trial using a one-group pretest-posttest design [29].

Participants

Healthcare professionals (physicians, psychologists, physical therapists, nurses, social and pastoral workers, support workers, and managers) at a hospital specialized in musculoskeletal problems were approached in September, October and November 2011 by the head of the Human Resources department and managers of other departments and

invited to voluntarily participate in the pre-post intervention pilot study. The professionals willing to participate received a questionnaire that assessed a few inclusion criteria (i.e., being a healthcare professional in this specialized hospital; having worked there for at least two years, three days per week) and exclusion criteria (i.e., having attended mindfulness training over the past two years; having followed a stress reduction course, such as relaxation training or cognitive behavioral therapy, over the past two years).

Thirty healthcare professionals participated in the intervention, divided among two training groups of 15 participants each. The MBSR training of the first group started in December 2011, and the training of the second group started eight weeks later (in February 2012).

Intervention

The MBSR training used is primarily based on the MBSR program developed by Jon Kabat-Zinn [13]. The program consists of eight 2.5-hour weekly sessions and one 7-hour day of silence during working hours. A very important part of the training is the homework: 45 minutes of daily practice at home, six days per week, with the support of guided CDs and a customized workbook. MBSR includes:

- guided instruction in mindfulness meditation practices (body scan, sitting meditation);
- simple movement exercises (stretching and yoga);
- a short group discussion;
- informal meditation exercises: paying full attention to daily activities (e.g., brushing one's teeth, taking a shower, eating).

Two experienced mindfulness trainers (one being the first author) delivered the MBSR program. Both trainers meet the advanced criteria of the Center for Mindfulness of the University of Massachusetts Medical School (https://www.umassmed.edu/cfm/) and maintain regular personal meditation practices.

Outcome measures

Our selection of outcome variables measuring mental health to be included in the study started from a list of the 15 most important mental health outcomes, as mentioned in the systematic review of Janssen, Heerkens, Kuijer, Van der Heijden, and Engels (see Chapter 2). The level of evidence for the variables/outcomes was Level 2 ('it is plausible that ….'), which implied that at least two medium-quality RCTs show significance between groups differences, or Level 3 ('there are indications that …'), which meant that at least one medium-quality RCT shows significance. In the systematic review (SR), we found no studies that met the requirements for Level 1 ('it has been proven that ….'), which referred to significance between groups in at least two high-quality RCTs (see Chapter 2).

The selection of the mental health variables was as follows. First, we chose the three most important variables: mindfulness, burnout, and stress level. Second, except for one additional negative symptom-focused variable (negative emotions), we selected only positive symptom-focused variables: quality of sleep, positive emotions, self-efficacy, and work engagement. The main reason is that, as reported in Janssen et al.'s SR (see Chapter 2), most MBSR studies use negative symptom-focused variables, although positive outcomes may also indicate or contribute to well-being. Finally, one variable for which there was no evidence in the SR (Level 5) – worrying – was chosen as well. There are two reasons for this choice: 1) there were indications that many participants were worrying; and 2) Mindfulness-Based Cognitive Therapy, the most important adaptation of MBSR [30], decreases worrying [31].

Measurement instruments

Information on the feasibility and acceptability of the training were collected by assessing the recruitment rate, the retention rate, and the participants' evaluation of the training by means of five multiple choice items, followed by some questions in open-ended format [32]. The following open questions were used to gather additional information: "Did the training meet your expectations?; Does the training have a positive effect on your daily life?; Are you satisfied with the content and structure of the training?; Are you satisfied with the educational methods of the training?; Are you satisfied with the trainer(s)?"

The following well-validated questionnaires (in Dutch) were employed:

- the Dutch version of the Five Facet Mindfulness Questionnaire (FFMQ-NL) [33];
- the Dutch version of the Maslach Burnout Inventory – General Survey (MBI-GS): the Utrechtse BurnOut Schaal-Algemeen (UBOS-A; Utrecht Burnout Scale – General) [34-36];
- the stress scale of the Dutch Depression, Anxiety, and Stress Scales (DASS) [37];
- the Dutch sleep quality subscale of the Vragenlijst Beleving en Beoordeling van de Arbeid (VBBA; Questionnaire Perception and Assessment of Labor) [38];
- the Dutch version of the Job-related Affective Well-Being Scale (JAWS) [39, 40];
- the Dutch General Self-Efficacy Scale, a translated version of the original German instrument [41-44];
- the Dutch version of the shortened Utrecht Work Engagement Scale (UWES), the UBES-9 [45, 46];
- the Dutch VBBA worrying subscale [38].

Instrument selected to measure the primary outcome measure

Mindfulness skills were examined with the FFMQ-NL [18, 33]. The 39-item FFMQ-NL has a five-factor structure, which is captured in the following five subscales: *observing*, *describing*, *acting with awareness*, *non-judging* of inner experience, and *non-reactivity* to

inner experience. The FFMQ-NL total score is ranging from 39 to 195; the total scores of the subscales, except *non-reactivity* (7 to 35), are 8 to 40. Higher values indicate more mindfulness skills. The internal consistency (Cronbach's alpha) for the FFMQ-NL total score is 0.85 (for the non-meditating sample) and 0.90 (for the meditating sample); the Cronbach's alphas for the five subscales vary from 0.70 to 0.89. The five dimensions show modest but significant correlations among one another (ranging from 0.13 to 0.39), which suggests that they represent distinct but interrelated constructs. Overall, the psychometric properties of the FFMQ-NL [33] are comparable to the original English version [18].

Instruments selected to measure the secondary outcome measures

Burnout was measured using the Dutch version of the MBI-GS: the UBOS-A; Utrecht Burnout Scale – General [34-36]. The 15-item UBOS-A has a three-dimensional structure with three subscales: *emotional exhaustion*, *mental distance* (cynicism, depersonalization), and (job-related) *personal accomplishment*.

The total scores of the three subscales are ranging from 0 to 6. Higher values indicate more emotional exhaustion, more mental distance, and more personal accomplishment, respectively. Cronbach's alphas of the three subscales – emotional exhaustion (5 items), mental distance (4 items), and professional efficacy (6 items) – are 0.88, 0.81, and 0.75, respectively.

Stress was assessed with the 14-item stress scale of the Dutch 42-item Depression, Anxiety, Stress Scales (DASS). The total score on the stress scale is ranging from 0 to 21. Higher values indicate more stress. The DASS has a three-factor structure: depression, anxiety, and stress. The internal consistency (Cronbach's alpha) of the DASS factors is 0.94, 0.88, and 0.93, respectively [37].

Quality of sleep was measured using the Dutch sleep quality subscale of the 14-item VBBA (Questionnaire Perception and Assessment of Labor). The total score is ranging from 0 to 100. Higher values indicate less quality of sleep. The internal consistency (Cronbach's alpha) is 0.86 [38].

Positive and negative emotions at work were assessed by the 12-item Dutch version of the JAWS [39, 40]. The Dutch JAWS has a two-factor structure, which led to the following two subscales: a positive six-item emotions scale (Cronbach's alpha = 0.77) and a negative six-item emotions scale (Cronbach's alpha = 0.78). The total score on each subscale is ranging from 6 to 30. Higher values indicate more positive emotions and more negative emotions, respectively [40].

Self-efficacy was assessed using the Dutch General Self-Efficacy Scale, a translated 10-item version of the original German instrument [41]. The total score is ranging from 10 to 40. Higher values indicate more self-efficacy. The German scale has an internal consistency ranging from 0.75 to 0.91 [42, 43]. The Cronbach's alpha coefficient of the Dutch version is 0.85 [44].

Work engagement was assessed using the nine-item Dutch version of the shortened Utrecht Work Engagement Scale (UWES), the UBES-9 [45, 46]. The three-dimensional UWES consists of three 3-item subscales: vigor, dedication, and absorption. The total score of the UWES is ranging from 9 to 45. Higher values indicate more work-engagement. The internal consistency (Cronbach's alpha) for the total UBES-9 is 0.93 and the alphas for the three subscales vary from 0.79 to 0.89. The three work engagement scales are highly correlated (minimum = 0.65). The three factors are negatively correlated with the three dimensions of burnout [45].

Worrying was measured using the Dutch four-item VBBA worrying subscale. The total score is ranging from 0 to 100. Higher values indicate more worrying. The internal consistency (Cronbach's alpha) is 0.80 [38].

Statistical analyses

Normality of data was checked and verified by histograms, normal probability plots, and Shapiro-Wilk tests [47]. To examine the effects of MBSR training (differences between baseline and post-intervention) on mental health, we used t-tests for paired samples. Given the non-normally distributed variables on baseline and post-intervention, we also used the Wilcoxon signed-rank test. In this case, significance on the Wilcoxon signed-rank test was a requirement to accept significance on the t-test for paired samples (Table 2). Two-tailed tests were performed.

Effect sizes for the difference between means are reported: small (d = 0.20), medium (d = 0.50), and large (d = 0.80) [48, 49].

All statistical analyses were performed using IBM SPSS Statistics (Version 23). The level of significance was set at 0.05.

Results

The research population, a heterogeneous sample drawn from various occupational categories consisted of seven psychologists, two physical therapists, two nurses, five social/pastoral workers, five support workers, and nine managers. The mean age of the participants, consisting of 6 males and 24 females, was 44.5 years (range 27 to 64 years).

Regarding the recruitment phase, we received more applications (exceeding 40) than we offered places (30). Hence, a numerus fixus was needed; only the first 30 applications were admitted.

Of the 30 professionals, 29 (6 males and 23 females) completed the survey measure at both time points. The participation ("retention rate") of the 29 participants in the intervention study sessions can be summarized as follows: 17 of them participated in all nine sessions, 10 in eight sessions, 1 in seven sessions, and 1 in six sessions (M = 8.50, SD = 0.74). The 30th participant, a female manager, attended two sessions.

In Table 2 the participants' evaluation of the MBSR training is included. The participants' evaluation of the training (first question) showed that for 83% of the participants the training has met their expectations ("reasonable degree" or "absolutely"). For 62% of the participants the training had a positive effect on their daily life (second question). For the last three questions these percentages were 90%, 90%, and 97%, respectively.

Table 2. The participants' evaluation of the MBSR training

	Not at all	Somewhat	Reasonable degree	Absolutely
Did the training meet your expectations?	0	5	16	8
Does the training have a positive effect on your daily life?	0	11	13	5
Are you satisfied with the content and structure of the training?	0	3	16	10
Are you satisfied with the educational methods of the training?	0	3	17	9
Are you satisfied with the trainer(s)?	0	1	18	10

The mental health variables in Table 1 are presented in order of importance. Two criteria are considered: first, the level of evidence, and second, the number of studies reporting a particular (significant or non-significant) result . As shown in Table 1, statistically significant improvements were observed on many outcome variables, from baseline to post-intervention. Significant increases in the total mindfulness score and in four mindfulness dimensions, except 'describing,' were reported. The effect sizes were medium to large. Significant increases with medium effect sizes were also found for personal accomplishment, quality of sleep, positive emotions, and self-efficacy. Significant decreases, at least medium, were reported for stress level, negative emotions, and worrying. No significant improvements were observed for the variables: describing, emotional exhaustion, mental distance, and work engagement.

Table 1. Mental health variables' ratings before and after the Mindfulness-Based Stress Reduction (MBSR) training

	a T_0	*a* T_1	Min-max T_0 Min-max T_1	N	T_0: M (SD)	Normality+ T_0	T_1: M (SD)	Normality+ T_1	Wilcoxon Z (p 2-tailed)	Difference $T_1 - T_0$ M (SD)	t (df)	p t-test (2-tailed)	Effect size
FFMQ-NL	0.91	0.92	88.92 – 159.12 102.96-171.99	28	125.61 (17.09)	0.98 (.94)	137.14 (15.92)	0.98 (.83)		11.53 (14.44)	164.78(27)	**< 0.01**	0.80
Observing	0.80	0.70	14.00 – 34.00 21.04 – 34.00	28	25.86 (5.21)	0.95 (.24)	28.10 (3.39)	0.97 (.60)		2.25 (4.16)	22.90 (27)	**< 0.01**	0.54
Describing	0.81	0.91	17.04 – 35.04 14.00 – 37.04	28	26.54 (4.17)	0.99 (.96)	27.50 (5.43)	0.93 (.10)		0.96 (4.28)	9.54 (27)	0.24	0.23
Acting awareness	0.88	0.91	14.00 – 38.00 18.00 – 39.04	28	24.04 (5.34)	0.97 (.68)	26.00 (5.43)	0.95 (.28)		1.96 (4.26)	19.50 (27)	**0.02**	0.46
Non-judging	0.89	0.93	16.00 – 38.00 20.00 – 40.00	28	27.82 (6.14)	0.97 (.56)	31.25 (5.64)	0.96 (.43)		3.43 (4.02)	36.08 (27)	**< 0.01**	0.85
Non-reactivity	0.78	0.80	14.98 – 30.03 17.01 – 31.99	28	21.36 (4.09)	0.96 (.37)	24.29 (3.62)	0.98 (.75)		2.93 (3.96)	27.38 (27)	**< 0.01**	0.74
UBOS, emotional exhaustion subscale	0.84	0.89	0.60 – 4.40 0.00 – 4.20	27	1.99 (1.08)	0.92 (.05)	1.64 (1.00)	0.92 (.05)	-1.84[a] (.07)	-0.34 (1.09)	-1.63 (26)	0.12	0.31
UBOS, personal accomplishment subscale	0.82	0.85	1.50 – 5.67 2.17 – 6.00	27	4.00 (0.88)	0.96 (.36)	4.28 (0.94)	0.94 (.14)		0.28 (0.50)	2.94 (26)	**< 0.01**	0.57
UBOS, mental distance subscale	0.84	0.86	0.25 – 4.75 0.00 – 4.50	27	1.90 (0.96)	0.97 (.62)	1.62 (1.06)	0.92 (.04)	-1.62[a] (.11)	-0.28 (0.89)	-1.61 (26)	0.12	0.31
DASS, stress subscale	0.91	0.86	0.49 – 12.53 0.00 – 9.52	28	4.79 (3.28)	0.91 (.03)	3.21 (2.34)	0.92 (.04)	-2.52[a] (**.01**)	-1.57 (3.07)	-18.94 (27)	**0.01**[1]	0.51
VBBA, sleep quality subscale (complaints)	0.79	0.77	0 – 71 0 – 71	27	27.25 (22.06)	0.92 (.04)	19.05 (19.00)	0.86 (.00)	-2.68[a] (**<.01**)	-8.20 (13,97)	-305.10 (26)	**< 0.01**[1]	0.59
JAWS, positive emotions subscale	0.77	0.94	12.00 – 27.00 9.00 – 30.00	28	21.68 (3.35)	0.94 (.13)	23.36 (4.62)	0.94 (.12)		1.68 (3.59)	14.84 (27)	**0.02**	0.47
JAWS, negative emotions subscale	0.75	0.75	7.98 – 28.02 9.00 – 24.00	28	15.86 (4.08)	0.86 (.00)	13.07 (3.09)	0.92 (.04)	-3.30[a] (**<.01**)	-2.79 (4.05)	-21.84 (27)	**< 0.01**[1]	0.69

Dutch General Self-Efficacy Scale	0.86	0.90	24 – 40 27 – 40	28	31.43 (4.23)	0.98 (.86)	33.04 (4.01)	0.95 (.20)		1.61 (3,46)	24.60 (27)	**.02**	0.47
UWES	0.86	0.86	18.99 – 42.03 17.01 – 42.03	27	30.22 (5.65)	0.98 (.89)	30.63 (5.41)	0.95 (.22)		0.41 (3.90)	4.89 (26)	.60	0.11
VBBA, worrying subscale	0.71	0.72	0 – 100 0 -100	27	37.96 (34.23)	0.87 (.00)	24.07 (30.60)	0.77 (.00)	-2.52[a] (**.01**)	-13.89 (24.35)	-296.40 (26)	**< .01**[1]	0.57

α Cronbach's alpha

\+ Normality: statistic Shapiro-Wilk test (p-value); p-value > .05 indicates a normal distribution

a. Wilcoxon signed-rank test: based on positive ranks

1. Wilcoxon signed-rank test and t-test showed significance

Normality of the data was checked and verified by histograms, normal probability plots, and Shapiro-Wilk tests. To examine the effects of MBSR training on the incorporated mental health outcomes, we used t-test for paired samples, including effect sizes, for normally distributed mental health outcomes. The Wilcoxon signed-rank test and t-test for paired samples were used for non-normally distributed mental health outcomes. In this case, the outcomes of the t-test for paired samples can only be used if the Wilcoxon signed-rank test showed significance.

Bold: significant (two-tailed)

Discussion

The purpose of this pilot study was to measure the feasibility and acceptability of the current trial and to examine both positive and negative mental health variables which could be used to test the predictive validity of a MBSR training in a group of healthcare professionals. Two clustered expectations were investigated. The first expectation was that MBSR training would increase positive symptom-focused mental health outcomes. The second expectation was that MBSR training would decrease negative symptom-focused mental health outcomes.

Of the 130 contacted healthcare professionals, 40 showed interest for 30 available places. Of the 30 participants, 29 completed the survey measure at both time points. The degree of participation during the eight week MBSR program suggests that the participants showed willingness as reflected in an average total participation time of 8.5 sessions out of the nine sessions that were offered. Training compliance with the 45 minutes of daily practice at home and performing informal meditation exercises, during and after the training, was not assessed or reported. The participants' evaluation of the training was positive with regard to the content and the course of the training, but only moderately positive with respect to the influence of the training on daily life. A limitation is that the items to evaluate the MBSR training had only four scale points using rather rough wordings ("Not at all", "Somewhat", "Reasonable degree", "Absolutely"; see Table 2), which have prevented a more precise assessment.

Between baseline and post-intervention, the participants, a group of healthcare professionals (N = 30) at a specialized hospital, showed a significant improvement in general mindfulness (specifically, in four out of five mindfulness dimensions (except describing)), personal accomplishment, quality of sleep, positive emotions at work, and self-efficacy, and a significant decrease in emotional exhaustion (dimension of burnout), stress level, negative emotions at work, and worrying. These results, except for worrying, are in accordance with the findings in published reviews/meta-analyses [19-28]. There is plausible evidence for the effectiveness of the intervention for general mindfulness, emotional exhaustion and personal accomplishment (two dimensions of burnout), stress level, and quality of sleep, and indicative evidence for its effectiveness in the light of positive and negative emotions at work . The significant decrease in worrying is remarkable, because no previous reviews/meta-analyses [19-28] have mentioned this. Thus far, only studies on Mindfulness-Based Cognitive Therapy (MBCT) have reported decreases in worrying in relation to mindfulness training [30]. A possible explanation is that one of the MBSR trainers, who is educated in MBCT, introduced the CT component of MBCT in response to the worrying complaints of many participants. The CT component includes psychoeducation about the nature of thoughts ("thoughts are not facts") and the explicit link between one's thoughts and one's mood. It is possible that the decrease in worrying might have been caused by this additional CT component.

However, we found no significant changes for mental distance (dimension of burnout) and work engagement. In addition, the reliability of the instruments to measure mental health variables appeared adequate (see Cronbach's alpha in Table 1).

All mental health variables used (mindfulness, burnout, stress level, quality of sleep, positive emotions at work, negative emotions at work, self-efficacy, and worrying), except for work engagement, showed statistically significant effects of the MBSR training and seemed appropriate for a larger-scale RCT on its effects. When one dimension of a variable showed statistically significant effects, for sake of incorporating a broad scope of possible explaining variables, we argue that the variable should be included in follow-up research. Moreover, although work engagement revealed no statistically significant effects, we posit that the variable will still be appropriate for a larger-scale RCT as it comprises a positive counterpart of burnout [50]. We assume that in the daily healthcare context the sharing of positive experiences regarding stress reduction and burnout prevention at the workplace are just as important as statistically significant outcomes. For this reason, we not only reported the p-values in Table 1, but also the effect sizes [51]. For interested readers, we refer to Copay et al. [52] who discuss the concept of 'minimal clinically important difference' (MCID) and go into methods to assess this. So far, there is no academic consensus about the most appropriate method.

The participants of this study have different professions and different job characteristics, e.g., weekly work hours, work shift/no work shift, patient/no patient contact, supervisor/non-supervisor. That may influence mental health variables' ratings at baseline (e.g., emotional exhaustion, and stress level) and the opportunity to participate in the MBSR training. For this study, these job characteristics were not available and also some demographic data are lacking (e.g., education level, profession, years of experience, area of work, and previous experience with MBSR or meditation). This may be considered as a limitation of this pilot study. In a larger-scale RCT, such demographics will give researchers the opportunity to provide a more in-depth answer to the question of "which participants can benefit most from MBSR training?" In addition, it would be useful to examine the effects of MBSR training on experiencing job characteristics.

Training compliance as regards the 45 minutes of daily practice at home and performing informal meditation exercises was not reported. In a systematic review and meta-analysis, Parsons, Crane, Parsons, Fjorback, and Kuyken [53] reported a significant but small positive correlation between home practice and intervention outcomes. This should be considered in a larger-scale RCT too.

In addition, we only measured short-term effects, immediately after the MBSR training. Attending a MBSR training course requires a real investment (e.g., time, energy, and financial costs) and, from this perspective, examining long-term effects has high priority. We used questionnaires to measure variables and collect quantitative data using self-ratings. The reliance on these self-report data, however, may be subject to response bias. This study contained no qualitative data, which reduces our ability to investigate

in-depth the participants' experiences with the training and daily practice at home. There were no symptom-focused outcome measures related to work performance (e.g., caring efficacy, work behavior, work performance, and work ability). A few variables (mindfulness, self-efficacy, and worrying) were assessed using process-focused (mediating) measures, which may be suitable for capturing the mechanisms by which formal and informal mindfulness practice leads to specific outcomes, like mental and physical health and work performance. Moreover, no outcomes referred to perceptions of work characteristics (e.g., work pressure, emotional load, feedback, autonomy, and learning opportunities). That should be considered in a larger-scale RCT as well.

MBSR is a person-centered intervention, which seems to be only partly effective at improving employees' mental health [54]. However, stress can be caused both by personal characteristics and work characteristics. Therefore, an integrated approach that also considers the work context is needed [55].

To address most of these limitations, a larger-scale RCT (see Chapter 4) should assess the short- and long-term effects on a diversity of outcomes: negative and positive symptom-focused measures of mental health; work performance; process-focused outcome measures, and outcomes on work-related perceptions. Moreover, a larger, homogeneous sample or stratification is needed to be able to detect specific, statistically significant, demands and challenges of these groups with respect to the outcomes of MBSR training. Qualitative data are also needed to profoundly investigate the participants' experiences. The moderating effect of an additional organizational intervention, which may enhance the effects of the MBSR training, should be examined.

Conclusion

Significant improvements were found in general mindfulness, personal accomplishment, quality of sleep, positive emotions, and self-efficacy. A significant decrease was found in emotional exhaustion, stress level, negative emotions at work, and worrying. The results of this pilot study suggest that MBSR may help to improve employees' mental health. However no firm conclusions can be drawn.

The trial that is dealt with in this study seems to be feasible and acceptable and forms a sound basis for implementation in follow-up empirical research. The results suggest that mindfulness, burnout, stress level, quality of sleep, positive emotions at work, negative emotions at work, self-efficacy, and worrying are meaningful mental health variables, which makes it appropriate for a larger-scale RCT intended to investigate the effects of MBSR.

References

1. World Health Organization (WHO). Raising awareness of stress at work in developing countries: a modern hazard in a traditional working environment. Advice to employers and worker representatives. Protecting Workers' Health Series No. 6. 2007 5 December 2018]; Available from: http://apps.who.int/iris/bitstream/10665/42956/1/924159165X_eng.pdf.
2. European Agency for Safety and Health at Work. European opinion poll on occupational safety and health 2013. 2013 5 December 2018]; Available from: https://osha.europa.eu/en/surveys-and-statistics-osh/european-opinion-polls-safety-and-health-work/european-opinion-poll-occupational-safety-and-health-2013.
3. Gilboa S, Shirom A, Fried Y, Cooper C. A meta-analysis of work demand stressors and job performance: Examining main and moderating effects. Personnel Psychology. 2008; 61(2): 227-271.
4. Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. Journal of Occupational and Environmental Medicine. 2004; 46(4): 398-412.
5. Chou L-P, Li C-Y, Hu SC. Job stress and burnout in hospital employees: comparisons of different medical professions in a regional hospital in Taiwan. BMJ Open. 2014; 4(2).
6. Verweij H, van der Heijden FMMA, van Hooff MLM, Prins JT, Lagro-Janssen ALM, van Ravesteijn H, et al. The Contribution of Work Characteristics, Home Characteristics and Gender to Burnout in Medical Residents. Advances in Health Sciences Education. 2017; 22(4): 803-818.
7. Zangaro GA, Soeken KL. A meta-analysis of studies of nurses' job satisfaction. Research in Nursing & Health. 2007; 30(4): 445-458.
8. Hooftman WE, Mars GMJ, Janssen B, De Vroome EMM, Janssen BJM, Ramaekers MMMJ, et al. Nationale Enquête Arbeidsomstandigheden 2017. Methodologie en globale resultaten [National Survey of Working Conditions 2017. Methodology and overall results] (Dutch). 2018, Leiden/Heerlen: TNO; CBS.
9. Van der Ploeg K, Van der Pal S, De Vroome E, Van den Bossche S. De kosten van ziekteverzuim voor werkgevers in Nederland [The costs of absenteeism for employers in the Netherlands] (Dutch). 2014, Leiden: TNO.
10. Amanullah S, McNally K, Zelin J, Cole J, Cernovsky Z. Are burnout prevention programs for hospital physicians needed? Asian Journal of Psychiatry. 2017; 26: 66-69.
11. McCain RS, McKinley N, Dempster M, Campbell WJ, Kirk SJ. A study of the relationship between resilience, burnout and coping strategies in doctors. Postgraduate Medical Journal. 2018; 94(1107): 43-48.
12. Yang S, Meredith P, Khan A. Is mindfulness associated with stress and burnout among mental health professionals in Singapore? Psychology, Health & Medicine. 2017; 22(6): 673-679.
13. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. 1990, New York: Delacorte.
14. Reb J, Atkins PWB. Introduction. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 1-16, 2015.
15. Chaskalson M, Hadley SG. Mindfulness: historical and contemplative context and recent developments. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 42 - 66, 2015.
16. Shapiro SL, Carlson LE. The art and science of mindfulness: integrating mindfulness into psychology and the helping professions. 2009, Washington, DC: American Psychological Association Publications.

17. Shapiro SL, Wang MC, Peltason EH. What is mindfulness, and why should organizations care about it? . In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 17-41, 2015.
18. Baer RA, Smith GT, Lykins E, Button D, Krietemeyer J, Sauer S, et al. Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. Assessment. 2008; 15(3): 329-342.
19. Chiesa A, Serretti A. Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. Journal of Alternative & Complementary Medicine. 2009; 15(5): 593-600.
20. Escuriex BF, Labbé EE. Health care providers' mindfulness and treatment outcomes: A critical review of the research literature. Mindfulness. 2011; 2(4): 242-253.
21. Irving JA, Dobkin PL, Park J. Cultivating mindfulness in health care professionals: A review of empirical studies of mindfulness-based stress reduction (MBSR). Complementary Therapies in Clinical Practice. 2009; 15(2): 61-66.
22. Lamothe M, Rondeau E, Malboeuf-Hurtubise C, Duval M, Sultan S. Outcomes of MBSR or MBSR-based interventions in health care providers: A systematic review with a focus on empathy and emotional competencies. Complementary Therapies in Medicine. 2016; 24: 19.
23. Lomas T, Medina JC, Ivtzan I, Rupprecht S, Eiroa-Orosa FJ. A Systematic Review and Meta-analysis of the Impact of Mindfulness-Based Interventions on the Well-Being of Healthcare Professionals. Mindfulness. 2019; 10(7): 1193-1217.
24. Morgan P, Simpson J, Smith A. Health Care Workers' Experiences of Mindfulness Training: a Qualitative Review. Mindfulness. 2015; 6(4): 744-759.
25. Smith SA. Mindfulness-Based Stress Reduction: An Intervention to Enhance the Effectiveness of Nurses' Coping With Work-Related Stress. International Journal of Nursing Knowledge. 2014; 25(2): 119-131.
26. Burton A, Burgess C, Dean S, Koutsopoulou GZ, Hugh-Jones S. How Effective are Mindfulness-Based Interventions for Reducing Stress Among Healthcare Professionals? A Systematic Review and Meta-Analysis. Stress and Health. 2017; 33(1): 3.
27. Guillaumie L, Boiral O, Champagne J. A mixed-methods systematic review of the effects of mindfulness on nurses. Journal of Advanced Nursing. 2017; 73(5): 1017.
28. Regehr C, Glancy D, Pitts A, Leblanc VR. Interventions to reduce the consequences of stress in physicians: a review and meta-analysis. Journal of Nervous & Mental Disease. 2014; 202(5): 353-359.
29. Harris AD, McGregor JC, Perencevich EN, Furuno JP, Zhu J, Peterson DE, et al. The use and interpretation of quasi-experimental studies in medical informatics. Journal of the American Medical Informatics Association. 2006; 13(1): 16-23.
30. Williams JMG. Mindfulness, Depression and Modes of Mind. Cognitive Therapy and Research. 2008; 32(6): 721.
31. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for depression; a new approach to preventing relapse. 2002, New York: Guilford Press.
32. Junyong I. Introduction of a pilot study. Korean Journal of Anesthesiology. 2017; 70(6): 601-605.
33. de Bruin EI, Topper M, Muskens JGAM, Bögels SM, Kamphuis JH. Psychometric properties of the Five Facets Mindfulness Questionnaire (FFMQ) in a meditating and a non-meditating sample. Assessment. 2012; 19(2): 187-197.
34. Maslach C, Jackson SE. The Measurement of Experienced Burnout. Journal of Occupational Behavior. 1981; 2: 99.
35. Schaufeli W, Van Dierendonck D. Handleiding van de Utrechtse Burnout Schaal (UBOS) [Utrecht Burnout Scale Manual] (Dutch). 2000, Amsterdam: Harcourt Assessment B.V.

36. Schaufeli WB, Leiter MP, Maslach C, Jackson SE. Maslach Burnout Inventory-General Survey. In Maslach C, Jackson SE, Leiter MP. The Maslach Burnout Inventory-Test Manual., Palo Alto, CA: Consulting Psychologists Press, 1996.
37. Nieuwenhuijsen K, de Boer A, Verbeek J, Blonk RWB, van Dijk FJH. The Depression Anxiety Stress Scales (DASS): detecting anxiety disorder and depression in employees absent from work because of mental health problems. Occupational and Environmental Medicine. 2003; 60: 77-82.
38. Van Veldhoven M, Meijman TF, Broersen JPJ, Fortuin RJ. Handleiding VBBA. [VBBA Manual] (Dutch). 2002, Amsterdam: SKB Vragenlijst Services.
39. Van Katwyk PT, Fox S, Spector PE, Kelloway EK. Using the Job-Related Affective Well-Being Scale (JAWS) to investigate affective responses to work stressors. Journal of Occupational Health Psychology. 2000; 5(2): 219-230.
40. Schaufeli W, van Rhenen W. Over de rol van positieve en negatieve emoties bij het welbevinden van managers: Een studie met de Job-related Affective Well-being Scale (JAWS) = About the role of positive and negative emotions in managers' wellbeing: A study using the Job-related Affective Well-being Scale (JAWS). Gedrag en Organisatie. 2006; 19(4): 323-344.
41. Jerusalem M, Schwarzer R. Self-efficacy as a resource factor in stress appraisal processes. In Schwarzer R. Self-efficacy: Thought control of action. Washington DC: Hemisphere Publishing Corporation; 195-213, 1992.
42. Schwarzer R. Measurement of perceived self-efficacy. Psychometric scales for cross-cultural research. 1993, Berlin: Freie Universität Berlin.
43. Schwarzer R, Jerusalem M. Self-efficacy measurement: generalized self-efficacy scale. In Weinman J, Wright S, Johnston M. Measures in health psychology: A user's portfolio. Causal and control beliefs. Windsor, UK: NFER-Nelson; 35-37, 1995.
44. Schwarzer R. General Perceived Self-Efficacy in 14 Cultures 12 March 2020]; Available from: http://userpage.fu-berlin.de/~health/world14.htm.
45. Schaufeli W, Bakker A. Voorlopige handleiding Utrechtse Bevlogenheidschaal (versie 1). [Preliminary handbook for the Utrecht Work Engagement Scale (version 1)] (Dutch). 2003, Utrecht: Universiteit Utrecht.
46. Schaufeli WB, Salanova M, González-romá V, Bakker AB. The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach. Journal of Happiness Studies. 2002; 3(1): 71-92.
47. Twisk JW. Inleiding in de toegepaste biostatistiek. [Introduction to applied biostatistics] (Dutch). 2010, Amsterdam: Reed Business.
48. Field A. Discovering statistics using IBM SPSS statistics. 4 ed. 2016, London: Sage Publications Ltd.
49. Cohen J. A power primer. Psychological bulletin. 1992; 112(1): 155-159.
50. Schaufeli WB. Applying the Job Demands-Resources model: A 'how to' guide to measuring and tackling work engagement and burnout. Organizational Dynamics. 2017; 46(2): 120-132.
51. Stang A, Poole C, Kuss O. The ongoing tyranny of statistical significance testing in biomedical research. European Journal of Epidemiology. 2010; 25(4): 225-230.
52. Copay AG, Subach BR, Glassman SD, Polly DW, Schuler TC. Understanding the minimum clinically important difference: a review of concepts and methods. The Spine Journal. 2007; 7(5): 541.
53. Parsons CE, Crane C, Parsons LJ, Fjorback LO, Kuyken W. Home practice in Mindfulness-Based Cognitive Therapy and Mindfulness-Based Stress Reduction: A systematic review and meta-analysis of participants' mindfulness practice and its association with outcomes. Behaviour Research and Therapy. 2017; 95: 29.

54. Schelvis RMC, Oude Hengel KM, Wiezer NM, Blatter BM, van Genabeek JAGM, Bohlmeijer ET, et al. Design of the Bottom-up Innovation project - a participatory, primary preventive, organizational level intervention on work-related stress and well-being for workers in Dutch vocational education. BMC Public Health. 2013; 13(1): 1-15.
55. Van der Klink JJL, Burdorf A, Schaufeli WB, Van der Wilt GJ, Zijlstra FRH, Brouwer S, et al. Duurzaam inzetbaar: werk als waarde. [Sustainable employability: work as value] (Dutch). 2010, The Hague: The Netherlands Organisation for Health Research and Development (ZonMw).

4

Chapter 4

A study protocol for a cluster randomised controlled trial on mindfulness-based stress reduction: Studying effects of mindfulness-based stress reduction and an additional organisational health intervention on mental health and work-related perceptions of teachers in Dutch secondary vocational schools

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Abstract

Background: Dutch teachers in secondary vocational schools suffer from stress and burnout complaints that can cause considerable problems at work. This paper presents a study design that can be used to evaluate the short- and long-term effectiveness of Mindfulness-Based Stress Reduction (MBSR), a person-focused intervention, both within and without the context of an additional organisational health intervention.

Methods: The proposed study comprises a cluster randomised controlled trial that will be conducted in at least three secondary vocational schools, for which teachers will be recruited from three types of courses: Care, Technology, and Economy. The allocation of the intervention programme to the participating schools will be randomised. The teachers from each school will be assigned to either Intervention Group 1 (IG 1), Intervention Group 2 (IG 2), or the Waiting List Group (WG). IG 1 will receive MBSR training and IG 2 will receive MBSR training combined with an additional organisational health intervention. WG, that is the control group, will receive MBSR training one year later. The primary outcome variable of the proposed study is mindfulness, which will be measured with the Dutch version of the Five Facet Mindfulness Questionnaire (FFMQ-NL). In the conceptual model, the effects of teachers' mindfulness resulting from the intervention programmes (MBSR training and MBSR training combined with an additional organisational health intervention) will be related to salient (secondary outcome) variables: mental health outcomes (e.g., burnout, work engagement), work performance, work-related perceptions (job demands and job resources), and personal competencies (e.g., occupational self-efficacy). Data will be collected before (T_0) and immediately after the MBSR training (T_1), and three (T_2) and nine months (T_3) after the training. The power analysis revealed a required sample size of 66 teachers (22 in each group).

Discussion: The proposed study aims to provide insight into: (1) the short- and long-term effects of MBSR on teachers' mental health, (2) the possible enhancing effects of the additional organisational health intervention, and (3) the teachers' experiences with the interventions (working mechanisms, steps in the mindfulness change process). Strengths of this study design are the use of both positive and negative outcomes, the wide range of outcomes, both outcome and process measures, longitudinal data, mixed methods, and an integral approach. Although the proposed study protocol may not address all weaknesses of current studies (e.g., self-selection bias, self-reporting of data, the Hawthorne effect), it is innovative in many ways and can be expected to make important contributions to both the scientific and practical debate on how to beat work-related stress and occupational burnout, and on how to enhance work engagement and work performance.

Background

Work-related stress and its consequences

Dutch society needs healthy teachers to maintain and improve the quality of the education sector and to enhance student performance [1]. In all sectors, however, work-related stress has become an inherent feature of the employment relationship in industrialised countries such as the Netherlands [2]. Work-related stress is an increasingly important cause of workers' mental health problems, such as stress symptoms, overstrain, and burnout, which can decrease work performance [3, 4]. In 2017, almost one in six Dutch employees reported stress or burnout complaints. In the educational sector, this figure was more than one in five employees [5]. More than 30% of teachers have reported that major changes in the work context are an important cause of work-related stress. Teachers are expected to meet higher job demands (e.g., high workload, emotional strain) with fewer job resources, especially less professional autonomy [5].

Job demands can be defined as the physical, social, or organisational aspects of the job that require sustained physical or psychological effort [6]. The increase in teachers' workload is caused by numerous administrative tasks and school reforms. The growing needs of students also generate emotional strain [7]. Job resources can be defined as the physical, social, or organisational aspects that may help teachers to achieve goals and to stimulate learning and development. As such, job resources can buffer the influence of job demands [6, 8].

Work-related stress is associated with several negative organisational outcomes, such as increased absenteeism and early retirement [5]. In comparison with the agriculture, information and communication sectors, the absenteeism rate in the educational sector is relatively high: 5.3% in the latter versus less than 3% in the former sectors in 2017 [5]. In the Netherlands, the costs of work-related stress absenteeism for the total workforce is €1.8 billion, of which €275 million involves the costs in the educational sector. Work stress-related absenteeism costs are the highest in the educational sector: almost €6000 (number of days x costs per day) for each employee who is absent [9]. When a teacher is absent, organisations in the educational sector strongly rely on the (mostly serendipitous) availability of substitutable colleagues to cover for the absent worker. Consequently, colleagues are overloaded (i.e., a job demand), while the job resources they can draw from remain the same at best. This pattern creates an imbalance between these colleagues' job demands and resources, which can jeopardise their well-being [7]. This imbalance between job demands and resources and its associated risk of negative effects on one's well-being may be an important reason that many novice teachers leave the educational sector within the first five years of their career [10] and that many experienced teachers retire early. In fact, 45% to 70% of the early retirements in the educational sector can be attributed to psychosomatic and psychological problems [7]. Therefore, it is extremely important to reduce and prevent stress and absenteeism in the occupational sector and to develop effective mental health management interventions, which can be both person- and organisation-focused.

Mental health interventions in the educational sector

A high percentage of Dutch employees (57%), especially in the educational sector, ask for interventions to address work-related stress problems [5]. Many employers in this sector (48%) also recognise the risk of stress [5]. Preventive interventions can be classified as primary, secondary, or tertiary. Primary interventions, which are oriented to the organisational level, aim to change the sources of work-related stress. Secondary and tertiary interventions, both of which are focused on the individual employee, aim to decrease stress symptoms before they cause mental health problems and to treat mental health problems (e.g., burnout), respectively [11]. Mental health interventions in the educational sector are mostly secondary preventive and targeted at the individual level, with the goal of enhancing the ability of teachers to cope with stressors in the workplace [12-18]. Examples are workshops on stress management skills and Mindfulness-Based Stress Reduction (MBSR) programmes. MBSR has been shown to be partly effective in influencing mental health outcomes (see Chapter 2).

From a health perspective, primary prevention – when possible – is preferable to secondary and tertiary prevention. In their review of occupational stress interventions in Australia, Caulfield et al. [19] suggested that primary interventions generate more positive changes in comparison with individual-focused secondary or tertiary interventions. However, two meta-analyses on work-related stress interventions [20, 21] found no substantial differences between organisational-level and individual-level interventions. One explanation is the complexity of organisational-level interventions, which might hinder the implementation and measurement of outcomes [7, 22]. In view of this, an appropriate (i.e., mixed-methods) evaluation of an organisational health intervention may require considering multiple process outcomes to monitor the implementation process and to investigate in-depth the intervention's outcomes [7, 23]. We agree with Van der Klink et al. [24] that there is a need for an integrated approach that combines both an individual-focused intervention and an organisation-focused intervention.

Individual-focused secondary health intervention: MBSR

Two systematic reviews have shown that an MBSR intervention programme in the workplace can significantly affect deficit-based outcomes, such as emotional exhaustion (one of the three dimensions of occupational burnout), (occupational) stress, psychological distress, anxiety, and depression (see Chapter 2; [25]). Three systematic reviews also found significant improvements in asset-based outcomes, such as mindfulness, personal accomplishment (a dimension of burnout), (occupational) self-compassion, quality of sleep, relaxation, and job performance (see Chapter 2; [25, 26]. The systematic review by Donaldson-Feilder et al. [27] reported positive effects on the well-being, resilience and leadership capability of leaders/managers. Slutsky et al. [28] conducted a randomised controlled trial (RCT) and suggested that small doses of mindfulness training (half-day training) are sufficient to increase job productivity, but that larger doses (6-week training) are needed to improve

attentional focus at work, job satisfaction, and work-life balance. The systematic review by Donald et al. [29] found a positive relationship between mindfulness (both operationalised as a personality variable and as an intervention) and prosocial behaviour.

In a meta-analysis, Klingbeil and Renshaw [30] mentioned that mindfulness-based interventions with teachers are promising for increasing their mindfulness and psychological well-being and for decreasing psychological distress. Overall, they concluded that their findings were similar to the outcomes found in other meta-analyses of the effects of such interventions on employees' mental health.

Research on mindfulness is often criticised for its poor methodological quality [31, 32]. However, it is impossible to do such research using a double-blind placebo-controlled design, which is often applied in medical interventions [33]. It is obvious that participants cannot be kept blind to the fact that they are (or are not) assigned to an MBSR training programme. This raises questions about which methodological features should be included to improve the research design. Goldberg et al. [31] highlighted six features: 1) active control conditions to consider the amount of non-specific attention participants receive, called the Hawthorne effect [34]; 2) larger sample sizes; 3) longer follow-up assessment to measure the sustainability of training effects; 4) evaluation of treatment fidelity; 5) reporting of instructors' skill levels; and 6) Intention-To-Treat (ITT) analysis. Three other important features are assessing a diversity of outcomes (negative and positive, process and effect measures, mental health and work performance); using a mixed-methods approach that combines quantitative and qualitative data; and combining an individual-focused intervention, such as MBSR, with an additional organisational intervention (i.e., taking an integrated approach) (see Chapter 2).

Organisational health interventions

The key points of participatory action research (PAR) [35] are the effective ingredients for organisational interventions: having a bottom-up approach; composing a participatory group; fostering active participation by stakeholders (e.g., employees) and collaboration between researchers and stakeholders; using stakeholders' knowledge, skills, and perceptions; and creating joint ownership of problems and solutions [7]. Solutions from stakeholders appeared more effective than solutions adopted by others [36]. The belief that one is the master of one's own behaviour and is able to influence others and the environment (i.e., an internal locus of control) is crucial [37]. In other words, the organisational health intervention should target individuals' occupational self-efficacy: the belief in one's own ability in a specific domain of work. The most effective way to enhance one's self-efficacy is through mastery of experiences [7, 38]. By taking part in the organisational intervention or even by experiencing its effects, we assume that occupational self-efficacy can be influenced to decrease burnout. Indeed, Consiglio et al. [39] found a negative relationship between occupational self-efficacy and burnout, which appeared to be partially mediated by job demands and job resources.

Aim of the proposed study

The proposed study aims to contribute to the debate on prevention of work-related stress and burnout, and improvement of work engagement and work performance by evaluating the short- and long-term effectiveness of MBSR, being an individual-focused intervention, on teachers in secondary vocational schools, as an example of a possible application area. It will look at the effects of the intervention on teachers' mental health (mindfulness as primary outcome), work performance, work-related perceptions (job demands and job resources), and personal competencies. In addition, it will investigate the effects of a participatory, preventive, organisational health intervention (i.e., a participatory action approach) that targets and engages teachers in a specific course. We hypothesise that participating in the organisational health intervention will positively influence occupational self-efficacy. The application of the organisational health intervention will generate tailored work solutions that may positively influence the balance between job demands (work pressure, work-life balance) and job resources (autonomy, feedback, relationships) for all teachers in schools.

Conceptual model

For this study, we will use a conceptual model (see Figure 1) inspired by the Job Demands-Resources (JD-R) model [6, 8] and the mindfulness literature (see Chapter 2; [40-42]). The JD-R model and the mindfulness literature present two different but complementary points of view on work stress. The original JD-R model has been expanded to include personal resources, aspects of the self, referring to one's ability to influence successfully the environment. Examples are self-efficacy, emotional stability, extraversion, and resilience [43, 44]. Both the original and expanded model suggest that job characteristics (i.e., job demands and job resources) can influence work stress via two processes. The first process was referred to by Demerouti et al. [6] as the health impairment process, in which high job demands exhaust workers' mental and physical resources and may therefore lead to a depletion of energy, exhaustion, health problems, and, eventually, premature retirement from their profession. The second process implies a motivational process: job resources have motivational potential that is either intrinsic (because they foster growth, learning and development) or extrinsic (because they are instrumental in achieving work goals) and lead to positive work outcomes [6]. Job resources and personal resources can buffer the effects of the job demands [6].

Mindfulness, the primary outcome in our study, can reduce stress by separating work characteristics from employees' reactions to them. This enables the individual to become aware of the difference between observation and interpretation [45].

Figure 1 depicts the conceptual model, including the processes mentioned above and how these relate to mental health outcomes. The right-hand side of the conceptual model presents the study's secondary outcome variables: mental health outcomes (mindfulness, burnout, stress, sleep quality complaints, positive and negative emotions

at work, work engagement, perceived general health, organisational commitment) and work performance outcomes (work performance and work behaviour, absenteeism) (see Chapter 2).

The relationships between the two interventions (MBSR and MBSR with an additional organisational health intervention), on the one hand, and the two clusters of outcome variables, on the other hand, are mediated by two clusters of process variables, which are presented in the middle of the model. The first cluster contains personal competencies that represent the personal resource outcomes resulting from the interventions (occupational self-efficacy, taking distance, as the opposite of worry) [40-42]. The second cluster contains secondary outcome variables: work-related perceptions that refer to how an individual worker experiences work characteristics. In line with the JD-R model, we make a distinction between job demands (work pressure, emotional demands, work-life balance) and job resources (autonomy, feedback from colleagues and superior, relationship with colleagues, relationship with superior, relationship with students).

We assume that the Five-Factor-Model of personality, that is the Big Five [46], especially the factors of extraversion and openness, can be expected to positively moderate mental health and work performance. The Big Five consists of five personality characteristics or traits, that are fixed and cannot be developed, in contrary to personal competencies.

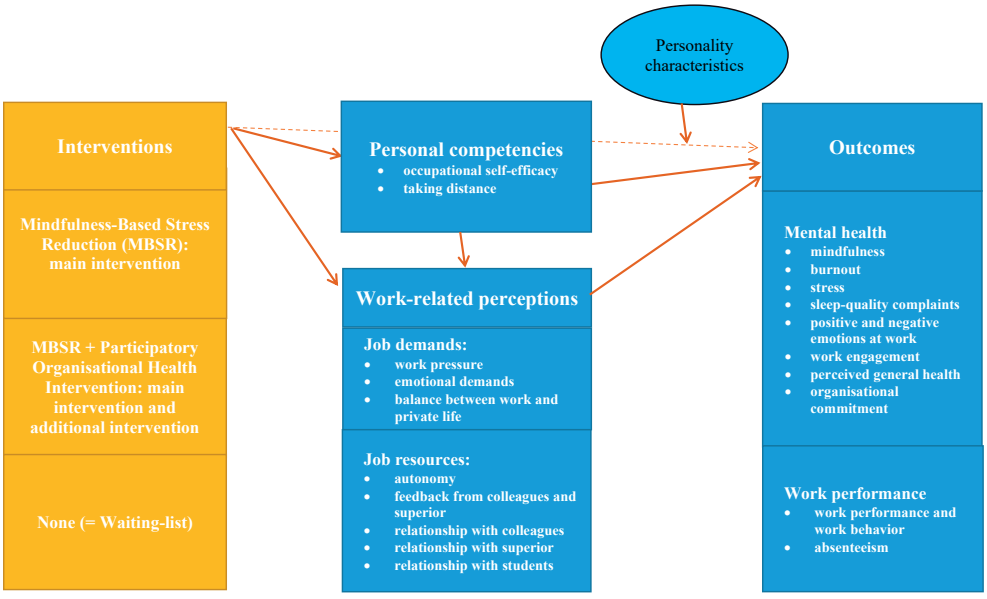

Figure 1: Conceptual model

Methods/design

Study organisation

The proposed study is a cluster randomised controlled trial (CRCT) that uses a mixed-methods design (quantitative and qualitative, online questionnaire, telephone and face-to-face interviews) and contains four measurement moments (see Figure 2). The Ethics Committee Practice based Research of het HAN University of Applied Sciences (ECPR) and the Medical Ethics Committee (METC) of Radboud University Medical Centre, both located in Nijmegen, the Netherlands, approved the research proposal (Registration no. ACPO 07.12/15; File number CMO: 2019-5266). Both committees stated that the research complied with the requirements of ethical conduct of research as set out in the national Code of Conduct for Scientific Integrity in the Netherlands and that it fulfilled the criteria of the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects. The study will be carried out in the Netherlands in full compliance with the applicable rules concerning the review of research ethics committees. Participation is voluntary and participants can withdraw at any moment with no consequences. The study title given to the potential participants and other stakeholders is: 'Mindfulness and job satisfaction of teachers in secondary vocational schools'. Participants will sign informed consent forms before participating in this study. They will be asked if they agree to use of their data should they choose to withdraw from the trial. This trial does not involve collecting biological specimens for storage.
Significant deviations of the protocol will be documented using a breach report form and will be sent to the funder NWO and to the Ethics Committees. The protocol in the trial register will be updated. A Standard Protocol Items Recommendations for Interventional Trials (SPIRIT 2013) checklist (see Additional file 1) and figure (see Table 1) are provided.

Table 1: SPIRIT checklist

	Study period							
	Enroll-ment		Allo-cation	Before start	Post-allocation			
TIMEPOINT**		t_0			*Inter-vention*	t_1	t_2	t_3
ENROLLMENT:								
Eligibility screen	X							
Informed consent	X							
[List other procedures]	X							
Allocation			X					
INTERVENTIONS:								
MBSR training					X			
MBSR training and organizational health intervention					X			
Waiting List Group								
DATA COLLECTION by on line questionnaire:								
Demographics		X						
Primary outcome and secondary outcomes		X				X	X	X
Other data variables		X				X	X	X
DATA COLLECTION by interviews*:								
Expectations		X		X				
Experiences						X		X

* Interviews were only with some participants in MBSR training and MBSR training and organizational health intervention groups
** T0 = before the training; T1 = immediately after the training; T2 = three months after the training; T3 = nine months after the training

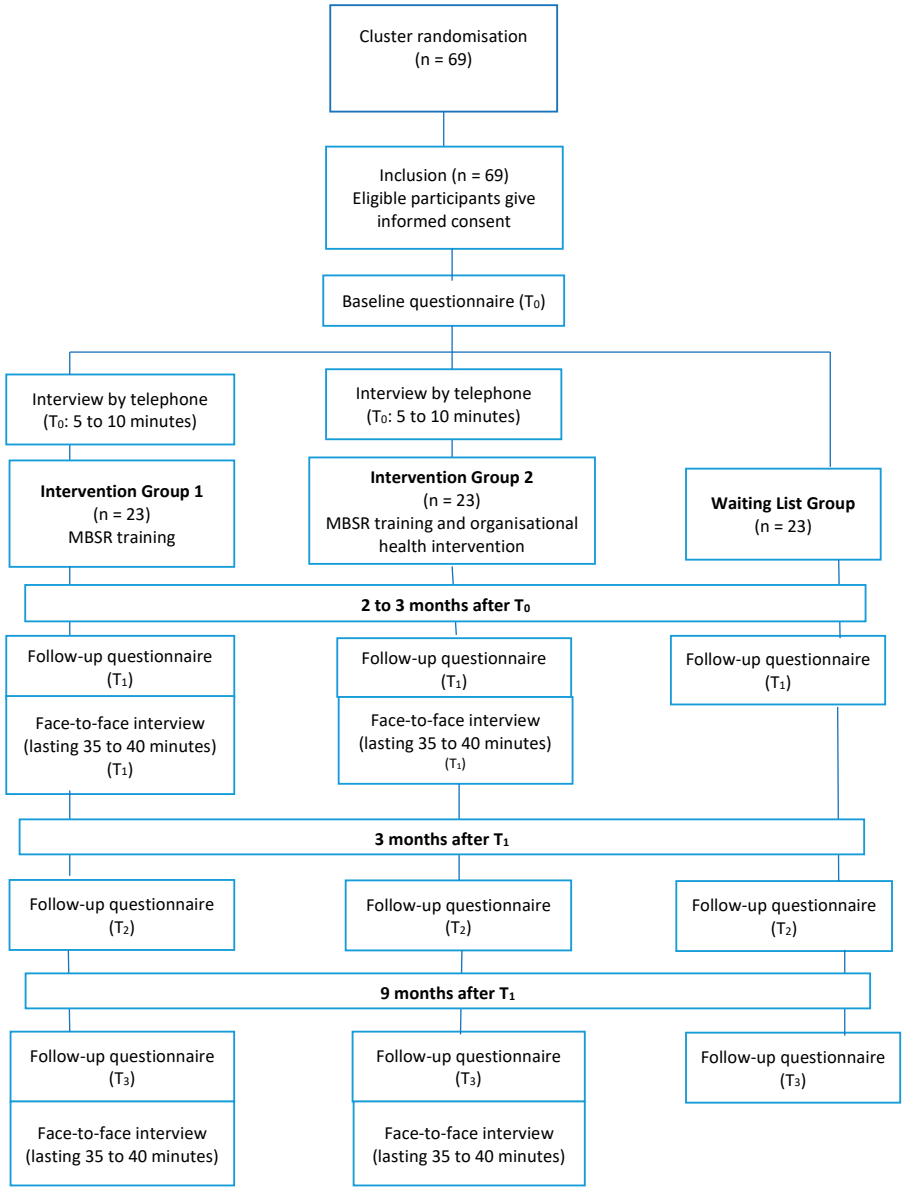

Figure 2: Flowchart showing the design of the trial

Participants and recruitment

Study participants will be recruited from the teaching staff at no fewer than three secondary vocational schools. When a secondary vocational school agrees to participate, we will recruit potential participants from three programmes (Care, Technology, and

Economy) using e-mail, posters, flyers, and each school's intranet. The researchers, HR consultants, and supervisors will inform potential participants about the research project.

Respondents who are willing to participate will be screened in terms of the eligibility criteria by the first author (MJ) (see Table 2). Eligible candidates will receive an information letter about the project. This letter includes the information as approved by the ECPR and the METC and the informed consent letter. One week before the start of the interventions, cluster randomisation will be conducted and the participants will be informed about their assignment to one of the intervention groups or the waiting list group.

Table 2: Eligibility criteria

Inclusion criteria	Exclusion criteria
Teachers in the Care, Technology, and Economy courses	Attended mindfulness training in the past 2 years
Employed in a secondary vocational school for at least 2.5 days a week for at least one year	Attended stress reduction training (e.g., cognitive therapy or relaxation training) in the past 2 years

Cluster randomisation

A CRCT is a randomised controlled trial in which groups of subjects (i.e., schools) are randomised rather than individual subjects (i.e., teachers) [47]. Cluster randomisation will be performed at the school level. This will provide the researchers with the opportunity to study the effects of an additional organisational health intervention that cannot be directed towards selected individuals (i.e., teachers) and to control for 'contamination' across individuals (i.e., the effects on one teacher may influence the effects on another teacher in the same course) [48]. In the first secondary vocational school (known as an MBO in Dutch), participating teachers from one course (Care, Technology, or Economy) will be assigned to Intervention Group 1 (IG 1: MBSR), teachers from another course will be assigned to Intervention Group 2 (IG 2: MBSR and an additional organisational health intervention), and teachers from the third course will be assigned to the Waiting List Group (WG). The allocation will be different at each school (see Table 3). A researcher who is not involved in assigning courses/participants to the groups will prepare concealed, consecutively numbered, sealed opaque envelopes. Every envelope will contain a paper indicating the treatment assignment at school level (type 1, 2 or 3). The MBO schools will receive their envelopes from a researcher who is unaware of the randomisation sequence. The MBO schools can open the envelope in the presence of the researcher and the researcher will be informed about the treatment assignment.

There is little evidence for the harmful effects of MBSR (see Chapter 2). Besides we will recruit participants from a healthy target population. Therefore there will be no special criteria for discontinuing or modifying allocated interventions. In case of (serious) adverse events and harms from the intervention, the participant concerned will be referred

to an occupational health professional and the project management group, consisting of YH, BVdH, PP and JE, the funder NWO and the Ethics Committees will be informed. A final decision to terminate the trial will be made by the project management group, deliberating at least every six weeks or more, when necessary.

The trial conduct will be audited by an annual evaluation report for the funding organization NWO. The report is also available for the Ethics Committees and the project management group, which will discuss the progress of the trial every six weeks. YH and JE will be responsible for the daily supervision of the trial. The implementation of the interventions and the data collection will be strictly separated.

Table 3: Cluster randomisation

	Care	Technology	Economy
MBO school, type 1	IG 1[a]	IG 2[b]	WG[c]
MBO school, type 2	WG	IG 1	IG 2
MBO school, type 3	IG 2	WG	IG 1

[a]: IG 1: Intervention group 1 (MBSR)
[b]: IG 2: Intervention Group 2 (MBSR and an additional organisational health intervention)
[c]: WG: Waiting List Group (control group that will receive MBSR one year later)

Procedures

All study participants will be asked to complete an online questionnaire on a secured website before the start of the intervention(s) (the starting date of the study is different for each school) (T_0). After completing the questionnaire, the participating schools will be randomly assigned (type 1, 2 or 3; see Table 3), meaning that participants will take part in IG 1, IG 2 or WG depending on the course where they are working. At T_0, the first author will conduct 10-minute telephone interviews with at least 12 participants from IG 1, and 12 participants from IG 2 about their expectations of the interventions. All participants will receive the other three follow-up questionnaires on a secured website after the MBSR training (T_1), three months later (T_2), and nine months after the MBSR training (T_3). The first author will conduct face-to-face interviews with at least 12 participants from IG 1 and 12 from IG 2 at T_1 and T_3. At T_1, some members of the participatory group that will be involved in the organisational health intervention – excluding the teachers participating in IG 2 (e.g., a superior, an HR consultant, and the director of the programme) – will be interviewed about the process and effects of the organisational health intervention.

Participants in IG 1 and IG 2 should attend at least four of the nine MBSR sessions, because Bear et al. [49] revealed that structural changes in perceived stress did not occur until four MBSR sessions (see Chapter 2). Participants in WG will attend a MBSR programme one year later.

The collected data will be stored on a secure disk to ensure confidentiality. Not the researcher (MJ) but an independent external organization, assigning encrypted numbers to the participants, will collect the data. The researcher (MJ) cannot link the numbers and the participants. Only the researcher (MJ), the members of the project management group and a methodologist (HK) will have access to the data.

Interventions

MBSR: main intervention

MBSR, developed by Kabat-Zinn [50], is the most common form of secular mindfulness-based training [51]. MBSR aims to reduce suffering or stress [52] and was originally developed for patients with chronic pain. This training programme is primarily based on Kabat-Zinn's curriculum [50], but it contains elements of Mindfulness-Based Cognitive Therapy (MBCT) [53]: in particular, a 3-min breathing space and psycho-education about the nature of thoughts. The MBSR programme will consist of eight 2.5-h weekly group sessions, each with 4–15 participants per group, homework involving 45 minutes of daily home exercise six days a week, and one 7-h of silence. The sessions will be supervised by one of the four recruited qualified mindfulness trainers, who will receive a training script. The first session will begin with a short introduction to the programme and meet and greet between participants. Each session will consist of different meditation exercises, enquiry, psycho-education, and a specific theme (see Table 4). At the end of each session, participants will be given homework that will be discussed in the subsequent session.

Additional Organisational health intervention

The organisational intervention, that will be used in the proposed study, will be developed by following a design-based approach [54] in accordance with the key points of PAR [35] with a grounding in the Job Demands-Resources (JD-R) model [6]. A design-based approach is pragmatic, based on theory, observations and experiences [55]. The organisational intervention will be developed following the steps of the design-based approach (see Figure 3). The JD-R model [6, 44] assumes a relationship between work characteristics (i.e., job demands and job resources) and work outcomes. High job demands lead to stress reactions and unhealthiness (exhaustion process), while high job resources increase motivation and productivity (motivational process).

Table 4: Content of MBSR group sessions

Session	Theme	Content of group sessions	Homework
1	Automatic pilot	· Introduction · Raisin-eating exercise · Body scan	· Body scan · Attention to routine activity · Eating one meal mindfully
2	Perceiving clearly	· Body scan · Imagery exercise to demonstrate the relationship between thoughts and feelings · Sitting meditation, paying attention to breathing	· Body scan · Attention to breath · Awareness of pleasant events · Attention to routine activity
3	From doing to being: a mode of doing and a mode of being	· Lying-down yoga exercises · Sitting meditation with a focus on breathing, bodily sensations, sounds · Pleasant events · Seeing exercise to demonstrate the difference between observation and interpretation · Three-minute breathing space (mini-meditation)	· Body scan · Lying-down yoga exercises · Attention to breath · Awareness of unpleasant events
4	Be present	· Three-minute breathing space (mini-meditation) · Standing yoga exercises · Unpleasant events; interrelatedness of bodily sensations, feelings, and thoughts · Sitting meditation with a focus on breathing, bodily sensations, sounds, feelings/emotions, and thoughts	· Body scan · Standing yoga exercises · Sitting meditation · Three-minute breathing space · Awareness of stress reactions
5	Recognising and allowing what really is: reacting versus responding	· Three-minute breathing space (mini-meditation) · Walking meditation · Sitting meditation with a focus on breathing, bodily sensations, sounds, feelings/emotions, thoughts, and random attention · Automatic stress reactions and stress response · Mid-term evaluation	· Meditation by choice · Three-minute breathing space · Awareness of difficult situations · Awareness of reactions in difficult situations

6	Mindful communication	· Standing yoga exercises · Sitting meditation with a focus on breathing, bodily sensations, sounds, feelings/ emotions, thoughts, and random attention · Mindful communication exercises	· Meditation by choice · Three-minute breathing space
Day of silence	Deepen mindfulness skills in silence	· Various meditation exercises · Silent lunch and tea break	
7	Taking care of yourself: balance in life	· Standing/lying yoga exercises · Sitting meditation · Communication exercises	· Meditation exercises without CD · Attention to routine activities
8	The rest of your life	· Different exercises · Own menu of mindfulness exercises · Maintaining practice: review of supports · Reflection on training · Saying goodbye	· Further sources of information

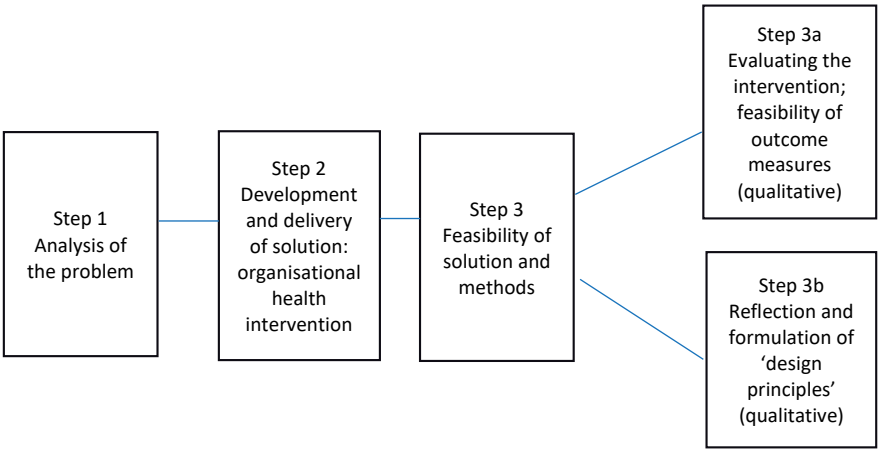

Figure 3: Steps of the design-based approach

The organisational health intervention will consist of two phases. In the first phase, the 'needs assessment phase', we will conduct a needs assessment using the knowledge, skills, and perceptions of teachers and educational managers to investigate the positive points (job resources) and the main difficulties (job demands) in the specific course. In the second phase, the "implementation phase", the teachers and managers will jointly determine the highest priorities and develop a feasible work-related action/ implementation plan.

A participatory group will be formed in the "needs assessment" phase. It will preferably include two teachers participating in the MBSR training, two other teachers (workplace), the HR consultant for the specific course (expert), a supervisor, the course director (decision-making power), an external facilitator, and relevant others from the workplace (e.g., a union member or a member of the formal employee participation committee).

The focus of the intervention is to stimulate dialogue between management and employees/teachers in which they can jointly investigate improvement opportunities and implement solutions that reduce stress and improve work pleasure. The intervention consists of approximately five sessions (see Table 5), starting with assessment of needs to the implementation of work-oriented solutions.

The programme theory or critical assumptions underpinning the organisational health intervention (*How would the intervention work if it were successfully implemented?*) [56] are as follows:

1) Involving an external facilitator (an expert in organisational change processes) and creating a participatory group that includes teachers, the Human Resources (HR) consultant, the director, and the managers will enable the group to establish the highest priorities and develop solutions to improve the working environment.
2) A supported, basic work-related action plan will be developed as well, consisting of: 'relatively easy and quick to solve' priorities (= quick wins), solutions, a timeline, necessary resources, and an implementation method.
3) The quick wins will be implemented immediately.
4) Healthy working in the course will be improved, dialogue between management and employees/teachers will be stimulated, and occupational self-efficacy will be increased.

Table 5: Sessions and content of participatory group sessions

Session	Content of participatory group sessions	Phase
1	· Introduction · Mutual expectations, drive and mission/vision. Mutual commitment · How to engage colleagues? · First inventory of positive points (job resources) and difficulties (job demands) for work pleasure in the course, as inspired by the JD-R model (Prioritising based on importance, level of influence, and the wait time for results)	1
2	· Which priorities do we choose? · Possible solutions · Action plan · Implementation plan	1
3	· Follow-up	2
4	· Follow-up	2
5	· Follow-up implementation · Maintaining, continuation, evaluation · Saying goodbye to the external facilitator	2

Waiting list group

The participants on the waiting list will receive MBSR after one year. They cannot attend a mindfulness training course or stress reduction training (e.g., cognitive therapy or relaxation training) until T_3.

Baseline characteristics of participants at T_0

Measures of the baseline characteristics of the participants are gender, age (years), family situation, level of education, nature of employment (course Care, Technology, or Economy), years of work experience, and number of working days and hours.

Outcome assessments and data collection

Primary outcome

Mindfulness skills will be examined using the Dutch version of the Five Facet Mindfulness Questionnaire (FFMQ-NL), a self-report measure based on a factor analysis of items from the five most widely used mindfulness questionnaires [57, 58]. The 39-item FFMQ-NL has a five-factor structure that is captured in the following five subscales: *observing*, *describing*, *acting with awareness*, *non-judging* of inner experience, and *non-reactivity* to inner experience. The FFMQ-NL total score ranges from 39 to 195; the total scores of the subscales are 8 to 40, except *non-reactivity* (7 to 35). Higher values indicate higher levels of mindfulness skills. De Bruin et al. [58] reported an internal consistency (Cronbach's alpha) for the FFMQ-NL total score of 0.85 (for the non-meditating sample) and 0.90 (for the meditating sample); the Cronbach's alphas for the five subscales vary from 0.70 to 0.89 [58]. The five dimensions show modest but significant correlations among one another (ranging from 0.13 to 0.39), which suggests that they represent distinct but interrelated constructs [58]. All mindfulness dimensions are positively correlated with meditation experience and negatively correlated with psychological symptoms (i.e., depression, anxiety, insomnia and social withdrawal) [58]. All the dimensions except observing are negatively related to the constructs of alexithymia (lack of ability to identify and describe feelings, and lack of interest in feelings, cognitions and motivations), thought suppression, rumination, worry and dissociation [58]. Overall, the psychometric properties of the FFMQ-NL [58] are comparable to those of the original English version [57].

Secondary outcomes

Secondary mental health outcomes

Burnout will be measured using the Dutch version of the Maslach Burnout Inventory – Education Survey (MBI-ES), the Utrechtse BurnOut Schaal-Leerkrachten (UBOS-L; Utrecht Burnout Scale – Education) [59-61]. The 22-item UBOS-L has a three-dimensional structure with the following subscales: *emotional exhaustion*, *mental distance* (cynicism, depersonalisation) and (job-related) *personal accomplishment*/professional efficacy. The total scores of the three subscales range from 0 to 6. Higher values indicate

more emotional exhaustion, more mental distance, and more personal accomplishment, respectively. Schaufeli et al. [59] mentioned Cronbach's alphas of the three subscales – emotional exhaustion (8 items), mental distance (7 items), and professional efficacy (7 items) – of 0.91, 0.73, and 0.85, respectively. The emotional exhaustion subscale is highly correlated with other mental and physical complaints, and with job demands like time pressure [59]. Mental distance and professional efficacy are significantly related to personal resources like autonomy and ambition level [59].

Stress will be assessed with the 14-item stress scale of the Dutch 42-item Depression, Anxiety, Stress Scales (DASS) [62]. The total score on the stress scale ranges from 0 to 21. Higher values indicate more stress. The DASS has a three-factor structure: depression, anxiety, and stress. Nieuwenhuijsen et al. [62] reported internal consistencies of the DASS of 0.94, 0.88, and 0.93, respectively.

Sleep quality complaints will be measured using the Dutch sleep quality subscale of the 14-item Vragenlijst Beleving en Beoordeling van de Arbeid 2.0 (VBBA2.0; Perception and Assessment of Labour 2.0 Questionnaire). The total score ranges from 0 to 100. Higher values indicate more complaints and lower quality sleep. Van Veldhoven et al. [63] reported an internal consistency (Cronbach's alpha) of 0.90.

Positive and negative emotions at work will be assessed by the 12-item Dutch version of the Job-related Affective Well-Being Scale (JAWS) [64, 65]. The Dutch JAWS has a two-factor structure, which is reflected in the following two subscales: a positive six-item emotions scale (Cronbach's alpha = 0.77) and a negative six-item emotions scale (Cronbach's alpha = 0.78) [65]. The total score on each subscale varies from 6 to 30. Higher values indicate more positive emotions and more negative emotions, respectively. The positive emotions subscale is negatively correlated with the frequency (r = -0.22) and duration (r = -0.23) of future absenteeism of managers; the negative emotions subscale is not correlated with these variables [65].

Work engagement will be assessed using the nine-item Dutch version of the shortened Utrecht Work Engagement Scale (UWES), the UBES-9 [66, 67]. The three-dimensional UWES consists of three 3-item subscales: vigour, dedication, and absorption. The total score on the UWES ranges from 9 to 54. Higher values indicate more work engagement. Schaufeli et al. [66] reported an internal consistency (Cronbach's alpha) for the total UBES-9 of 0.93 and the alphas for the three subscales vary from 0.79 to 0.89. The three work engagement scales are highly correlated (minimum r = 0.65) [66]. The three factors are negatively correlated with the three dimensions of burnout [66].

Perceived general health will be measured using two items (1 and 11) from the Dutch version of the Short Form 36 Health Survey, version 2 (SF-36-v2), named RAND-36 [68]. The score on each item ranges from 1 to 5; the transformed overall score on the two items varies from 0 to 100. Higher values indicate a higher perceived general health. The internal consistency (Cronbach's alpha) mentioned by van der Zee et al. [68] is 0.81.

Organisational commitment will be assessed by four items derived from the four-item Affective Commitment Scale (ACS) used by Smeenk et al. [69], who reported a Cronbach's alpha of 0.70 for this scale.

Secondary work performance outcomes

Work performance and work behaviour, defined as behaviours or actions of employees that are relevant to the organisation's goals, will be measured using the Dutch Individuele WerkPrestatie Vragenlijst (IWPQ; Individual Work Performance Questionnaire) [70]. The 18-item questionnaire consists of three subscales: task performance (5 items), contextual performance (8 items), and counter-productive work behaviour (5 items). The total scores on the three subscales range from 0 to 4. Higher values indicate more task performance, more contextual performance, and more counterproductive work behaviour. The internal consistency (Cronbach's alpha), reported by Koopmans et al. [70], varies between 0.78 (task performance) and 0.85 (contextual performance). Task performance and contextual performance are moderately positively correlated with work engagement: 0.32 and 0.43, respectively. Counterproductive work behaviour is moderately negatively correlated with work engagement (r value -0.29) [70].

Absenteeism, working fewer than the normal hours or days in the employment contract due to a health problem, will be measured by four items from the NEA 2018 [71], the Dutch Working Conditions Survey 2018 (e.g., *How many working days have you been absent in the last three months? How many times have you been absent in the last 12 months over one or more periods longer than 2 weeks? If so, has the absenteeism to do with your work? Have you fully returned to work now?).*

Mediating variables

'Personal competencies outcomes' or 'process-focused outcome measures'

Occupational self-efficacy, which refers to the confidence a worker has in their perceived ability to perform job tasks successfully, will be assessed using the short (six-item) Dutch version of the Occupational Self-Efficacy Scale [72]. The total mean score ranges from 1 to 6. High values reflect high occupational self-efficacy. Rigotti et al. [72] reported an internal consistency (Cronbach's alpha) of 0.85.

Taking distance, which comprises not worrying or ruminating about the work at home, will be assessed using the three-item 'Afstand Nemen' (Taking Distance) subscale of the VBBA 2.0. The total score varies from 0 to 100. Higher values indicate that the individual experiences more problems with taking a distance from work. Van Veldhoven et al. [63] mentioned an internal consistency (Cronbach's alpha) of the subscale of 0.80.

'Work-related perceptions'

The job demands of *work pressure* and *emotional demands* will be measured using the six-item Werktempo & Werkhoeveelheid (Work Pace and Workload) questionnaire and

the five-item Emotionele Belasting (Emotional Demands) questionnaire of the VBBA 2.0, respectively. The total score ranges from 0 to 100. Higher values indicate more work pressure and more emotional demands. Van Veldhoven et al. [63] reported an internal consistency (Cronbach's alpha) of the subscales of 0.86 and 0.80, respectively.

The job demand *of balance between work and private life* will be assessed using two subscales of the Dutch version of the Survey Work-home Interaction-NijmeGen (SWING): the negative Work-Home Interaction (*negative WHI*) subscale, which measures negative effects of work on functioning at home and the negative Home-Work interaction (*negative HWI*) subscale, which measures negative effects of home on functioning at work [73]. The SWING also includes two other subscales: the positive Work-Home Interaction (*positive WHI*) subscale and the positive Home-Work interaction (*positive HWI*) subscale. The total score on the *negative WHI* and the *negative HWI* ranges from 0 to 3. Higher values indicate more problems in work-home interaction. The internal consistency (Cronbach's alpha) of the *negative HWI* and the *negative WHI*, mentioned by Geurts et al., is 0.72 and 0.85, respectively [73].

The job resources of *autonomy* (4 items), *feedback from colleagues and superior* (4 items), *relationship with colleagues* (6 items), *relationship with superior* (6 items), and *relationship with students* (4 items) will be measured using several scales of the VBBA2.0. The total score on every scale ranges from 0 to 100. Higher values indicate more problems in the specific outcomes (e.g. a higher score on autonomy indicates less autonomy). The internal consistency (Cronbach's alpha) of the subscales, reported by van Veldhoven et al. [63], varies from 0.81 to 0.87.

Moderating variable 'personality characteristics'

The Dutch version of the Ten Item Personality Inventory (TIPI) will be used to measure the dimensions of the *Five-Factor-Model of personality*: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Each factor will be assessed by two unipolar items with a seven-point Likert scale ranging from 1 = *not applicable at all* to 7 = *completely applicable*. The TIPI has been shown to be a valid alternative for the existing extensive Big Five instruments [46].

Process evaluation of the MBSR training

A process evaluation will be conducted to explore working mechanisms and possible barriers to MBSR in this population. The process evaluation of MBSR will be conducted using both quantitative (online questionnaire, primarily questions about experiences with the MBSR training) and qualitative measurements (semi-structured interviews). All participants will receive the online questionnaire at T_0, T_1, T_2, and T_3. A selection of the participants to IG 1 and IG 2 will be interviewed at T_0, T_1, and T_3. The interview at T_0, lasting 10 minutes, will be conducted by telephone and will be focused on expectations about MBSR. The face-to-face interview at T_1, lasting 25 to 35 minutes, will be about

experiences during the MBSR training and its short-term effects. The face-to-face interview at T_3, lasting approximately 25 to 35 minutes, will be focused on long-term effects. All interviews will be recorded, fully transcribed, and anonymised. A deductive qualitative analysis will be performed, because of the availability of a focused main research question and a conceptual model [74, 75]. The interviews can provide valuable information about the working mechanisms and possible barriers of the MBSR training.

Process evaluation of the additional organisational health intervention

A process evaluation of the additional organisational health intervention will be performed to assess the requirements /conditions for successful implementation, based on a simplified version of the theoretical framework presented by Nielsen and Randall [56, 76]. These researchers indicate that a process evaluation is important because the implementation process can moderate or mediate the potential effects of the intervention on health and well-being [56, 76]. Successful implementation is a prerequisite for exposure to the intervention and therefore for entailing possible health effects. The framework, which enables us to link intervention processes to intervention outcomes, will be applied to qualitatively appraise three themes of process components: 1) intervention design and implementation, determining the maximum level of intervention exposure; 2) intervention context; and 3) participants' mental models [56, 76]. The process components of Themes 2 and 3 may mediate or moderate the link between any intervention exposure and intervention effects [76]. Table 6 lists the themes and requirements/process components for successful implementation that will be assessed in the semi-structured interviews (T_1). Applying the framework will help us to understand why the implementation process was successful or not [56].

The process evaluation will be conducted using semi-structured interviews. A selection of participants in IG 2 (taking into account participating in the participatory group or not) and of other participatory group members who are not participating in the MBSR training (e.g., teachers not participating in the MBSR training, or supervisor, director, HR consultant, work council member, trade union member) will be interviewed at T_0, T_1, and T_3.

Sample size

A power analysis (G*Power; version 3.9.1.4) revealed that a sample size of 22 participants in each group (IG 1; IG 2; WG), with at least two repeated measurements would enable detection of a medium effect size (d = 0.50) [77], with a power of 0.95 and an alpha of 0.05. A total sample size of 66 participants is therefore required.

Table 6: Themes and requirements/process components for successful implementation, based on a simplified version of the theoretical framework from Nielsen and Randall

Themes and requirements	Operationalisation
1) Intervention design and implementation	
Initiation	Commitment to the intervention and the motivation of the director and team managers
Communication about the intervention at the start	Communication to the teachers from the course, the mindfulness training participants, and the participatory group members
Participation	· Establishment of a participatory group · Involvement of the teachers in the course and of the participants in the mindfulness training and in the participatory group
Targeting	Choosing the right problems in the workplace with the possibility of quick wins
Satisfaction	The teachers'/participants' satisfaction with the intervention
2) Intervention context	
Organisation's culture	Inherent features of the organisation's culture that facilitate or impede the implementation of the action plan
Conditions	The organisation's capacity and skills to implement the action plan
Events	Events that interfere with implementation of the action plan
3) Participants' mental models	
Readiness to change	Employees' and participants' readiness to change at T_1
Perceptions	Was the perception of the intervention (action plan) positive?

Blinding

Participants, trainers, facilitator, and researchers cannot be blinded to their assigned intervention after cluster randomisation. All participants have to fill in the online questionnaire at home or at work, excluding the influence of the researcher. The developer of the online questionnaire will collect the data and provide the anonymous data to the researcher. The researcher will analyse the data blinded to the assigned intervention.

Statistical analyses

Baseline characteristics of participants will be presented as means and standard deviations (SDs) for metric variables, and as frequencies and percentages for categorical variables. The outcomes of the questionnaires will be compared at baseline (T_0), immediately after the intervention(s) (T_1), three months later (T_2), and nine months after the intervention(s) (T_3). All analyses will be conducted according to the intention-to-treat (ITT) principle.

ITT-analysis, based on the initial treatment allocation and not on the treatment eventually received, will avoid the effects of drop-out, which may break the random allocation to the intervention groups [78]. Per-protocol (PP) analyses with the treatment-adherent sample (i.e., participants in IG 1 and IG 2 have to attend at least four of the nine MBSR sessions, and participants in WG cannot attend a MBSR programme or stress reduction training) will also be performed. The aim of PP analysis is to assess the effects of MBSR and the additional organisational health intervention **under optimal conditions:** What is the effect if participants are fully compliant [79]? Therefore, drop-outs need to be excluded from any PP analysis.

The quantitative short-term and long-term effects of MBSR and the additional organisational health intervention (differences between $T_{0,}$ T_1, T_2, and T_3) will be examined using longitudinal regression analysis (Generalised Estimating Equations, GEE, or mixed models), which is fit to analyse longitudinal/clustered data in clinical trials [80] or repeated-measures designs (General Linear Model, GLM) [81]. The baseline values of outcomes (T_0) of the three groups (IG 1; IG 2; WG) will be defined as independent variables, while the outcomes on the follow-up measurements (T_1, T_2, T_3) will be treated as dependent variables. Correction of confounding variables will be applied.

To investigate the working mechanisms (*How is mental health improved?*) of MBSR and the organisational health intervention, mediating and moderating analyses will be conducted. The mediating effect of personal competencies on mental health outcomes and on work performance outcomes will be tested. The mediating effect of work-related perceptions on mental health outcomes and on work performance outcomes will also be investigated. The moderating effect of the Big Five, especially as regards the factors of extraversion and openness, on mental health outcomes/work performance outcomes will also be examined.

All statistical analyses will be conducted using IBM SPSS Statistics, version 25. The level of significance will be set at 0.05. The analysis of the qualitative data, collected by the semi-structured interviews at T_0, T_1, and T_3, will be deductive [-76], and will be conducted by means of using ATLAS.ti [82].

Dissemination policy

Results of the trial will be communicated by scientific articles in open access journals, management letters for participants and non-participants of Dutch secondary vocational schools, and articles for professional magazines intended for occupational health professionals.

Discussion

The proposed study will evaluate the short (T_1) and long-term effects (T_2 and T_3) of Mindfulness-Based Stress Reduction (MBSR), being a person-focused intervention aimed at strengthening the individual capacity of teachers in secondary vocational schools to cope with stress and enhance their mental health. In addition, the possible enhancing effects of an additional organisational health intervention, a participatory action approach, will be investigated as well. The teachers' experiences with the interventions (the working mechanisms of MBSR and the organisational health intervention) will also be examined. This study is a cluster randomised controlled trial, in which Intervention Group 1 (IG 1; receiving MBSR) and Intervention Group 2 (IG 2; receiving MBSR and an additional organisational health intervention) will be compared with the Waiting List Group (WG; the control group).

Many previous studies on the effects of MBSR on employees have primarily assessed negative outcomes, focusing predominantly on mental health (e.g., burnout, stress level, psychological distress). Process measures, which are suitable for investigating how mindfulness can contribute to well-being, have rarely been assessed (see Chapter 2). The strength of this study lies in the fact that we will assess both negative and positive outcomes. More specifically, it considers not only mental health (e.g., positive emotions at work, work engagement, organisational commitment), but also work performance and work-related perceptions (e.g., job demands and job resources). Process measures (e.g., occupational self-efficacy, taking distance) will also be examined. Hence a wide range of outcomes will be measured (see Chapter 2).

In their systematic review on MBSR and employees' mental health, Janssen et al. (see Chapter 2) reported that 14 of the 23 studies included in the review only incorporated short-term effects, measured immediately after the intervention. However, in terms of the cost-benefit ratio, MBSR and the organisational health intervention should lead to sustainable long-term effects. Therefore, another strength of this study is that it will gather longitudinal data by measuring both short- and long-term effects (until 9 months after the intervention).

The proposed study will use a mixed-methods approach, which is rare in studies on the effects of MBSR (see Chapter 2). That approach means that, in addition to quantitative data, qualitative data will be collected to investigate in-depth relevant process measures and to capture the mechanisms by which MBSR (key aspects of the MBSR programme) and the organisational health intervention (factors for successful implementation in an organisation) result in specific outcomes. Another strength of the proposed study is the integrated approach, which combines an individual-focused secondary intervention (MBSR) and an organisation-based primary intervention. This is important since teachers' stress likely results from a complex interaction between personal characteristics of the teacher and the environment (work and personal circumstances) [6, 83].

The design of the Cluster Randomised Controlled Trial (CRCT), in which schools are randomised as opposed to individual teachers, is another strength of our proposed approach. CRCT allows us to study the effects of an organisational health intervention and to control for 'contamination' across participants [47, 48].

Despite the many strengths of the proposed study, complying with research ethics implies that we cannot account for some limitations that have already been raised in previous literature. For example, the proposed study design will be based on self-selection, as we depend on voluntary participation by teachers, which may result in somewhat biased samples. Moreover, it is likely that the characteristics of the teachers who participate in the proposed study (e.g., motivation, sensitivity to the MBSR training and the organisational health intervention, personality) may differ from those who will not participate or drop out early.

We assume that many participants experience work pressure, time pressure, and stress complaints. The MBSR training (and the additional organisational participatory health intervention) requires a lot of time and effort from the teachers. We are therefore aware that (potential) participants have to be motivated to prevent premature drop-out.

In line with this, the time frame of the organisational health intervention (8 to 12 weeks) is a short period with regards to capturing organisational changes. Therefore, the T_1 measurement might occur too soon to detect effects. However, the measurements at T_2 and T_3 overcome this limitation.

Data from questionnaires using self-reports may be biased [84]. The primatologist and psychologist De Waal [86] posited that human beings are insufficiently aware of their inner state and may therefore mislead themselves and others. The study of the human psyche needs behavioural reports, based on observation by others [85]. The proposed study will address this concern partly by using both validated questionnaires and data triangulation (both quantitative and qualitative data).

Another potential source of bias is associated with the effect of attention received by teachers in IG 1 and IG 2, also known as the Hawthorne effect [34]. Participating in group sessions in IG 1 and IG 2 may lead to an overestimation of the effect of MBSR and the organisational health intervention. Participants cannot be blinded with regard to the allocated intervention, so the Hawthorne effect cannot be excluded.

The proposed CRCT has some disadvantages compared to an RCT [86]. A CRCT has greater complexity in design and analysis and requires more participants/teachers to achieve adequate statistical power.

Trial status

The trial is funded for 5 years. The first participants were randomly assigned in September 2016. Final outcome assessments will be completed in June 2020. This is the first protocol version (31 August 2015).

Abbreviations

ACS: Affective Commitment Scale; CRCT: Cluster Randomised Controlled Trial; DASS: Depression, Anxiety, Stress Scales; ECPR: Ethics Committee Practice based Research of het HAN University of Applied Sciences, Nijmegen; FFMQ-NL: Five Facet Mindfulness Questionnaire; GEE: Generalised Estimating Equations; GLM: General Linear Model; HR: Human Resources; HWI: Home-Work Interaction; IG 1: Intervention Group 1; IG 2: Intervention Group 2; ITT: Intention-To-Treat analysis; JAWS: Job-related Affective Well-being Scale; IWPQ: Individual Work Performance Questionnaire; JDR: Job Demands-Resources; METC: Medical Ethics Committee; MBCT: Mindfulness-Based Cognitive Therapy; MBI-ES: Maslach Burnout Inventory – Education Survey; METC: Medical Ethics Committee of Radboud University Medical Centre, Nijmegen; MBSR: Mindfulness-Based Stress Reduction; PAR: Participatory Action Approach; PP: Per-Protocol analysis; SDs: Standard Deviations; SF-36v2: Short Form 36 Health Survey, version 2; SWING: Survey Work-home Interaction-NijmeGen; TIPI: Ten Item Personality Inventory; UBOS-L: Utrechtse BurnOut Schaal-Leerkrachten (Utrecht Burnout Scale – Education); UWES: Utrecht Work Engagement Scale (Dutch; UBES); VBBA2.0: Vragenlijst Beleving en Beoordeling van de Arbeid 2.0 (Perception and Assessment of Labour 2.0); WG: Waiting List Group; WHI: Work-Home Interaction

References

1. Van der Steeg M, Gerritsen S. Teacher evaluations and pupil achievement: evidence from classroom observations [CPB Discussion Paper 230]. 2013: CPB Netherlands Bureau for Economic Policy Analysis.
2. World Health Organization (WHO). Raising awareness of stress at work in developing countries: a modern hazard in a traditional working environment. Advice to employers and worker representatives. Protecting Workers' Health Series No. 6. 2007 5 December 2018]; Available from: http://apps.who.int/iris/bitstream/10665/42956/1/924159165X_eng.pdf.
3. Hughes RE. Deciding to leave but staying: teacher burnout, precursors and turnover. International Journal of Human Resource Management. 2001; 12(2): 288-298.
4. Maslach C, Schaufeli WB, Leiter MP. Job Burnout. Annual Review of Psychology. 2001; 52(1): 397-422.
5. Douwes M, Hooftman W. Arbobalans 2018: Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of working conditions 2018. Quality of work, impacts and measures in the Netherlands] (Dutch). 2019, Leiden: TNO.
6. Demerouti E, Bakker AB, de Jonge J, Janssen PPM, Schaufeli WB. Burnout and engagement at work as a function of demands and control. Scandinavian Journal of Work, Environment & Health. 2001; 27(4): 279-286.
7. Schelvis RMC, Oude Hengel KM, Wiezer NM, Blatter BM, van Genabeek JAGM, Bohlmeijer ET, et al. Design of the Bottom-up Innovation project - a participatory, primary preventive, organizational level intervention on work-related stress and well-being for workers in Dutch vocational education. BMC Public Health. 2013; 13(1): 1-15.
8. Demerouti E, Bakker AB, Nachreiner F, Schaufeli WB. The job demands-resources model of burnout. Journal of Applied Psychology. 2001; 86(3): 499-512.
9. Boonstra W. Het onderwijs brandt mensen op [Education burns people out] (Dutch). 2015 Accessed 5 Dec. 2018]; Available from: https://www.intermediair.nl/werk-privebalans/burn-out/het-onderwijs-brandt-mensen-op.
10. Pas ET, Bradshaw CP, Hershfeldt PA. Teacher- and school-level predictors of teacher efficacy and burnout: identifying potential areas for support. Journal of School Psychology. 2012; 50(1): 129-145.
11. LaMontagne AD, Keegel T, Louie AM, Ostry A, Landsbergis PA. A systematic review of the job-stress intervention evaluation literature, 1990-2005 [corrected] [published erratum appears in Int J Occup Environ Health 2008 Jan-Mar;14(1):24]. International Journal of Occupational & Environmental Health. 2007; 13(3): 268-280.
12. Unterbrink T, Pfeifer R, Krippeit L, Zimmermann L, Rose U, Joos A, et al. Burnout and effort-reward imbalance improvement for teachers by a manual-based group program. International archives of Occupational and Environmental Health. 2012; 85(6): 667-674.
13. Zołnierczyk-Zreda D. An intervention to reduce work-related burnout in teachers. International Journal of Occupational Safety and Ergonomics. 2005; 11(4): 423-430.
14. Beshai S, McAlpine L, Weare K, Kuyken W. A non-randomised feasibility trial assessing the efficacy of a mindfulness-based intervention for teachers to reduce stress and improve well-being. Mindfulness. 2016; 7(1): 198-208.
15. Jennings PA, Frank JL, Snowberg KE, Coccia MA, Greenberg MT. Improving classroom learning environments by Cultivating Awareness and Resilience in Education (CARE): results of a randomized controlled trial. School Psychology Quarterly. 2013; 28(4): 374-390.

16. Frank JL, Reibel D, Broderick P, Cantrell T, Metz S. The effectiveness of mindfulness-based stress reduction on educator stress and well-being: Results from a pilot study. Mindfulness. 2015; 6(2): 208-216.
17. Roeser RW, Jha A, Wallace L, Wilensky R, Schonert-Reichl KA, Cullen M, et al. Mindfulness training and reductions in teacher stress and burnout: results from two randomized, waitlist-control field trials. Journal of Educational Psychology. 2013; 105(3): 787.
18. Taylor C, Harrison J, Haimovitz K, Oberle E, Thomson K, Schonert-Reichl K, et al. Examining ways that a mindfulness-based intervention reduces stress in public school teachers: A mixed-methods study. Mindfulness. 2016; 7(1): 115-129.
19. Caulfield N, Chang D, Dollard MF, Elshaug C. A Review of Occupational Stress Interventions in Australia. International Journal of Stress Management. 2004; 11(2): 149-166.
20. Richardson KM, Rothstein HR. Effects of occupational stress management intervention programs: a meta-analysis. Journal of Occupational Health Psychology. 2008; 13(1): 69-93.
21. Van der Klink JJL, Blonk RWB, Schene AH, Van Dijk FJH. The benefits of interventions for work-related stress. American Journal of Public Health. 2001; 91(2): 270-276.
22. Hasson H, Gilbert-Ouimet M, Baril-Gingras G, Brisson C, Vézina M, Bourbonnais R, et al. Implementation of an organizational-level intervention on the psychosocial environment of work: comparison of managers' and employees' views. Journal of Occupational and Environmental Medicine. 2012; 54(1): 85-91.
23. Nielsen K, Taris TW, Cox T. The future of organizational interventions: addressing the challenges of today's organizations. Work & Stress. 2010; 24(3): 219-233.
24. Van der Klink JJL, Bültmann U, Burdorf A, Schaufeli WB, Zijlstra FRH, Abma FI, et al. Sustainable employability — definition, conceptualization, and implications: A perspective based on the capability approach. Scandinavian Journal of Work, Environment & Health. 2016; 42(1): 71-79.
25. Bartlett L, Martin A, Neil AL, Memish K, Otahal P, Kilpatrick M, et al. A systematic review and meta-analysis of workplace mindfulness training randomized controlled trials. Journal of Occupational Health Psychology. 2019; 24(1): 108-126.
26. Lomas T, Medina JC, Ivtzan I, Rupprecht S, Eiroa-Orosa FJ. Mindfulness-based interventions in the workplace: An inclusive systematic review and meta-analysis of their impact upon wellbeing. Journal of Positive Psychology. 2019; 14(5): 625-640.
27. Donaldson-Feilder E, Lewis R, Yarker J. What outcomes have mindfulness and meditation interventions for managers and leaders achieved? A systematic review. European Journal of Work & Organizational Psychology. 2019; 28(1): 11-29.
28. Slutsky J, Chin B, Raye J, Creswell JD. Mindfulness training improves employee well-being: A randomized controlled trial. Journal of Occupational Health Psychology. 2019; 24(1): 139-149.
29. Donald JN, Sahdra BK, Van Zanden B, Duineveld JJ, Atkins PWB, Marshall SL, et al. Does your mindfulness benefit others? A systematic review and meta-analysis of the link between mindfulness and prosocial behaviour. British Journal of Psychology (London, England : 1953). 2019; 110(1): 101-125.
30. Klingbeil DA, Renshaw TL. Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base. School Psychology Quarterly. 2018; 33(4): 501-511.
31. Goldberg SB, Tucker RP, Greene PA, Simpson TL, Kearney DJ, Davidson RJ. Is mindfulness research methodology improving over time? A systematic review. PloS one. 2017; 12(10): e0187298.
32. Van Dam NT, van Vugt MK, Vago DR, Schmalzl L, Saron CD, Olendzki A, et al. Mind the Hype: A Critical Evaluation and Prescriptive Agenda for Research on Mindfulness and Meditation. Perspectives on Psychological Science. 2018; 13(1): 36-61.

33. Davidson RJ, Kaszniak AW. Conceptual and methodological issues in research on mindfulness and meditation. The American psychologist. 2015; 70(7): 581-592.
34. Wickström G, Bendix T. The "Hawthorne effect"--what did the original Hawthorne studies actually show? Scandinavian Journal of Work, Environment & Health. 2000; 26(4): 363-367.
35. McVicar A, Munn-Giddings C, Seebohm P. Workplace stress interventions using participatory action research designs. International Journal of Workplace Health Management. 2013; 6(1): 18-37.
36. Ouweneel E, Schaufeli W, Le Blanc P. Van preventie naar amplitie: Interventies voor optimaal functionerende werknemers: Interventies voor optimaal functioneren. Gedrag en Organisatie. 2009; 22: 118.
37. Ng TWH, Sorensen KL, Eby LT. Locus of control at work: a meta-analysis. Journal of Organizational Behavior. 2006; 27(8): 1057-1087.
38. Bandura A. Health promotion from the perspective of social cognitive theory. Psychology & Health. 1998; 13(4): 623-649.
39. Consiglio C, Borgogni L, Alessandri G, Schaufeli WB. Does self-efficacy matter for burnout and sickness absenteeism? The mediating role of demands and resources at the individual and team levels. Work & Stress. 2013; 27(1): 22-42.
40. Gu J, Strauss C, Bond R, Cavanagh K. How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. Clinical Psychology Review. 2015; 37: 1-12.
41. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. Journal of Clinical Psychology. 2006; 62(3): 373.
42. Van der Velden AM, Kuyken W, Wattar U, Crane C, Pallesen KJ, Dahlgaard J, et al. A systematic review of mechanisms of change in mindfulness-based cognitive therapy in the treatment of recurrent major depressive disorder. Clinical Psychology Review. 2015; 37: 26-39.
43. Arnold BB, Carolyn MB, Maureen D, Nicole G, Anthony HW, Con S. The role of personality in the job demands-resources model: A study of Australian academic staff. Career Development International. 2010; 15(7): 622-636.
44. Schaufeli WB, Taris TW. A Critical Review of the Job Demands-Resources Model: Implications for Improving Work and Health. Bridging Occupational, Organizational & Public Health. 2014: 43-68.
45. Kabat-Zinn J. Wherever you go, there you are. Mindfulness meditation for everyday life. 2005, Suffolk: Clowes Ltd.
46. Hofmans J, Kuppens P, Allik J. Is short in length short in content? An examination of the domain representation of the Ten Item Personality Inventory scales in Dutch language. Personality and Individual Differences. 2008; 45(8): 750.
47. Bland JM. Cluster randomised trials in the medical literature: two bibliometric surveys. BMC Medical Research Methodology. 2004; 4: 21.
48. Edwards SJ, Braunholtz DA, Lilford RJ, Stevens AJ. Ethical issues in the design and conduct of cluster randomised controlled trials. BMJ (Clinical research ed.). 1999; 318(7195): 1407-1409.
49. Baer RA, Carmody J, Hunsinger M. Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. Journal of Clinical Psychology. 2012; 68(7): 755.
50. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. 1990, New York: Delacorte.
51. Chaskalson M, Hadley SG. Mindfulness: historical and contemplative context and recent developments. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 42 - 66, 2015.

52. Reb J, Atkins PWB. Introduction. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 1-16, 2015.
53. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for depression; a new approach to preventing relapse. 2002, New York: Guilford Press.
54. Reeves TC. Design research from a technological perspective. In Van den Akker J. Design methodology and developmental research in education and training. Alphen aan den Rijn: Kluwer; 52-66, 2006.
55. Van den Akker J, McKenney S, Nieveen NM, Gravemeijer KI. Introducing educational design research. In Van den Akker J, et al. Educational design research. London: Routledge; 3-7, 2006.
56. Schelvis RMC, Wiezer NM, Blatter BM, van Genabeek JAGM, Oude Hengel KM, Bohlmeijer ET, et al. Evaluating the implementation process of a participatory organizational level occupational health intervention in schools. BMC Public Health. 2016; 16(1).
57. Baer RA, Smith GT, Lykins E, Button D, Krietemeyer J, Sauer S, et al. Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. Assessment. 2008; 15(3): 329-342.
58. de Bruin EI, Topper M, Muskens JGAM, Bögels SM, Kamphuis JH. Psychometric properties of the Five Facets Mindfulness Questionnaire (FFMQ) in a meditating and a non-meditating sample. Assessment. 2012; 19(2): 187-197.
59. Schaufeli WB, Leiter MP, Maslach C, Jackson SE. Maslach Burnout Inventory-General Survey. In Maslach C, Jackson SE, Leiter MP. The Maslach Burnout Inventory-Test Manual., Palo Alto, CA: Consulting Psychologists Press, 1996.
60. Maslach C, Jackson SE. The Measurement of Experienced Burnout. Journal of Occupational Behavior. 1981; 2: 99.
61. Schaufeli W, Van Dierendonck D. Handleiding van de Utrechtse Burnout Schaal (UBOS) [Utrecht Burnout Scale Manual] (Dutch). 2000, Amsterdam: Harcourt Assessment B.V.
62. Nieuwenhuijsen K, de Boer A, Verbeek J, Blonk RWB, van Dijk FJH. The Depression Anxiety Stress Scales (DASS): detecting anxiety disorder and depression in employees absent from work because of mental health problems. Occupational and Environmental Medicine. 2003; 60: 77-82.
63. Van Veldhoven M, Prins J, Van der Laken P, Dijkstra L. VBBA2.0 Update van de standaard voor vragenlijstonderzoek naar werk, welbevinden en prestaties [VBBA2.0 Update of the standard for questionnaire survey on work, well-being and work performance] (Dutch). 2014, Amsterdam: SKB.
64. Van Katwyk PT, Fox S, Spector PE, Kelloway EK. Using the Job-Related Affective Well-Being Scale (JAWS) to investigate affective responses to work stressors. Journal of Occupational Health Psychology. 2000; 5(2): 219-230.
65. Schaufeli W, van Rhenen W. Over de rol van positieve en negatieve emoties bij het welbevinden van managers: Een studie met de Job-related Affective Well-being Scale (JAWS) = About the role of positive and negative emotions in managers' wellbeing: A study using the Job-related Affective Well-being Scale (JAWS). Gedrag en Organisatie. 2006; 19(4): 323-344.
66. Schaufeli W, Bakker A. Voorlopige handleiding Utrechtse Bevlogenheidschaal (versie 1). [Preliminary handbook for the Utrecht Work Engagement Scale (version 1)] (Dutch). 2003, Utrecht: Universiteit Utrecht.
67. Schaufeli WB, Salanova M, González-romá V, Bakker AB. The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach. Journal of Happiness Studies. 2002; 3(1): 71-92.
68. Van der Zee KI, Sanderman R. Het meten van de algemene gezondheidstoestand met de Rand-36. Een handleiding. Tweede druk [Assessing general health with the Rand-36. A handbook. Second edition] (Dutch). 2012, Groningen: University of Groningen.

69. Smeenk SGA, Eisinga RN, Teelken JC, Doorewaard JACM. The effects of HRM practices and antecedents on organizational commitment among university employees. International Journal of Human Resource Management. 2006; 17(12): 2035-2054.
70. Koopmans L, Bernaards C, Hildebrandt V, Vet R, Beek A. De Individuele Werkprestatie Vragenlijst (IWPV): interne consistentie, construct validiteit en normering. Tijdschrift voor Gezondheidswetenschappen. 2014; 92(6): 231-239.
71. Hooftman WE, Mars GMJ, Janssen B, De Vroome EMM, Janssen BJM, Pleijers AJSF, et al. Nationale Enquête Arbeidsomstandigheden 2018 [National Working Conditions Survey 2018] (Dutch). 2019, Leiden/Heerlen: TNO/CBS.
72. Rigotti T, Schyns B, Mohr G. A short version of the occupational self-efficacy scale: Structural and construct validity across five countries. Journal of Career Assessment. 2008; 16(2): 238-255.
73. Geurts SAE, Taris TW, Kompier MAJ, Dikkers JSE, van Hooff MLM, Kinnunen UM. Work-home interaction from a work psychological perspective: development and validation of a new questionnaire, the SWING. Work & Stress. 2005; 19(4): 319-339.
74. Boeije H. Analysis in qualitative research. 2009: Sage Publications Ltd.
75. Miles MB, Huberman AM. Qualitative data analysis: an expanded sourcebook. 1994, London: Sage Publications.
76. Nielsen K, Randall R. Opening the black box: Presenting a model for evaluating organizational-level interventions. European Journal of Work and Organizational Psychology. 2013; 22(5): 601-617.
77. Cohen J. A power primer. Psychological bulletin. 1992; 112(1): 155-159.
78. Lachin JM. Statistical considerations in the intent-to-treat principle. Controlled clinical trials. 2000; 21(3): 167-189.
79. Ranganathan P, Pramesh CS, Aggarwal R. Common pitfalls in statistical analysis: Intention-to-treat versus per-protocol analysis. Perspectives in Clinical Research. 2016; 7(3): 144-146.
80. Wang M. Generalized Estimating Equations in Longitudinal Data Analysis: A Review and Recent Developments. Advances in Statistics. 2014; 2014(1).
81. Liang K-Y, Zeger SL. Longitudinal Data Analysis Using Generalized Linear Models. Biometrika. 1986; 73(1): 13-22.
82. Friese S. Qualitative data analysis with Atlas.ti. 2012, London: Sage Publications.
83. Bakker AB, Demerouti E. The Job Demands-Resources model: state of the art. Journal of Managerial Psychology. 2007; 22(3): 309.
84. Brock TC, Green MC, Reich DA, Evans LM. The Consumer Reports study of psychotherapy: Invalid is invalid. American Psychologist. 1996; 51(10): 1083-1083.
85. De Waal F. Mama's last hug. Animal emotions and what they tell us about ourselves. 2019, New York: Norton.
86. Campbell MK, Elbourne DR, Altman DG. Consort statement: extension to cluster randomised trials. BMJ: British Medical Journal (International Edition). 2004; 328(7441): 702-708.

5

Chapter 5

Effects of mindfulness-based stress reduction and an organizational health intervention on Dutch teachers' mental health

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Abstract

Objective This study aimed to test the effectiveness of Mindfulness-Based Stress Reduction (MBSR) combined with an organizational health intervention.

Methods A cluster randomized controlled trial was conducted in five Dutch secondary vocational schools. Teachers were assigned to Intervention Group 1 (IG1; MBSR) or 2 (IG2; MBSR and an organisational health intervention), or to the Waiting List Group (WLG). The primary outcome variable was mindfulness. Secondary outcomes included other mental health outcomes, work performance, personal competencies, and work-related perceptions. Data was collected before (T_0), immediately after (T_1), and three (T_2) and nine months (T_3) after the MBSR training and analyzed applying repeated measures between-subjects designs.

Results As the additional intervention showed no effects, IG1 and IG2 were merged (IG). MBSR had positive short-term effects on the total mindfulness score, its dimensions 'observing' and 'non-reactivity', and the work engagement dimension 'dedication'. Long-term effects were found for the total mindfulness score, its dimensions 'observing', 'non-reactivity', and 'non-judging', sleep quality complaints, negative emotions, and negative work-home interaction. IG displayed a larger short- and long-term decrease in organisational commitment. No significant differences were found for work performance, personal competencies, and work-related perceptions.

Conclusion Although teachers did not perceive a decrease in job demands after the training, they felt more mindful and lowered their organisational commitment. Their mental health improved and their dedication during work increased. These findings may suggest that enhanced mindfulness enabled them to mentally disengage from work during their leisure time, which allowed them to experience fewer symptoms of psychological strain.

Introduction

Maintaining and improving the quality of education requires healthy teachers [1]. In 2017, stress or burnout complaints were reported by almost one in six Dutch employees, and more than one in five in the educational sector [2]. Teachers have demanding jobs (e.g., high workload, emotional strain) in combination with few job resources and little professional autonomy [2]. The situation is especially troublesome in Dutch secondary vocational schools, due to the poor capacity to implement interventions, the organisational culture, and policy changes by the Ministry of Education [3].

Work-related stress is associated with negative organisational outcomes like increased absenteeism and early retirement [2]. In 2017, the absenteeism rate in the educational sector was relatively high (5.3%) [2] and its associated costs per employee were the highest on the labour market as a whole: almost €6000 (number of days x costs per day) [4]. Organisations strongly rely on the (mostly serendipitous) availability of colleagues to cover for absent teachers. Consequently, colleagues are overloaded with work while the job resources they can draw from remain the same at best. This creates a pattern of imbalance that can jeopardise teachers' well-being [5]. The imbalance between job demands and resources, and the associated risk for one's well-being, may be an important reason why many novice teachers leave the educational sector in the first five years of their career [6] and why many experienced teachers retire early. In fact, 45% to 70% of early retirements in the educational sector can be attributed to psychosomatic and psychological problems [5]. Therefore, it is extremely important to reduce and prevent stress and absenteeism in this sector, and to develop effective mental health management interventions that are both person- and organisation-focused. In their meta-analysis about the effectiveness of interventions aimed at reducing teacher burnout, Iancu et al. [7] reported that mindfulness interventions had significant effects on the burnout dimensions exhaustion and personal accomplishment.

The current study aimed to test the short- and long-term effectiveness of Mindfulness-Based Stress Reduction (MBSR) on teachers' mindfulness (as the primary outcome), other mental health aspects, and work performance. We hypothesised that MBSR would improve these outcomes (see Chapter 4). We also investigated the effect of MBSR on mediating factors such as personal competencies (occupational self-efficacy and taking distance) and work-related perceptions (job demands, job resources, and negative work-home-/negative home-work-interaction) (see Chapter 4), and we investigated the effects of a participatory, preventive, organisational health intervention (i.e., a participatory action approach). We hypothesised that this intervention, among other outcomes, would positively influence teachers' occupational self-efficacy (see Chapter 4, [8]). We hoped that its implementation would generate tailored work solutions that positively influence the balance between job demands (work pressure and work-life balance) and job resources (autonomy, feedback, relationships) for teachers in the participating schools.

Methods

Study design

The short- and long-term effectiveness of the intervention(s) was tested in a cluster randomised controlled trial (CRCT) that used an online questionnaire on a secured website. Data was collected at baseline, before the MBSR training (T_0), immediately after the training (T_1), three months later (T_2), and nine months after the training (T_3).

The Ethics Committee on Practice-Based Research at HAN University of Applied Sciences (ECPR) and the Medical Ethics Committee (METC) at Radboud university medical centre, both located in Nijmegen, the Netherlands, approved the research proposal (Registration no. ACPO 07.12/15; File number CMO: 2019-5266). Both committees stated that the research complied with the Netherlands Code of Conduct for Research Integrity and with the criteria of the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects.

Participation was voluntary and participants signed informed consent forms. They could withdraw at any moment without consequence. The methods used have been described extensively elsewhere (see Chapter 4).

Study population

Participants were recruited from the teaching staff at five secondary vocational schools. We used e-mail, posters, flyers and each school's intranet to recruit participants from three programmes (Care, Technology, and Economy). The researchers, HR consultants, and supervisors informed potential participants about the research project.

Respondents who were willing to participate were screened in terms of the eligibility criteria by the first author (see Table 1). Eligible candidates received a letter that included information about the project's aim, the approval by the ECPR and the METC, and the informed consent form. Cluster randomisation was conducted one week before the interventions began, and the participants were informed about their group assignment.

Table 1. Eligibility criteria

Inclusion criteria	Exclusion criteria
Teachers in Care, Technology, and Economy courses	Attended mindfulness training in the past 2 years
Employed in a secondary vocational school for at least 2.5 days a week for at least 1 year	Attended stress reduction training (e.g., cognitive therapy or relaxation training) in the past 2 years

Cluster randomisation

Cluster randomisation [9] was performed at the school level. At the first school, participating teachers from one course (either Care, Technology, or Economy) were assigned to Intervention Group 1 (IG1: MBSR), teachers from one of the other two courses were assigned to Intervention Group 2 (IG2: MBSR and an organisational health

intervention), and teachers from the remaining course were assigned to the Waiting List Group (WLG). The allocation was different at each school (see Table 2). An independent researcher, not involved in this study, prepared concealed, consecutively numbered, sealed opaque envelopes. Every envelope contained a paper indicating the treatment assignment at the school level (Type 1, 2, or 3; see Table 2). A representative from each school received an envelope from the researcher (who was unaware of the randomisation sequence) and opened it in the presence of the researcher.

Participants were recruited from June 2016 until March 2019. The MBSR training and the organisational health intervention were implemented between September 2016 and July 2019. In total 141 teachers were interested in participating, 120 of whom met the eligibility criteria. In total 87 were allocated to IG1 and IG2 and 33 to the WLG.

Table 2. Cluster randomization

	Course		
Secondary Vocational School	**Care**	**Technology**	**Economy**
Type 1	IG1[a]	IG2[b]	WLG[c]
Type 2	WLG	IG1	IG2
Type 3	IG2	WLG	IG1

[a] IG1: Intervention group 1 [Mindfulness-Based Stress Reduction (MBSR)]
[b] IG2: Intervention Group 2 (MBSR and an organisational health intervention)
[c] WLG: Waiting List Group (control group that received MBSR 1 year later)

Blinding and sample size

The researchers, the facilitator of the organisational health intervention, the trainers, and the participants could not be blinded for their assigned intervention after the cluster randomisation process. To reduce the researchers' influence, all participants had to fill in the online questionnaire at home or at work. Digital data was collected by a third-party organisation that provided the anonymized data to the researchers.

Interventions

MBSR: *main intervention*

The MBSR programme was primarily based on Kabat-Zinn's curriculum [10], but it also contained elements of mindfulness-based cognitive therapy [11] (i.e., a three-minute breathing space and psychoeducation about the nature of thoughts). The programme consisted of eight 2.5-hour weekly group sessions, each with 4–15 participants per group, daily homework involving 45 minutes of exercise for six days a week, and one 7-hour day of silence. The sessions were supervised by one of the four recruited qualified mindfulness trainers, who received a training script. Each session consisted of meditation exercises (like the breathing space), enquiry, a discussion of homework, psychoeducation, and

a specific theme. The specific content of the MBSR group sessions has been described extensively elsewhere (see Chapter 4).

Additional organisational health intervention

The organisational health intervention consisted of two phases (Chapter 4). In the first phase – the 'needs assessment phase' – a participatory group was formed. Preferably, it included two participants in the MBSR training, two teachers who did not participate in the training intervention (workplace representative), the school's HR consultant for the specific course (expert), a supervisor (line management), the course director (top management/decision-making power), an external facilitator, and relevant others from the workplace (e.g., a member of the union or the formal employee participation committee). We used the teachers' and educational managers' knowledge, skills, and perceptions to investigate the positive aspects (job resources) and the main difficulties (job demands) in the specific course.

In the second phase – the 'implementation phase' – dialogue was stimulated between teachers and top and line managers. These parties jointly determined the highest priorities and developed a feasible work-related action/implementation plan aimed at reducing teachers' stress and improving work pleasure.

Waiting list group

The participants on the waiting list were invited to participate in MBSR training one year after the study's intervention. To enable comparison between the study groups and the control group, WLG members could not attend a mindfulness training course or stress reduction training (e.g., cognitive therapy or relaxation training) until T_3.

Outcome measures and data collection

Just before cluster randomisation (T_0) and at the start of the intervention(s), participants completed the online baseline questionnaire on a secured website. They received follow-up questionnaires at T_1, T_2 and T_3.

The psychometric properties of the measurement instruments included in the questionnaire have been discussed extensively elsewhere (Chapter 4). Table 3 shows the variables, the measurement instruments used, and the ranges of their response scales. For all scales, higher scores indicate higher levels/intensity of the measured construct. For the scales on The Questionnaire on the Experience and Evaluation of Work (VBBA), higher scores indicate more problems.

Table 3. Measurement instruments used

Variables	**Measurement instrument**	**Range of the response scale**
Baseline characteristics (demographic data)	Online questions about gender, age, family situation, education level, nature of employment/course, years of work experience, number of working hours per week	
Primary outcome		
Mindfulness skills	FFMQ-NL total: Dutch version of the Five Facet Mindfulness Questionnaire [12, 13] Subscales: · observing · describing · acting awareness · non-judging · non-reactivity	1 (never or almost never) to 5 (very often or always)
Secondary mental health outcomes		
Burn-out	UBOS-L Utrechtse Burn-Out Schaal-Leerkrachten (Utrecht Burn-Out Scale - Education) [14-16] Subscales: · emotional exhaustion · mental distance · personal accomplishment	0 (never) to 6 (always/daily)
Stress	DASS stress: subscale stress of the Depression, Anxiety, Stress Scales [17]	0 (not at all or never applicable) to 3 (certainly or mostly applicable)
Sleep quality complaints	VBBA subscale [18]	0 (no) to 1 (yes)
Positive emotions	Job-related Affective Well-being (JAWS) Scale, positive emotions subscale [19, 20]	1 (never) to 5 (often)
Negative emotions	JAWS Scale, negative emotions subscale [19, 20]	1 (never) to 5 (often)
Work engagement	UWES Utrecht Work Engagement Scale (Dutch; UBES) [21, 22] Subscales: · vigour · dedication · absorption	0 (never) to 6 (always/daily)

Perceived general health	SF-36v2, perceived general health: Short-Form 36 Health Survey, version 2 [23]	1 (poor) to 5 (excellent)
Organisational commitment	ACS: Affective Commitment Scale, subscale of the Organizational Commitment Questionnaire (OCQ) [24]	1 (I totally disagree) to 5 (I totally agree)
Work performance		
Work performance and work behaviour	IWPQ: Individual Work Performance Questionnaire [25] Subscales: · task performance · contextual performance · counter-productive work behaviour	0 (rare) to 4 (always)
Personal competencies		
Occupational Self-Efficacy	Occupational Self-Efficacy scale [26]	1 (totally disagree) to 6 (totally agree)
Taking distance	VBBA subscale [18]	0 (never) to 3 (always)
Work-related perceptions / job demands		
Work pace and workload	VBBA subscale [18]	0 (never) to 3 (always)
Emotional demands	VBBA subscale [18]	0 (never) to 3 (always)
Negative work-home interaction	Survey Work-home Interaction-NijmeGen (SWING), negative work-home interaction subscale [27]	0 (never/almost never) to 3 (always/almost always)
Negative home-work interaction	SWING, negative home-work interaction subscale [27]	0 (never/almost never) to 3 (always/almost always)
Work-related perceptions / job resources		
Autonomy	VBBA subscale [18]	0 (never) to 3 (always)
Feedback	VBBA subscale [18]	0 (never) to 3 (always)
Relationship with colleagues	VBBA subscale [18]	0 (never) to 3 (always)
Relationship with superior	VBBA subscale [18]	0 (never) to 3 (always)
Relationship with students	VBBA subscale [18]	0 (never) to 3 (always)
Other		
Evaluation of the additional organisational health intervention. Only for IG2.	Four online questions about chosen problem, method of working, joint approach, achieved results	1 (very bad/certainly not) to 5 (very good/ certainly)

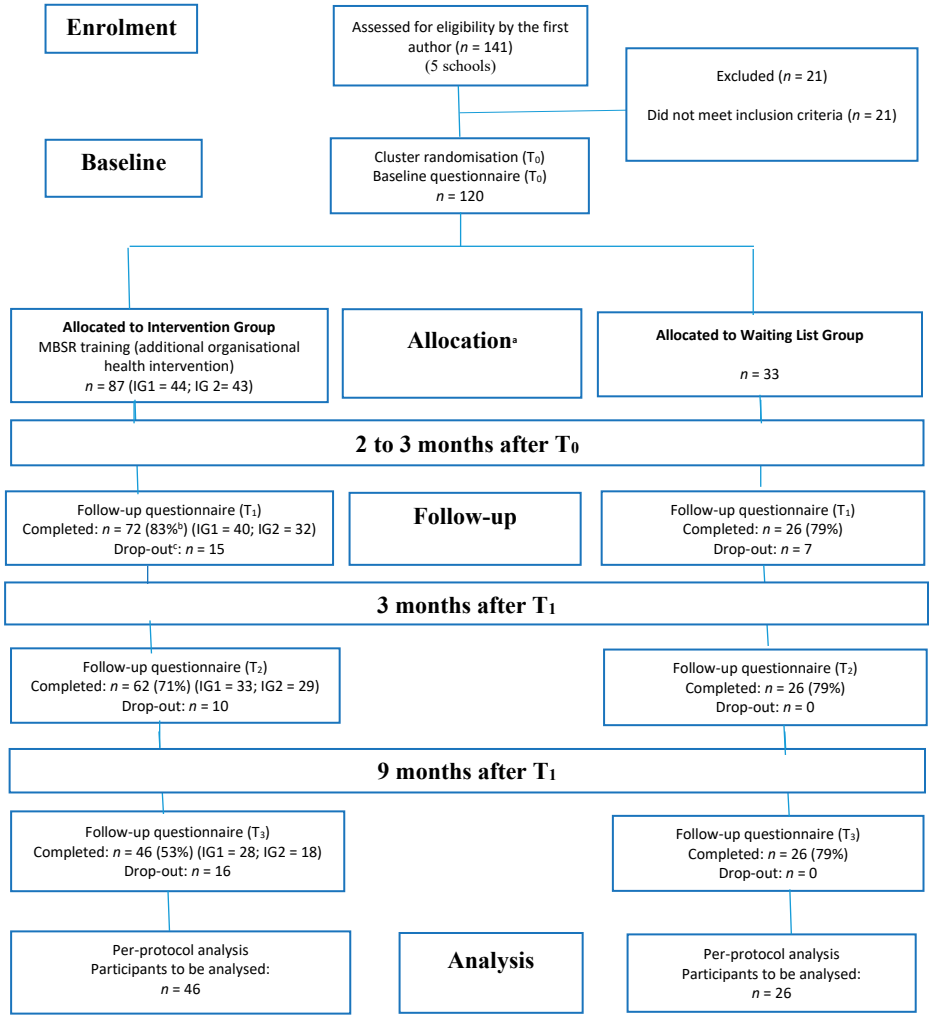

Figure 1. Flow diagram of the participants through the measurement moments of the trial

[a] Allocation was based on eligibility criteria.
[b] Percentages are response percentages compared to baseline / allocation.
[c] Reasons given for drop-out: lack of time, personal circumstances, not fulfilling expectations, lack of motivation.

Statistical analyses

Baseline characteristics of participants are presented in terms of means and standard deviations (*SD*s) for metric variables, and in terms of frequencies and percentages for categorical variables. One-way ANOVAs were conducted at T_0 to detect significant differences at baseline between the three groups (IG1; IG2; WLG).

The survey data were compared at T_0, T_1, T_2, and T_3. Per-protocol analyses were performed using the treatment-adherent sample (i.e., participants in IG1 and IG2 had

to attend at least four of the nine MBSR sessions, and participants in WLG could not attend a MBSR programme or stress reduction training).

Effects over time of the measures (i.e., T_0, T_1, T_2, and T_3 differences) between the three groups (IG1, IG2, WLG) were examined using a repeated measures between-subjects design (general linear model, GLM), with simple contrasts for short-term (T_0 versus T_1) and long-term (T_0 versus T_3) effects [28, 29].

All statistical analyses were conducted using IBM SPSS Statistics, Version 25. The level of significance was set at 0.05.

Table 4. Characteristics of the study population (measured at baseline)

Characteristics	Intervention Group (IG1) (*n* = 44)	Intervention Group (IG2) (*n* = 43)	*p*[1] *IG1 vs IG2*	Intervention Group (IG) (*n* = 87)	Waiting List Group (WLG) (*n* = 33)	*p IG vs WLG*
Gender:			.19			.24
Female	27 (61.4)	32 (74.4)		59 (67.8)	26 (78.8)	
Male	17 (38.6)	11 (25.6)		28 (32.2)	7 (21.2)	
Age[2], mean (SD) in years	49 (11.1)	50 (12.0)	.29	49 (11.5)	49 (11.1)	.81
Family situation:			.06			.65
Single without resident children	9 (20.5)	6 (14.0)		15 (17.2)	4 (12.1)	
Single with resident children	1 (2.3)	6 (14.0)		7 (8.0)	3 (9.1)	
Married or cohabitating without	14 (31.8)	18 (41.9)		32 (36.8)	10 (30.3)	
resident children	20 (45.5)	11 (25.6)		31 (35.6)	16 (48.5)	
Married or cohabitating with	0 (0.0)	2 (4.7)		2 (2.3)	0 (0.0)	
resident children						
Other						
Level of education:			.64			.36
Lower	1 (2.3)	0 (0.0)		1 (1.1)	1 (3.0)	
Medium	3 (6.8)	3 (7.0)		6 (6.9)	3 (9.1)	
General	0 (0.0)	0 (0.0)		0 (0.0)	1 (3.0)	
Higher	32 (27.7)	28 (65.1)		60 (69.0)	20 (60.6)	
Academic	7 (15.9)	9 (20.9)		16 (18.4)	8 (24.2)	
Other	1 (2.3)	3 (7.0)		4 (4.6)	0 (0.0)	
Course:			.01*			.02*
Care	21 (47.7)	18 (41.9)		39 (44.8)	23 (69.7)	
Technology	18 (40.9)	7 (16.3)		25 (28.7)	2 (6.1)	
Economy	4 (9.1)	16 (34.0)		20 (23.0)	8 (24.2)	
Other[3]	1 (2.3)	2 (4.7)		3 (3.4)	0 (0.0)	
Years of work experience:			.42			.09
0-2 years	2 (4.5)	0 (0.0)		2 (2.3)	1 (3.0)	
3-5 years	4 (9.1)	2 (4.7)		6 (6.9)	0 (0.0)	
6-10 years	4 (9.1)	5 (11.6)		9 (10.3)	0 (0.0)	
≥ 11 years	34 (77.3)	36 (83.7)		70 (80.5)	32 (97.0)	
Number of working hours per			.48			.10
week:	5 (12.5)	2 (5.3)		7 (9.0)	6 (20.0)	
≤ 24	8 (20.0)	10 (26.3)		18 (23.1)	10 (33.3)	
25-32	27 (67.5)	26 (68.4)		53 (67.9)	14 (46.7)	
≥33						

Characteristics are presented in terms of means and standard deviations (*SD*s) for metric variables, and in terms of frequencies and percentages for categorical variables.

[1] Crosstabs and Chi-square tests were used, except for 'Age' for which the Mann-Whitney U-test was used because of non-normality of the data.

[2] Age was calculated at the start of the intervention. The starting date of the interventions differed across schools.

[3] 'Other' are teachers working for more than one course, e.g., Technology and Economy.

Results

Figure 1 shows the participant flow through the phases of the trial. The participants' baseline characteristics are presented in Table 4. Due to the skewed distribution over the three courses, with an overrepresentation of teachers from the Care course (see Table 4), we did not differentiate between the three courses in the analyses.

Merging IG1 and IG2

The two intervention groups mentioned in the study protocol (Chapter 4) were merged into one intervention group for three main reasons.

First, the repeated-measures design (GLM) only showed differences between IG1 and IG2 for emotional exhaustion (p = .04) and contextual performance (p = .01). In addition, participants evaluated the quality of the needs assessment and the implementation of actual action plans stemming from the organisational health intervention as moderate (other data can be obtained upon request from the first author).

Second, we assumed that the organisational health intervention would increase occupational self-efficacy and organisational commitment. However, organisational commitment appeared to decrease in IG and to increase in WLG (see Table 5). We detected no effects on occupational self-efficacy and other key variables.

Third, similar results were achieved in a study by Schelvis et al. [30], which dealt with the effects of an organisational health intervention on work-related stress and well-being in secondary vocational schools. In particular, it found no significant effects on the primary outcomes (need for recovery and vitality) or secondary outcomes (like occupational self-efficacy).

Effectiveness of the MBSR training intervention

One-way ANOVAs showed two significant differences between the IG and WLG groups at T_0; for negative work-home interaction (p = .03) and for feedback (p = .04).

Table 5. Effects of the intervention(s) on the outcome measures

Outcome measures	Experi-mental group	Internal consistency				NN	Scores at the four measuring moments								Effectivity	
		a T_0	a T_1	a T_2	a T_3		T_0: *M (SD)*	T_1: *M (SD)*	T_2: *M (SD)*	T_3: *M (SD)*	*df*	*F*	p^a	*Effect size*[b]	Short-term effect	Long-term effect
Primary outcome																
FFMQ-NL total	IG WLG	.90	.89	.89	.91	39 20	3.25 (0.45) 3.29 (0.27)	3.53 (0.38) 3.37 (0.34)	3.52 (0.43) 3.34 (0.27)	3.56 (0.39) 3.36 (0.36)	2.88, 164	3.73	.01*	.06	.01*	< .01**
FFMQ-NL observing	IG WLG	.82	.82	.80	.80	39 20	3.16 (0.68) 3.40 (0.47)	3.40 (0.63) 3.37 (0.57)	3.41 (0.64) 3.34 (0.53)	3.47 (0.60) 3.44 (0.42)	2.77, 158	2.42	.04*	.04	.03*	.02*
FFMQ-NL describing	I WLG	.90	.88	.88	.94	39 20	3.53 (0.66) 3.46 (0.61)	3.76 (0.57) 3.54 (0.72)	3.70 (0.59) 3.51 (0.64)	3.70 (0.66) 3.53 (0.80)	2.79, 159	0.49	.34	.01	.14	.25
FFMQ-NL acting awareness	IG WLG	.86	.83	.85	.89	39 20	3.11 (0.68) 3.14 (0.64)	3.40 (0.49) 3.33 (0.61)	3.33 (0.61) 3.29 (0.66)	3.39 (0.52) 3.26 (0.73)	2.93, 167	0.41	.37	< .01	.27	.16
FFMQ-NL non-judging	IG WLG	.88	.88	.87	.85	39 20	3.44 (0.69) 3.26 (0.40)	3.74 (0.69) 3.40 (0.61)	3.88 (0.62) 3.40 (0.50)	3.87 (0.59) 3.39 (0.60)	2.94, 168	1.72	.08	.03	.15	.04*
FFMQ-NL non-reactivity	IG WLG	.76	.76	.76	.78	39 20	2.99 (0.64) 3.17 (0.44)	3.30 (0.52) 3.18 (0.44)	3.28 (0.58) 3.15 (0.47)	3.37 (0.51) 3.16 (0.48)	2.97, 169	2.87	.02*	.05	.03*	< .01**
Secondary mental health outcomes																
UBOS-L emotional exhaustion	IG WLG	.83	.86	.90	.90	38 20	2.23 (1.06) 2.14 (0.88)	2.15 (1.10) 2.36 (0.99)	1.92 (1.18) 2.11 (1.16)	1.79 (1.09) 2.11 (1.19)	2.76, 155	1.00	.20	.02	.10	.09
UBOS-L mental distance	IG WLG	.62	.72	.76	.72	38 20	1.06 (0.69) 1.14 (0.73)	0.92 (0.67) 1.16 (0.78)	0.95 (0.73) 1.05 (0.68)	0.93 (0.75) 1.04 (0.70)	3.00, 168	0.45	.36	< .01	.13	.43
UBOS-L personal accomplish-ment	IG WLG	.78	.77	.79	.78	38 20	4.26 (0.89) 4.42 (0.62)	4.33 (0.76) 4.34 (0.60)	4.30 (0.72) 4.29 (0.76)	4.34 (0.71)\ 4.47 (0.55)	2.83, 158	0.52	.33	.01	.21	.46
DASS stress	IG WLG	.92	.93	.94	.95	38 20	0.61 (0.56) 0.83 (0.48)	0.58 (0.55) 0.71 (0.47)	0.62 (0.65) 0.69 (0.37)	0.60 (0.60) 0.70 (0.44)	2.95, 165	0.33	.40	.01	.31	.24
VBBA sleep quality com-plaints	IG WLG	.82	.87	.90	.91	41 21	0.35 (0.25 0.34 (0.29)	0.29 (0.27) 0.34 (0.31)	0.31 (0.32) 0.36 (033)	0.28 (0.29) 0.40 (0.33)	2.90, 174	1.28	.14	.02	.19	.03*
JAWS positive emotions	IG WLG	.83	.86	.90	.88	38 20	3.83 (0.64) 3.89 0.63)	3.84 (0.64) 3.76 (0.65)	3.76 (0.75) 3.81 (0.74)	3.82 (0.70) 4.02 (0.71)	2.98, 167	0.85	.23	.02	.20	.23
JAWS negative emotions	IG WLG	.78	.78	.78	.87	38 20	2.18 (0.64) 2.08 (0.44)	2.16 (0.63) 2.22 (0.65)	2.01 (0.64) 2.13 (0.55)	2.00 (0.73) 2.38 (0.80)	2.77, 155	2.33	.04*	.40	.18	.02*
UWES vigour	IG WLG	.79	.81	.89	.88	37 20	4.03 (1.06) 4.47 (0.99)	4.05 (1.13) 4.38 (1.07)	3.97 (1.18) 4.28 (1.09)	4.06 (1.19) 4.43 (1.00)	3.00, 165	0.10	.47	< .01	.32	.39

UWES dedication	IG WLG	.90	.90	.93	.88	37 20	4.39 (1.03) 4.87 (0.99)	4.47 (1.29) 4.60 (0.92)	4.25 (1.33) 4.67 (1.02)	4.51 (1.16) 4.65 (0.96)	2.85, 157	0.99	.20	.02	.04*	.11
UWES absorption	IG WLG	.77	.79	.83	.82	37 20	3.80 (1.09) 4.43 (1.10)	3.94 (1.22) 4.35 (0.99)	3.87 (1.28) 4.27 (0.86)	4.00 91.16) 4.42 (1.09)	3.00, 165	0.41	.37	.01	.33	.33
SF-36-v2 perceived general health	IG WLG	.71	.68	.74	.72	38 20	3.65 (0.55) 3.75 (0.54)	3.76 (0.60) 3.76 (0.48)	3.62 (0.65) 3.85 (0.50)	3.63 (0.65) 3.77 (0.50)	3.00, 168	1.01	.19	.02	.21	.37
ACS organisational commitment	IG WLG	.81	.87	.87	.88	41 21	3.71 (0.84) 3.51 (0.77)	3.58 (0.90) 3.64 (0.85)	3.58 (0.92) 3.73 (0.84)	3.62 (0.95) 3.77 (0.86)	2.95, 177	2.41	.04*	.04	.04*	.01*
Work performance																
IWPQ task performance	IG WLG	.82	.78	.75	.81	37 20	2.15 (0.71) 2.38 (0.61)	2.21 (0.68) 2.37 (0.81)	2.27 (0.70) 2.38 (0.66)	2.27 (0.73) 2.44 (0.74)	2.91, 160	0.13	.47	< .01	.34	.39
IWPQ contextual performance	IG WLG	.87	.87	.90	.90	37 26	2.29 (0.87) 2.47 (0.72)	2.40 (0.76) 2.56 (0.65)	2.16 (0.89) 2.38 (0.66)	2.36 (0.91) 2.61 (0.58)	2.94, 162	0.09	.48	< .01	.46	.36
IWPQ counter-productive work behaviour	IG WLG	.78	.79	.81	.77	37 20	1.62 (0.56) 1.60 (0.65)	1.38 (0.64) 1.48 (0.58)	1.28 (0.71) 1.50 (0.51)	1.41 (0.60) 1.44 (0.53)	3.00, 165	0.73	.27	.01	.22	.39
Personal competencies																
IWPQ Occupational Self-Efficacy Scale	IG WLG	.78	.78	.82	.87	38 20	4.61 (0.53) 4.68 (0.58)	4.77 (0.54) 4.78 (0.44)	4.73 (0.67) 4.77 (0.51)	4.80 (0.64) 4.76 (0.55)	3.00, 168	0.23	.44	< .01	.31	.22
VBBA taking distance	IG WLG	.80	.84	.77	.83	38 20	1.40 (0.61) 1.43 (0.58)	1.28 (0.56) 1.35 (0.64)	1.21 (0.56) 1.28 (0.52)	1.15 (0.56) 1.35 (0.41)	2.71, 152	0.63	.29	.01	.37	.15
Work-related perceptions / job demands																
VBBA work pace and workload	IG WLG	.82	.85	.83	.88	41 21	1.28 (0.50) 1.27 (0.35)	1.38 (0.50) 1.43 (0.52)	1.31 (0.56) 1.35 (0.46)	1.20 (0.49) 1.34 (0.52)	2.90, 174	0.62	.30	.01	.30	.10
VBBA emotional demands	IG WLG	.64	.67	.76	.77	40 21	1.24 (0.38) 1.19 (0.20)	1.18 (0.40) 1.18 (0.33)	1.10 (0.44) 1.25 (0.28)	1.14 (0.41) 1.20 (0.29)	2.80, 165	2.37	.04*	.04	.23	.11
SWING negative work-home interaction[c]	IG WLG	.86	.86	.89	.90	36 21	0.01 (0.55) 0.87 (0.38)	0.98 (0.59) 0.99 (0.42)	0.79 (0.56) 0.91 (0.47)	0.79 (0.50) 0.89 (0.42)	2.95, 162	1.94	.06	.03	.13	.03*
SWING negative home-work interaction	IG WLG	.84	.81	.77	.76	36 21	0.47 (0.71) 0.43 (0.38)	0.28 (0.38) 0.35 (0.40)	0.29 (0.37) 0.26 (0.32)	0.28 (0.37) 0.31 (0.34)	2.03, 112	0.23[d]	.40	< .01	.28	.35

Work-related perceptions / job resources																
VBBA autonomy	IG WLG	.80	.80	.83	.86	41 21	1.20 (0.62)| 1.19 (0.47)	1.24 (0.58) 1.31 (0.41)	1.28 (0.56) 1.24 (0.48)	1.29 (0.59) 1.26 (0.46)	2.97, 178	0.44	.36	.01	.19	.45
VBBA feedback[c]	IG WLG	.74	.73	.77	.85	41 21	1.48 (0.54) 1.23 (0.43)	1.48 (0.63) 1.35 (0.40)	1.46 (0.57) 1.35 (0.40)	1.48 (0.64) 1.44 (0.58)	2.86, 172	0.77	.25	.01	.18	.06
VBBA relation colleagues	IG WLG	.77	.79	.78	.82	41 21	0.69 (0.44) 0.64 (0.35)	0.73 (0.45) 0.70 (0.42)	0.74 (0.45) 0.69 (0.33)	0.69 (0.45) 0.72 (0.34)	3.00, 177	0.42	.37	.01	.43	.17
VBBA relation superior	IG WLG	.86	.84	.87	.92	41 21	0.71 (0.49) 0.52 (0.45)	0.83 (0.58) 0.52 (0.43)	0.82 (0.54) 0.62 (0.56)	0.75 (0.55) 0.54 (0.47)	2.78, 167	0.44	.35	.01	.16	.44
VBBA relation students	IG WLG	.66	.65	.70	.72	41 21	0.82 (0.34) 0.96 (0.09)	0.82 (0.31) 0.93 (0.14)	0.80 (0.39) 0.94 (0.21)	0.77 (0.33) 0.95 (0.22)	3.00, 180	0.41	.37	.01	.31	.28

Outcome measures:
FFMQ-NL total: Dutch version of the Five Facet Mindfulness Questionnaire; FFMQ-NL observing, FFMQ-NL describing, FFMQ-NL acting awareness, FFMQ-NL non-judging, FFMQ-NL non-reactivity: subscales of the Dutch version of the Five Facet Mindfulness Questionnaire;
UBOS-L emotional exhaustion, UBOS-L mental distance, UBOS-L personal accomplishment: subscales of Utrechtse BurnOut Schaal-Leerkrachten (Utrecht Burnout Scale - Education);
DASS stress: subscale stress of the Depression, Anxiety, Stress Scales;
JAWS positive emotions: Job-related Affective Well-being Scale, subscale positive emotions; JAWS negative emotions: Job-related Affective Well-being Scale, subscale negative emotions;
UWES vigour, UWES dedication, UWES absorption: subscales of the Utrecht Work Engagement Scale (Dutch; UBES);
SF-36v2, perceived general health: Short Form 36 Health Survey, version 2;
ACS: Affective Commitment Scale, subscale of the Organizational Commitment Questionnaire (OCQ);
IWPQ task performance, IWPQ contextual performance, IWPQ counter-productive work behaviour: subscales of the Individual Work Performance Questionnaire; Occupational Self-Efficacy scale;
SWING negative work-home interaction, SWING negative home-work interaction: subscales of the Survey Work-home Interaction-NijmeGen;
VBBA subscales: subscales of the Vragenlijst Beleving en Beoordeling van de Arbeid 2.0 (Perception and Assessment of Labour 2.0).

Other abbreviations:

IG Intervention Group received an MBSR training (combined with an additional organisational health intervention).
WLG Waiting List Group.
a Cronbach's alpha.
[a] p is one-tailed; * $p < .05$; ** $p < .01$.
[b] Effect size is reported as partial eta squared: small (eta = 0.04), medium (eta = 0.25) and large (eta = 0.64) effect sizes.
Short-term effect: p between $T_0 - T_1$; Long-term effect: p between $T_0 - T_3$.
[c] Significant difference on T_0 between IG and WLG.
[d] Huynh-Feldt's F is reported because Greenhouse-Geisser correction is in almost all cases > .75; except [2]: Greenhouse-Geisser.

Table 5 shows the results of the repeated-measures design (GLM) using simple contrast analysis. In comparison to WLG, IG appeared to have a significantly higher short- and long-term increase in the total mindfulness score (p = .01; p < .01) and in the mindfulness dimensions 'observing' (p = .03; p = .02) and 'non-reactivity' (p = .03; p < .01). Significantly higher long-term scores in the mindfulness dimension 'non-judging' (p = .04) were reported as well.

In comparison to WLG, IG showed a significantly higher short-term increase in the work engagement dimension 'dedication' (p = .04), and a significantly higher short- and long-term decrease in organisational commitment (p = .04; p = .01). In addition, IG had significantly lower long-term scores for sleep quality complaints (p = .03), negative emotions (p = .02), and negative work-home interaction (p = .03) (despite differences at T_0). The effect sizes for all outcomes were small, except for the medium to large effect size for negative emotions (eta = .40).

Discussion

This study aimed to evaluate the short-term (T_0 versus T_1) and long-term effects (T_0 versus T_3) of MBSR training, a person-focused intervention for strengthening the individual capacity of teachers in secondary vocational schools to help them cope with stress and enhance their mental health. The study confirmed the results of previous RCT studies among teachers [31-34]: a significant increase in the primary outcome 'mindfulness total' and its dimensions 'observing' and 'non-reactivity'.

Our study among teachers is the only one, as a result of MBSR, in which organisational commitment decreased, the work engagement dimension 'dedication' improved, and negative emotions and negative work-home interaction significantly diminished. Decreased organisational commitment and improved dedication during work may indicate that teachers detached from their work during their leisure time (as indicated by a decrease in negative work-home interaction), which allowed them to experience fewer symptoms of psychological strain (as indicated by a decrease in negative emotions).

MBSR seems not to have changed the perceived balance between job demands and job resources. Strikingly however, was that teachers appeared to respond better to mental processes that contribute to emotional distress and maladaptive behaviour after the MBSR course. They might psychologically detach [35] or dis-identify themselves by the mechanism of willingness to experience, awareness, and observation (see Chapter 2), as reflected in the increase of mindfulness total, its dimensions observing, non-reactivity and non-judging, and in the decrease of organisational commitment and negative work-home interaction. Our results also suggest that the teachers' psychological functioning improved, as reflected in fewer sleep quality complaints and negative emotions, and more dedication.

We hypothesized that participating in the organisational health intervention would positively influence occupational self-efficacy (Chapter 4). Similar to the study by Schelvis et al. [36], our organisational health intervention was unsuccessful: there were no effects on occupational self-efficacy.

The conceptual model - as suggested in our earlier article (Chapter 4) - could not be tested due to limited data, which might also have influenced the conclusiveness of our results. However, several reasons may partly explain the non-significant and small effect sizes for the other mental health outcomes, work performance, personal competencies, job demands, and job resources.

First, attention to mindfulness may have been triggered in the WLG when filling in the online questionnaires. Since the WLG was aware of the MBSR training, they may have searched for mindfulness apps, exercises, or books, which may have improved some of their outcomes (see Table 5).

Second, given that one in five employees in the educational sector reported stress or burnout complaints in 2017 [2], the exceptionally low score for stress at baseline for the IG is remarkable. It seems that the target group for our intervention(s) – teachers with the highest stress scores – did not participate in our study. Many participants were women with a relatively high average age and many years of work experience (see Table 4). Therefore, we may be dealing with a healthy worker effect [37] and an absence of younger workers who are too busy for the MBSR training. Possible barriers to participation were limited time availability, low expectations, low motivation, lower levels of perceived health, and lower perceptions of their organisation's commitment to employee health [38]. This leads us to ask how the core target group can be reached in future scholarly work in this field, and how non-participation can be reduced. Participation might be stimulated by a genuine understanding of employees' needs by the management team and cooperation within the organisation, by a careful selection of participants, using criteria such as the extent of stress/burnout complaints, presenteeism and absenteeism rate, and by reducing possible barriers (in the context of a health programme: more commitment and the possibility to participate in the training during working hours).

Third, the lack of effects by the organisational health intervention could be caused by poor implementation [39]. The intervention may not have been fully implemented as planned, which might have limited its potential impact [36]. There may be several possible explanations for this. Maybe the preparation phase (establishment of a participatory group, commitment of management, communication to the teachers) (Chapter 4), which is a requirement of utmost importance in the light of creating readiness for change by management and employees, was too brief. Employees' perception and appraisal of the organisational intervention may not be really affected by a serious communication strategy. After all, the present organisational culture of Dutch secondary vocational schools and the sometimes authoritarian leadership - marked by controlling, top-down communication, and the belief that 'employees' point of view is of limited value' - may

not have facilitated the implementation of the intervention. Consequently, we detected no increase in occupational self-efficacy and no change in job demands or job resources.

Strengths and limitations of this study

One strength was the CRCT design and the integrated approach. Despite the possible weak implementation of the organisational intervention, the MBSR had some significant effects. We found it surprisingly difficult to recruit secondary vocational schools, perhaps because they were busy with day-to-day business and organisational changes. The same applied to recruiting enough teachers at the schools, due to the heavy time investment, the course dates, fear of attending such a meeting with colleagues, or the chance of being randomised to the WLG. Nevertheless, the number of schools and teachers recruited were sufficient. Other strengths of our study are the wide range of outcomes that were measured and the longitudinal data comprising both short- and long-term effects. However, our study also had limitations.

First, the researchers, facilitator, trainers, and participants could not be blinded for their assigned intervention after cluster randomisation. However, participants filled in online questionnaires anonymously at home or at work, which strongly reduced the influence of the researchers, facilitator, and trainers.

Second, a CRCT, which the organizational health intervention required, entails a greater complexity in design and analysis than an RCT. It also requires more participants (based among others on the amount of groups, type of measurements, and the nature of the statistical tests) to achieve adequate statistical power [40].

Third, as the organizational health intervention took place at different schools with differing organizational conditions, treatment fidelity, i.e., the reliability of the administration of the intervention, may have been less optimal [41].

Fourth, all data were self-reported and may therefore be biased [41, 42]. De Waal [43] posited that human beings are insufficiently aware of their inner state and may therefore mislead themselves and others. However, as this study was designed as a CRCT, this bias is likely to have occurred to the same extent in the IG and the WLG. In addition, Schnittker and Bacak [44] reported that the predictive value for self-rated health is increasing, among others caused by the exposure to more health information. Consequently, the current study may have been less prone to this type of bias.

Fifth, there were a lot of drop-outs in the study (40%).

Recommendations for future research

This study followed up on some important recommendations from previous review studies in this field (see Chapter 4).

There are at least five possible avenues for future research. *First*, reaching the core target group (teachers with a high level of stress) would require a careful selection of participants before T_0, based on their mental health outcomes. *Second*, future research

could pay attention to the conditions under which the intervention should take place: during working hours and with good facilities. Otherwise, MSBR training could actually add a stressor to the work environment. *Third*, more scholarly work is needed to determine which settings are particularly suitable for which types of mindfulness courses. Mindfulness training needs to be implemented with care, because it cannot be assumed that it works for everyone and under all circumstances. *Fourth*, possible causal relationships and reversed causations between the outcomes need to be analysed to explore the working mechanisms of MBSR [45]. *Fifth*, we recommend an integrated approach that combines both an individual-focused intervention and an organisation-focused intervention while simultaneously abiding by the determinants of successful implementation [36].

Based on the results discussed, we can conclude that although teachers did not perceive a decrease in their job demands after the training, they felt more mindful and lowered their organisational commitment. Moreover, their mental health improved, as reflected in fewer sleep quality complaints, less negative emotions, reduced negative work-home interaction and more dedication during work. These findings may suggest that the enhanced mindfulness enabled them to mentally disengage from work during leisure time [35], which allowed them to experience fewer symptoms of psychological strain.

References

1. Van der Steeg M, Gerritsen S. Teacher evaluations and pupil achievement: evidence from classroom observations [CPB Discussion Paper 230]. 2013: CPB Netherlands Bureau for Economic Policy Analysis.
2. Douwes M, Hooftman W. Arbobalans 2018: Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of working conditions 2018. Quality of work, impacts and measures in the Netherlands] (Dutch). 2019, Leiden: TNO.
3. Schelvis RMC, Wiezer NM, Blatter BM, van Genabeek JAGM, Oude Hengel KM, Bohlmeijer ET, et al. Evaluating the implementation process of a participatory organizational level occupational health intervention in schools. BMC Public Health. 2016; 16(1).
4. Boonstra W. Het onderwijs brandt mensen op [Education burns people out] (Dutch). 2015 Accessed 5 Dec. 2018]; Available from: https://www.intermediair.nl/werk-privebalans/burn-out/het-onderwijs-brandt-mensen-op.
5. Schelvis RMC, Oude Hengel KM, Wiezer NM, Blatter BM, van Genabeek JAGM, Bohlmeijer ET, et al. Design of the Bottom-up Innovation project - a participatory, primary preventive, organizational level intervention on work-related stress and well-being for workers in Dutch vocational education. BMC Public Health. 2013; 13(1): 1-15.
6. Pas ET, Bradshaw CP, Hershfeldt PA. Teacher- and school-level predictors of teacher efficacy and burnout: identifying potential areas for support. Journal of School Psychology. 2012; 50(1): 129-145.
7. Iancu AE, Rusu A, Maroiu C, Pacurar R, MaricuÈoiu LP. The Effectiveness of Interventions Aimed at Reducing Teacher Burnout: a Meta-Analysis. Educational Psychology Review. 2018; 30(2): 373.
8. Bandura A. Health promotion from the perspective of social cognitive theory. Psychology & Health. 1998; 13(4): 623-649.
9. Bland JM. Cluster randomised trials in the medical literature: two bibliometric surveys. BMC Medical Research Methodology. 2004; 4: 21.
10. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. 1990, New York: Delacorte.
11. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for depression; a new approach to preventing relapse. 2002, New York: Guilford Press.
12. Baer RA, Smith GT, Lykins E, Button D, Krietemeyer J, Sauer S, et al. Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. Assessment. 2008; 15(3): 329-342.
13. de Bruin EI, Topper M, Muskens JGAM, Bögels SM, Kamphuis JH. Psychometric properties of the Five Facets Mindfulness Questionnaire (FFMQ) in a meditating and a non-meditating sample. Assessment. 2012; 19(2): 187-197.
14. Maslach C, Jackson SE. The Measurement of Experienced Burnout. Journal of Occupational Behavior. 1981; 2: 99.
15. Schaufeli WB, Leiter MP, Maslach C, Jackson SE. Maslach Burnout Inventory-General Survey. In Maslach C, Jackson SE, Leiter MP. The Maslach Burnout Inventory-Test Manual., Palo Alto, CA: Consulting Psychologists Press, 1996.
16. Schaufeli W, Van Dierendonck D. Handleiding van de Utrechtse Burnout Schaal (UBOS) [Utrecht Burnout Scale Manual] (Dutch). 2000, Amsterdam: Harcourt Assessment B.V.
17. Nieuwenhuijsen K, de Boer A, Verbeek J, Blonk RWB, van Dijk FJH. The Depression Anxiety Stress Scales (DASS): detecting anxiety disorder and depression in employees absent from work because of mental health problems. Occupational and Environmental Medicine. 2003; 60: 77-82.

18. Van Veldhoven M, Prins J, Van der Laken P, Dijkstra L. VBBA2.0 Update van de standaard voor vragenlijstonderzoek naar werk, welbevinden en prestaties [VBBA2.0 Update of the standard for questionnaire survey on work, well-being and work performance] (Dutch). 2014, Amsterdam: SKB.
19. Van Katwyk PT, Fox S, Spector PE, Kelloway EK. Using the Job-Related Affective Well-Being Scale (JAWS) to investigate affective responses to work stressors. Journal of Occupational Health Psychology. 2000; 5(2): 219-230.
20. Schaufeli W, van Rhenen W. Over de rol van positieve en negatieve emoties bij het welbevinden van managers: Een studie met de Job-related Affective Well-being Scale (JAWS) = About the role of positive and negative emotions in managers' wellbeing: A study using the Job-related Affective Well-being Scale (JAWS). Gedrag en Organisatie. 2006; 19(4): 323-344.
21. Schaufeli W, Bakker A. Voorlopige handleiding Utrechtse Bevlogenheidschaal (versie 1). [Preliminary handbook for the Utrecht Work Engagement Scale (version 1)] (Dutch). 2003, Utrecht: Universiteit Utrecht.
22. Schaufeli WB, Salanova M, González-romá V, Bakker AB. The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach. Journal of Happiness Studies. 2002; 3(1): 71-92.
23. Van der Zee KI, Sanderman R. Het meten van de algemene gezondheidstoestand met de Rand-36. Een handleiding. Tweede druk [Assessing general health with the Rand-36. A handbook. Second edition] (Dutch). 2012, Groningen: University of Groningen.
24. Smeenk SGA, Eisinga RN, Teelken JC, Doorewaard JACM. The effects of HRM practices and antecedents on organizational commitment among university employees. International Journal of Human Resource Management. 2006; 17(12): 2035-2054.
25. Koopmans L, Bernaards C, Hildebrandt V, Vet R, Beek A. De Individuele Werkprestatie Vragenlijst (IWPV): interne consistentie, construct validiteit en normering. Tijdschrift voor Gezondheidswetenschappen. 2014; 92(6): 231-239.
26. Rigotti T, Schyns B, Mohr G. A short version of the occupational self-efficacy scale: Structural and construct validity across five countries. Journal of Career Assessment. 2008; 16(2): 238-255.
27. Geurts SAE, Taris TW, Kompier MAJ, Dikkers JSE, van Hooff MLM, Kinnunen UM. Work-home interaction from a work psychological perspective: development and validation of a new questionnaire, the SWING. Work & Stress. 2005; 19(4): 319-339.
28. Liang K-Y, Zeger SL. Longitudinal Data Analysis Using Generalized Linear Models. Biometrika. 1986; 73(1): 13-22.
29. Wang M. Generalized Estimating Equations in Longitudinal Data Analysis: A Review and Recent Developments. Advances in Statistics. 2014; 2014(1).
30. Schelvis RMC, Decreasing work stress in teachers (Doctoral dissertation). 2017, VU Amsterdam
31. Frank JL, Reibel D, Broderick P, Cantrell T, Metz S. The effectiveness of mindfulness-based stress reduction on educator stress and well-being: Results from a pilot study. Mindfulness. 2015; 6(2): 208-216.
32. Jennings PA, Frank JL, Snowberg KE, Coccia MA, Greenberg MT. Improving classroom learning environments by Cultivating Awareness and Resilience in Education (CARE): results of a randomized controlled trial. School Psychology Quarterly. 2013; 28(4): 374-390.
33. Roeser RW, Jha A, Wallace L, Wilensky R, Schonert-Reichl KA, Cullen M, et al. Mindfulness training and reductions in teacher stress and burnout: results from two randomized, waitlist-control field trials. Journal of Educational Psychology. 2013; 105(3): 787.
34. Taylor C, Harrison J, Haimovitz K, Oberle E, Thomson K, Schonert-Reichl K, et al. Examining ways that a mindfulness-based intervention reduces stress in public school teachers: A mixed-methods study. Mindfulness. 2016; 7(1): 115-129.

35. Sonnentag S. Psychological Detachment From Work During Leisure Time: The Benefits of Mentally Disengaging From Work. Current Directions in Psychological Science. 2012; 21(2): 114-118.
36. Schelvis RMC, Wiezer NM, van der Beek AJ, Twisk JWR, Bohlmeijer ET, Oude Hengel KM. The effect of an organizational level participatory intervention in secondary vocational education on work-related health outcomes: results of a controlled trial. BMC Public Health. 2017; 17(1).
37. Li CY, Sung FC. A review of the healthy worker effect in occupational epidemiology. Occupational Medicine. 1999; 49(4): 225-229.
38. Toker S, Heaney CA, Ein-Gar D. Why won't they participate? Barriers to participation in worksite health promotion programmes. European Journal of Work and Organizational Psychology. 2015; 24(6): 866-881.
39. Jenny GJ, Brauchli R, Inauen A, FÜLlemann D, Fridrich A, Bauer GF. Process and outcome evaluation of an organizational-level stress management intervention in Switzerland. Health Promotion International. 2015; 30(3): 573-585.
40. Campbell MK, Elbourne DR, Altman DG. Consort statement: extension to cluster randomised trials. BMJ: British Medical Journal (International Edition). 2004; 328(7441): 702-708.
41. Klingbeil DA, Renshaw TL. Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base. School Psychology Quarterly. 2018; 33(4): 501-511.
42. Brock TC, Green MC, Reich DA, Evans LM. The Consumer Reports study of psychotherapy: Invalid is invalid. American Psychologist. 1996; 51(10): 1083-1083.
43. De Waal F. Mama's last hug. Animal emotions and what they tell us about ourselves. 2019, New York: Norton.
44. Jason S, Valerio B. The increasing predictive validity of self-rated health. PLoS ONE. 2014; 9(1): e84933-e84933.
45. Zapf D, Dormann C, Frese M. Longitudinal studies in organizational stress research: a review of the literature with reference to methodological issues. Journal of Occupational Health Psychology. 1996; 1(2): 145-169.

6

Chapter 6

Effects of Mindfulness training on teachers' expectations and experiences about their mental health and mindfulness/prosocial competencies

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Abstract

Objectives: In this qualitative study, we explored Dutch secondary vocational schoolteachers' prior expectations of a Mindfulness-Based Stress Reduction (MBSR) course and of an additional health intervention. We report on their short- and long-term experiences regarding mental health outcomes and personal or mindfulness/prosocial competencies.

Methods: Teachers participating in a cluster randomised controlled trial were interviewed between September 2016 and June 2020. We interviewed 32 teachers prior to partaking in the MBSR course (T_0), 27 immediately after the course (T_1), and 16 nine months after finishing the course (T_3). No interviews were held on T_2, three months after finishing the course. Qualitative data was analysed using directed content analysis.

Results: Analysis of the data at T_0 resulted in five themes regarding prior expectations related to the MBSR course. Data analysis at T_1 and T_3 resulted in 10 themes regarding experiences, four of which were the same as at T_0: one mental health outcome ('stress and unpleasant feelings') and three personal competencies ('being in the present', 'taking distance', and 'recognising and changing dysfunctional patterns'). The fifth 'other' theme at T_0 was 'knowledge of mindfulness and of mindfulness skills'. The six additional themes regarding experiences were one mental health outcome ('inner calmness and pleasant feelings') and five personal competencies ('being aware', 'concentration', 'acceptance and non-judgment', 'communicating', and 'showing compassion towards yourself and others').

Conclusions: Our results suggest that MBSR, in addition to the attention for substantial and educational skills in the formal curriculum, can reduce teachers' stress, increase inner calmness, and cultivate their mindfulness and prosocial competencies.

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To maintain and improve public education, both the quality of teaching and teachers' personal development need to be addressed [1]. Teachers have demanding jobs (e.g., work pressure, social-emotional demands) in combination with few job resources, such as professional autonomy [2]. In a Dutch survey study conducted in 2017, stress and burnout complaints were mentioned by more than one in five teachers in the educational sector [2]. Teachers' well-being is especially troublesome in Dutch secondary vocational schools. This can be attributed to the poor capacity for implementing occupational health interventions. Causes can be attributed to poorly equipped middle managers, a culture of teachers' learned helplessness, authoritarian leadership, a lack of mutual trust between management and employees, and frequent policy changes by the Ministry of Education [3].

To carry out their tasks adequately, vocational teachers need competencies mentioned in the qualification dossier for teachers in Dutch secondary vocational schools [4], a publication by the Dutch secondary vocational schools council. Different personal competencies are emphasized such as being aware, taking distance/self-reflection, regulating emotions, and self-responsibility.

Neuropsychological studies of mindfulness courses suggest that mindfulness may increase attention regulation, working memory, body-awareness, and emotion-regulation [5-7]. However, a more recent systematic review on MBSR and Mindfulness-Based Cognitive Therapy (MBCT) did not support the claim of attention improvements, although cognitive flexibility, meta-awareness, and working memory were improved [8].

Moreover, a qualitative review on health care workers' experiences of mindfulness courses mentioned improvements in personal well-being, self-compassion, and presence when relating to others [9]. Two quantitative systematic reviews on the effects of mindfulness-based interventions for teachers [10, 11] reported a decrease in experienced stress and an increase in mindfulness and prosocial competencies (i.e., capabilities that are intended to benefit another person or group, like connecting/communicating, kindness, compassion, helping) such as emotion regulation, compassion, and awareness. Emerson et al. [10] also found an improvement in teachers' self-efficacy. A qualitative review on employees' experiences of mindfulness courses [12] reported stress reduction in particular as a perceived benefit. A more recent qualitative review on caring professionals including teachers, nurses, psychotherapists, and social workers [13], described increases in therapeutic presence, listening, non-judgment, compassion, self-care, emotional awareness, and emotion regulation.

These findings suggest that MBSR could contribute to teachers' personal development, to stress reduction, and to handling social-emotional teaching demands regarding relations with students and supportive classroom climates [14]. In addition, the findings of a cluster randomised controlled trial on mindfulness-based stress reduction and an organisational health intervention on Dutch teachers' mental health (see Chapter 5), suggest that enhanced mindfulness enables teachers to mentally disengage from

their work during leisure time, which allows them to experience fewer symptoms of psychological strain. However, to date, little is known about the impact of MBSR on the personal experiences of teachers, such as their development of mindfulness and prosocial competencies. Moreover, more knowledge about the role of prior expectations is needed to explore whether these might have a placebo effect, anticipating that an intervention will result in experiences regardless its content [15]. Qualitative methods [16, 17] provide the opportunity to gain a deeper understanding of teachers' expectations and experiences with MBSR, and therefore in this scholarly work, we will conduct a qualitative study into teachers' mental health and mindfulness/prosocial competencies.

Research aim and research questions

The primary aim of this qualitative study was firstly, to explore teachers' prior expectations (including motives to participate) and experiences when participating in MBSR courses. The secondary aim was to gain more insights into our previous quantitative study's finding (see Chapter 5) that an organisational health intervention among teachers had no effect on their mental health, work performance, personal or mindfulness/prosocial competencies (e.g., occupational self-efficacy), and work-related perceptions/work characteristics (job demands and job resources).
To reach these aims, we addressed two research questions:

1) What are the prior expectations (including motives to participate), and the short- and long-term experiences regarding mental health outcomes and personal or mindfulness/prosocial competencies, of teachers participating in the MBSR course?
2) What are the experiences of teachers and HR professionals with the organisational health intervention?

Theoretical framework

Our conceptual model was inspired by the Job Demands-Resources (JD-R) model [18, 19] as presented in the study protocol (see Chapter 4). It is a descriptive, heuristic model, expressing relations between (groups of) variables, subdivided in personal competencies, work-related perceptions (i.e., job demands and job resources), and outcomes of interventions (i.e., mental health outcomes and work performance). The theoretical perspectives needed to substantiate the relations between these specific variables [20] are outlined below.

Personal competencies

The *Conservation of Resources (COR) Theory* [21, 22], a general theory of motivation and stress, is valuable for reflecting on teachers' motivation for participating in the MBSR course and the organisational health intervention, and on their short- and long-term experiences. The theory's basic assumption is that people strive to maintain, obtain, and create resources that they value as beneficial for meeting current and future challenges of work and life [23]. An important principle of the COR theory is that employees must invest resources, such as time and money, to prevent resource loss and to gain other resources to protect themselves against occupational stress and burnout complaints [22]. Hobfoll [23] distinguishes four types of resources: 1) objects, that have physical presence and may be linked to socio-economic status (e.g., shelter and clothing); 2) conditions, such as good health, social relations, and status at work; 3) energy resources (e.g., time, money, and knowledge); and 4) personal resources (e.g., individual traits and coping skills). These resources are not isolated distinct variables, but exist in 'caravans', i.e., highly correlated mutually reinforcing resources [24]. For teachers in particular, the availability of more conditions at work (e.g., challenging work, autonomy, and social support), energy resources (e.g., time), and more personal resources (e.g., self-efficacy, optimism, and coping skills) will enable them to meet challenges/demands and will, ultimately, result in more work engagement and well-being. This mechanism generates an upwards spiral (gain cycle), characterized by an accumulation of resources [23]. In addition to this gain cycle, the COR theory also describes a loss cycle: " …. those with fewer resources are more vulnerable to resource loss [*e.g., diminished mastery or self-efficacy, and decreased social support,* Authors] and are less capable of resource gain" [22], p. 169.

In the context of our research, two reinforcing types of resources [23] are relevant: the condition of good (mental) health and personal competencies. It is interesting to reflect on why teachers, who have busy schedules and experience stress, still find time to participate in an MBSR course, as this requires a serious time investment (i.e., an energy resource) [23]. This time investment is only reasonable if teachers expect worthwhile effects from the MBSR. Another important item is which post-participation short- and long-term personal competencies are actually obtained.

Mindfulness skills as personal competencies

Hölzel et al. [6], inspired by four theoretical perspectives about the process of mindfulness meditation [25-28], identified four interacting components through which mindfulness works and which stimulate the process of enhanced self-regulation [29].

The first is *attention regulation* [30], which enhances performance and is a prerequisite to stay engaged in meditation: maintaining the focus on a chosen object and returning whenever distracted [6].

The second is *body awareness* [31], which increases observation skills: focussing on (subtle) bodily sensations [6].

The third is *emotion regulation* [28], including two different strategies. The first of these, 'reappraisal or reconstruction', consists of approaching ongoing emotional reactions in a non-judgmental way and with acceptance. This increases positive reappraisal, that is the reconstruction of stressful events as beneficial and meaningful. The second strategy, 'exposure, extinction, and reconsolidation', includes meeting unpleasant emotions (e.g., fear, sadness, anger) by turning towards them rather than turning away, and discovering that these unpleasant emotions pass. This increases non-reactivity to one's inner experiences [6].

The fourth is *change in perspective on the self*: detachment from identification or decentring [28], i.e., developing the 'observer perspective' [32].

These four interacting components mutually facilitate each other, creating a gain spiral [33].

Methods

Cluster randomised controlled trial

Our qualitative study was part of a cluster randomised controlled trial (CRCT) [34] and examined the short- and long-term effects of a MBSR course and an additional organisational health intervention on Dutch secondary vocational teachers' mindfulness (primary outcome) (see Chapter 4). Secondary outcomes included other mental health outcomes, work performance, work-related perceptions, and personal competencies.

Participating teachers for the MBSR course were recruited from five Dutch secondary vocational schools between June 2016 and March 2019. The MBSR course was implemented between September 2016 and July 2019. We had difficulties recruiting enough teachers who met the requirements to participate in our study. We also experienced a large number of dropouts, caused by lack of time, personal circumstances, not fulfilling expectations, and lack of motivation (see Chapter 5). Notwithstanding, 87 teachers met the eligibility criteria and participated in the MBSR course (see Table 1).

In reporting, we followed the COREQ guidelines, being the consolidated criteria for reporting qualitative studies [35].

Table 1 Eligibility criteria

Inclusion criteria	Exclusion criteria
Teachers in Care, Technology, and Economy courses	Attended mindfulness course in the past two years
Employed in a secondary vocational school for at least 2.5 days a week for at least one year	Attended stress reduction course (e.g., cognitive therapy or relaxation course) in the past two years

Table 2. Baseline characteristics of the participating teachers

Teacher	Gender	Age[1]	Education level[2]	Course[3]	Years working[4]	Inter-view T_0	Inter-view T_1	Inter-view T_3	Org. health intervent.[5]
T1	F	47	acad	tech	3	X	X		
T2	M	38	high	tech	5	X	X	X	
T3	F	57	high	tech	6	X			
T4	F	60	high	econ	12	X			X
T5	F	33	acad	econ	2	X			X
T6	M	62	high	econ	18	X			X
T7	M	38	middle	econ	1	X			
T8	F	47	acad	econ	14	X			X
T9	M	60	high	econ	36	X	X	X	X
T10	M	59	high	tech	10	X	X	X	
T11	F	57	high	econ	15		X	X	X
T12	M	58	acad	econ	12		X	X	X
T13	F	52	acad	tech	16			X	
T14	M	27	high	tech	2	X	X		
T15	M	65	acad	tech	10	X	X	X	
T16	F	66	high	econ	26	X	X		X
T17	M	60	high	econ	2	X	X	X	X
T18	M	50	high	econ	10	X	X	X	X
T19	F	52	high	econ	8	X		X	X
T20	F	35	high	tech	9	X	X		
T21	F	25	middle	econ	4	X	X	X	X
T22	F	48	high	tech	1	X			X
T23	F	58	high	care	9	X			
T24	M	52	high	tech	2	X	X		X
T25	F	58	acad	care	6	X			
T26	F	28	high	care	2	X	X	X	
T27	F	25	high	tech	3	X	X	X	X
T28	F	59	high	care	31	X	X	X	
T29	F	58	high	care	32	X	X	X	
T30	F	50	high	care	2		X	X	
T31	M	54	high	tech			X		X
T32	M	66	middle	econ	2	X	X		
T33	F	47	middle	care	6	X	X		X
T34	F	48	high	econ	3	X			
T35	F	56	high	care	13	X	X		X
T36	F	57	high	care	3	X			X
T37	F	26	high	care	1	X			X
T38	F	62	high	care	17		X		X
T39	M	49	high	tech	11		X		
T40	F	30	high	econ	3		X		
T41	F	57	high	care	17		X		X
Total						**32**	**27**	**16**	**22**

[1] Age was calculated at the start of the intervention. The starting date of the interventions differed across schools.
[2] Education level was classified as low (lower vocational education), middle (medium vocational education and general secondary education), high (higher professional education) and acad (academic education).
[3] Course was classified as care, tech (technology) and econ (economy).
[4] Years working in this job for this employer.
[5] X = MBSR course and organisational health intervention

Participants and data collection

For the interviews participants were selected from teachers participating in the MBSR by a purpose sampling strategy [36], taking account of gender, age, course, and involvement in the organisational health intervention. Their baseline characteristics are presented in Table 2. Due to availability constraints of the participants and the interviewer, the participants in the T_1 and T_3 interviews did not necessarily partake in a T_0 interview. As a result, the group of participants was not identical across the three interview samples.

To explore prior expectations and short-term (ST) and long-term (LT) experiences, 32 semi-structured interviews were conducted at T_0, 27 at T_1 (immediately after MBSR course completion), and 16 at T_3 (nine months after completion). No interviews were held at T_2 (three months after completion). At T_0, telephone interviews were held with the participating teachers about their prior expectations regarding the MBSR course. At T_1, the teachers were interviewed face-to-face about their experiences with the course, including its ST effects, and at T_3 about their long-term experiences. All interviews were conducted by the first author.

The telephone interviews at T_0 lasted 10 minutes and the face-to-face interviews at T_1 and T_3 from 25 - 40 minutes. The interview guides used at T_0, T_1 and T_3 are included in the supplementary information. All interviews were conducted in Dutch, audio-recorded, transcribed verbatim, and anonymized. The illustrative quotes were translated into English by a native English speaker.

In addition, 14 of the 27 teachers and five HR consultants in the participatory group of the organisational health intervention, as well as its external facilitator, were interviewed at T_1 about their experiences with the intervention and about its working mechanisms.

Intervention

The MBSR course consisted of eight 2.5 hour weekly group sessions each with 4-15 participants per group, daily homework involving 45 minutes of exercise for six days a week, and one 7-hour day of silence. The sessions were supervised by qualified mindfulness trainers, who received a script. Each session consisted of meditation exercises (e.g., the breathing space), enquiry, a discussion of homework, psychoeducation, and a specific theme. The specific content of the MBSR group sessions is described in the supplementary material and in an earlier article (see Chapter 4). Details of the organisational health intervention are also described elsewhere (see Chapter 4).

Data analysis

Inspired by the directed content analysis presented by Hsieh and Shannon [37], we used a deductive coding approach because of the large number of existing conceptualisations in the field of personal resources and working mechanisms behind mindfulness meditation described above. To get an overview of the data, the first two authors first read the entire transcripts separately and repeatedly. The authors used a codebook and new concepts/

codes were inductively developed (see the supplementary information). For the interview analysis at T_0, T_1 and T_3, codes about mental health and personal competencies were mainly used. Each author identified smaller text units with similar content and labelled them with these codes. The authors discussed the results of the coding and adjusted these until consensus was reached. Related codes/subthemes were then merged into themes and the codes and (sub)themes were discussed with the other authors. After consensus, the text units of the selected subthemes/themes were compiled, and notable quotations were chosen.

In this article, we report the most important themes and subthemes in the view of the participating teachers; we defined the threshold for reported (sub)themes as mentioned by ≥ 25% of the participants.

Ethical considerations

The Ethics Committee on Practice-Based Research at HAN University of Applied Sciences (ECPR) and the Medical Ethics Committee (METC) at Radboud university medical centre, both located in Nijmegen, the Netherlands, approved the research proposal (Registration no. ACPO 07.12/15; File number CMO: 2019-5266). Both committees stated that the research complied with the Netherlands Code of Conduct for Research Integrity and with the criteria of the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects. Participation was voluntary and participants gave informed consent.

Results

MBSR course

The analysis of the interview data resulted in 11 themes representing the prior expectations (including motives to participate) and the experiences of teachers participating in the MBSR course (see Table 3). The 11 themes included two themes which can be described as mental health outcomes (Items 1-2), eight themes as personal competencies (Items 3-10), and one theme as 'other', namely 'knowledge of mindfulness and of mindfulness skills' (Item 11). Subthemes were formulated for five of these themes.

For each theme both the prior expectations (PE = at T_0) and the short-term (ST = at T_1) and long-term (LT = at T_3) experiences are described. In addition, we report the relationships between the themes.

Table 3. Themes and subthemes (in italics) frequently mentioned by participating teachers before (T_0) and after (T_1; T_3) the MBSR course

Themes and *subthemes*	T_0 (prior expectations)	T_1 (short-term effects)	T_3 (long-term effects)
Mental health outcomes			
1. Stress and unpleasant feelings: · *Stress* · *Distress* (*experiencing unpleasant emotions)* · *Rumination/worrying about the future or past*	x		x
2. Inner calmness and pleasant feelings: · *Enjoying pleasant experiences* · *Balance in the body* · *Peace of mind* · *Energetic*		x	x
Personal competencies			
3. Being in the present (here and now)	x		x
4. Being aware of**:** · *Body* · *Thoughts and emotions* · *Behaviour*		x	x
5. Concentration (focusing) (attention regulation; decreasing distractions)		x	
6. Taking distance (decentring, detachment, de-identification; reflection-in-action, reflection-on-action; standstill; not acting on the automatic pilot)	x	x	x
7. Acceptance and non-judgment		x	x
8. Recognising and changing dysfunctional patterns: · *Making conscious choices* · *Reducing your targets* · *Regulating own emotions* · *Standing up for yourself*	x	x	x
9. Communicating (listening, asking questions; the ability to connect with others) with: · *Students* · *Colleagues and others*		x	x
10. Showing compassion towards yourself and others		x	x
Other			
11. Knowledge of mindfulness and of mindfulness skills	x		

Theme 1: Stress and unpleasant feelings

'Stress and unpleasant feelings' appeared an important theme. Three subthemes were distinguished: stress, distress (experiencing unpleasant emotions), and rumination/worrying about the future or the past. Almost all participating teachers reported the presence of 'stress and unpleasant feelings', including unpleasant emotions (anxiety, panic, annoyance) and ruminating or worrying about the past or future, as prior expectation

(PE), and as a reason to participate in the MBSR course. The teachers mentioned different sources of 'stress and unpleasant feelings', such as work pressure, large classes, complex schedules, failing computer systems, private problems, and lack of stress management skills.

> *If it's really busy, you have to be able to say 'guys, hello, I've already got this and that going on; I'll let this one go. The pressure on you is then increased and you say 'OK, I'll do it,' too quickly. Then you can't sleep at night and you think "oh dear, how am I going to get all this done, because I don't really have the time". Get it? So then you feel pressurized and that makes you a bit uptight, because you've just taken on too much. (T16, PE)*

> *Well, in my job I'm generally 'on the go', with some moments of peace, but mainly I'm doing a lot of running around. I sometimes find it very difficult to find peace when at work, because there's just so much going on at once. Then I think "oh, I still have to get my email finished. ... yes there's always a lot going on. I am mainly busy tutoring students … but every now and then I just need to take a rest and then get going again. I notice that I get very little done, but that I'm always trying to get everything done. Then I'm actually really tired when I get home in the evening. (T29, PE)*

Although no short term experiences of MBSR on reducing 'stress and unpleasant feelings' were found (less than 25% of the participants mentioned these at T_1), 'stress and unpleasant feelings' decreased in the long term.

> *A new class, for example, that's always exciting: "will they like me, will they be nice students, will it go well? At the same time, I think, "these are all things I'm worrying about, making things for myself more difficult, while experience shows that you have always had good experiences with first year students, every class is different, wait, maybe I should deal with this class in the same way, like 'that'll go well'". Yeah. So it does help to have a little less stress. (T2, LT)*

> *No, but you know what I mean? I'm more prepared and that gives me a lot of peace. All those little things in one day make me less stressed. (T28, LT)*

Theme 2: Inner calmness and pleasant feelings

We created four subthemes for the theme 'Inner calmness and pleasant feelings': enjoying pleasant experiences (small things in life), balance in the body (to feel great physically), peace of mind (not ruminating), and feeling energetic. Although there were no prior expectations related to these positive feelings, the teachers indicated that the MBSR course

actually increased their awareness of pleasant feelings, both in the short- and long term. They mentioned, for instance, 'finding rest in nature'.

> *Also learning to enjoy small things and just ... It feels like going back to my childhood, that you're like a child looking at an ant, just that. (T39, ST)*

> *Yes, yes, when I go to work by bike or on foot, it doesn't really matter which, I try to find routes where there's as little traffic as possible. So I try to cycle along the Rhine so that I can see a bit of water/nature. I enjoy that. Yes, I used to like nature, but I didn't really notice it. I think I've learned that now, so that I enjoy it more, that I see it and enjoy it even more. Yes ... (T19, LT)*

After the course (both short- and long-term) they experienced a state of tranquillity, calmness, and peace of mind, resulting in less worrying or brooding on work or private matters (Theme 1).

> *Well, it made me feel ... It made me feel very calm. This feeling of being calm meant that I could enjoy both the lesser or the more striking things more. As I said, it made me look around more attentively, so I now enjoy the world more. Things like, I go for a walk more often and I notice things that I didn't use to. Yes, that's a kind of relaxed feeling. (T40, ST)*

> *I notice that I'm calmer. Where before I could get worked up about something, now I can think, "so what". (T21, LT)*

Theme 3: Being in the present

At T_0 (PE), participants mentioned that they would like to be more 'in the here and now', in the moment, enjoying the small things in life, instead of worrying about the future, or thinking about the past.

> *Just to stay more in the here and now and not be so preoccupied with thoughts about the future or the past, that sort of thing. There's not much you can do about that at the time, anyway. (T27, PE)*

> *I would very much like to be able to better experience the moments in which I live. Yes, I can do that with the sad stuff, but yes, no, that's a bit lame, but I just want to live more in the here and now, not be so afraid of what's coming next, but just "I'm having fun now" and then be able to dwell on that. Yes, that's important for me. (T35, PE)*

No ST-experiences were mentioned by the participants regarding this theme. At T_3 (LT), teachers mentioned that they had succeeded in being more in the present which according to them contributed to their inner calmness (Theme 2).

> *I'm more in the present, in the moment, and things around it have become less important. When it comes to tomorrow or yesterday, it's like "never mind, tomorrow I'll see. If I'm able to do something about it, I will, but if I can't do anything now about tomorrow, I won't. (T9, LT)*

> *Yes, and of course we discuss it, about "pressure and all that stuff". But that makes you much more aware of "OK, how can I manage that, keep it under control". Then I notice that especially with things like having a quiet breakfast in the morning, but also walking calmly around the school l... Sometimes I really run through the school, but I'm much more aware of it now. (T11, LT)*

However, they did not always manage to stay in this state of mind in the longer term.

> *I knew it all. I knew it all before that too, how to just ... think positively, then nice things happen, that sort of thing. But because I've been too busy, I just lost all that. I didn't have time to think about it or to reflect on it, so I just keep on going, until at a certain moment I'm aware "I've lost that old Y (first name)". (T21, LT)*

Theme 4: Being aware

The theme 'being aware' has three subthemes: awareness of the body (physical sensations), awareness of thoughts and emotions, and awareness of behaviour. Less than 25% of the participants, however, mentioned 'being aware' as a prior expectation.

Being aware of the body

Most participants reported that they became more aware of physical (body) sensations, both in the ST and LT.

> *Yes. What I noticed is that I didn't realise I was having palpitations so often, that I was a bit stressed, had inner turmoil. I thought, "good grief, that this is happening so often". So, I thought "why am I experiencing this, what's making me so restless?". I then became aware that I had more inner turmoil than I had realised. (T29, ST)*

> *I always cycle to school, it's about twenty minutes. Then I really notice the surroundings...things like "I feel the wind on my face or through my hair" or "I*

smell...". I use my senses more. I see the birds. And, I appreciate that more as well. (T28, LT)

Being aware of thoughts and emotions

Participants described that they became aware of their thoughts and emotions, both in the ST and LT.

The moment I'm unhappy about something it's "can I do something about it and do I want to do something about it, then I have to do something about it and can't do anything about it, then I have to try not to worry about it because that's just the way it is". That's something I'm consciously working on and that really came to me clearly from the mindfulness, like "oh, wait, yes, if I'm consciously working on that, then I can really help myself too". (T2, LT)

Moreover, the awareness of the relation between physical sensations and thoughts and emotions increased. Physical sensations were regarded as a warning that a person could exceed his/her limits.

And now I feel it more quickly. Then I think "oh, this doesn't feel good or this is unpleasant, why and what is that; is it the environment, is it the people here - are these the reasons I'm not feeling great?". I'm more aware of that now than before. (T29, LT)

Being aware of behaviour

Participants described that they became aware of their dysfunctional behaviour, both in the ST and LT.

I'm also the kind of person who's very quick to have an opinion and to say something about it, to interfere, as I sometimes call it. I let that go a lot now ... at least, I still have to train myself to do so, but I'm more aware that I should just let things go. (T39, ST)

I think "ok, then I'll just work a bit longer". But at a certain point, of course, it's simply not enough to work longer, to have your vacation cancelled, to have your day off cancelled ... This all creeps in and before you know it, your evenings are taken up with lessons. Then I think "wait a minute, something's going terribly wrong here, so I have to do something about it". (T11, LT)

Theme 5: Concentration

Concentration refers to focus, attention regulation, and minimizing distractions. In the ST, many teachers mentioned better attention regulation and more focus.

> *Yes, yes. And it's also about focusing on the little things, right? So indeed your breathing, enjoying a shower, that sort of thing. That does give you peace, which eventually lasts a bit longer through the day. And that's also because you can do that at different times of the day. So I did the deep breathing exercises in the morning before I got up. (T38, ST)*

> *I can focus much better when I do yoga exercises, so it combines with my physicality. (T38, ST)*

Theme 6: Taking distance

Taking distance refers to decentring, detachment, de-identification, reflection-in-action, reflection-on-action, stand still, instead of acting on the automatic pilot. At T_0 (PE), teachers mentioned that when they were stressed, they wanted to be able to stop for a moment and reflect on the situation ('reflection-in-action') so to be able to make considered choices about whether particular behaviour would be helpful or not. In this way they tried to avoid their reliance on their automatic pilot, wanting to react in a more conscious way. They also wanted to learn how to let go in difficult situations or when they had negative thoughts in order to get more rest and relaxation.

> *Uhm …, well if you then ..., uhm, ... to put it nicely: steer clear of that day's madness for a while and, as I say, don't get drawn into it so much. For example in the classroom or so, uhm ... that you sometimes react angrily ..., you could better channel anger or so, ... stay calm, ... or something like that. (T7, PE)*

> *It always takes me a long time before I do things; I really can't do anything about ... That I've thought about what I'll do next time, but then I'm still stuck with the idea that I didn't do it right. I know you can make mistakes, but I can't stand it. So just let it go … yes, let go. Yes. Yes, I think that's it. (T35, PE)*

Both ST- and LT-experiences were reported. The increased awareness of physical sensations, thoughts, emotions, and behaviour (Theme 4) could result in increased reflection-on-action and reflection-in-action. Teachers indicated being enabled to disengage or de-identify from their thoughts and feelings about the school they worked for and their students.

Just to give a helping hand, the moment you grab the door handle to go inside - just to say that, where am I, how am I, am I all right? Yes, if no, rest a moment. And then walk inside. That's really become an anchor for me. And that way I can feel right - I know where I stand when I go into a lesson or a meeting. (T11, ST)

"Well, that's enough"; then I make some time for myself and say "well, don't do that now, think about it for a moment, what did you say about yourself, that you should be milder, that you shouldn't react too quickly ...". Then I take a moment ... Sometimes it only lasts a few seconds or so, but I take a moment to say "OK, just calm down". Then I also notice that my initial excitement subsides. Then I can say what I want to say in a calmer, more friendly way. (T9, LT)

Some teachers mentioned that they developed the habit of briefly pausing between appointments with two students so as to be able to pay attention to their breathing, and to reflect on their feelings.

I think it's all about attention, directing my attention. What I do more consciously is, between one pupil or student and the next, always do a little breathing exercise. That's also linked to organising my papers, a moment of peace before I move on to the next one. I didn't do that as much before. (T13, LT)

Teachers mentioned that when they were stressed in the classroom (Theme 1) about students or private life, they were able to stop for a moment and reflect on the situation to make considered choices about whether particular behaviour would be helpful or not.

Yes, just being aware of your body. Yes ... that's also an effect. Yes ... indeed, when I walk through the corridors from class to class, I don't let myself be led by the thought of, "I've got to be on time" for example – which would make my walk through the corridor stressed without my realising it. So then I just think, "OK, that's the time, I'm not going to walk any faster by thinking that, so I'd better let go of that thought and just walk to the classroom, nice and calm". (T27, ST)

Those feelings of stress; as soon as I recognise them or notice that they're coming up, I already know, "OK, stop, I mustn't do that anymore". Then I can immediately put it into perspective, put it aside and do something, for example go for a walk or think about my breathing for a moment, to get rid of that stress. (T19, LT)

Theme 7: Acceptance and non-judgement

Acceptance, 'so be it', is the opposite of avoiding or fighting against (mostly unpleasant) feelings. No prior expectations were mentioned by the participants. However, the MBSR course clearly resulted in attitudinal changes that the participants considered helpful in the classroom, both in the short- and long-term. They experienced being less critical about and more accepting of difficult experiences which led to increased tranquillity and calmness (Theme 2). Some teachers even indicated their vulnerability as a human being, for example referring to disease and mortality.

Accepting in any case that this is my team, and that I have make the best of it, I can't change that. So there's a bit of acceptance about a number of things. Yes, accepting things. I notice that with more things, like, "no, you just have to accept that this is how it is". It doesn't mean that you always have to agree, but you have to go along with it and deal with it, give it a place; I think that's the main thing. (T33, ST)

Yes. Being bothered by the other people's behaviour; I've noticed that this has already decreased. "(T33, ST) "Yes, it's true, but notice it and that's it. Then I bring myself back to reality and I see what's happening again. Then I think, "well, yes". (T39, ST)

Or … "OK, you're just a part of the world then, you're also transient, so you shouldn't make such a big deal out of it". Of course you do, but "that's the way it is, you have to accept it". I tried to do it a bit like that ... distancing yourself from your own perceived 'important' role. Well, I'm going to die one day, just like everybody else. (T19, LT)

Theme 8: Recognising and changing dysfunctional patterns

'Recognising and changing dysfunctional patterns' implies gaining insights into your own automatic, not always helpful, mindsets and behavioural patterns, and being enabled to change them. Based on the interviews, we divided these patterns into four subthemes: 'making conscious choices' (prioritising and limiting efforts), 'reducing own targets' ('good is good enough'; less perfectionistic), 'regulating your emotions', and 'standing up for yourself' (implying expressing your own needs and particular interests; caring for yourself).

The prior expectations only refer to the third subtheme 'regulating your emotions.'

Yes, I think you do become more aware of your thoughts or feelings, calmer. I'm always calm, but not at the moment when I explode. I know I shouldn't and yet it happens. (T21, PE)

A recent example: all the tests had been organised. So I had arranged "he sits in that classroom, he sits there". I also took over a classroom. Then we took a break, I came back and there was a whole pile of new tests on my desk. Like, "oh ..., where am I going to put all these students?". I only had three. Then I can get very panicky. I stayed reasonably cool that time, but that's an example of what happens regularly, that I really panic, like "oh ..., help and now? (T33, PE)

Making conscious choices

Teachers realized that they had a choice when dealing with stressors. They were better able to manage their ST- and LT-time by prioritising, realistic planning, and setting limits. They improved their self-regulation, and this resulted in tranquillity and calmness.

Yes, I've become more aware that everything can be a kind of choice and that you can also make a good choice, instead of always continuing on autopilot. (T27, ST)

I've agreed with myself now; to be able to meet all the students, especially to get to know them, if they're at the same institution and on the same internship days; then I'll take them together. Before, I did that separately, so that gives me extra time. I now think differently - "a final interview can't take longer than three quarters of an hour". I always took an hour, often more. So I'm not going to do that either. I've already agreed that with myself. (T29, LT)

Reducing own targets

Half of the teachers reduced their perfectionism in the ST and LT: feeling too responsible for students, working too many hours, too many tasks, fear of failing, and trying to meet their own very high expectations.

Yes. So I notice it especially when in private, that I'm a bit more relaxed, that I don't beat myself up when I make a mistake or when I'm angry. (T40, ST)

Yes, but I needed that too. I suffered a bit from perfectionism. I wanted to manage everything, ...I wanted to be ahead of everything. All of course at the expense of myself. In those days, I could stay at school until six or seven o'clock to make sure my things were finished. And now I think 'yes, hello, I'm off home'.(T27, LT)

Regulating your emotions

Half of the teachers indicated that they were able to reduce their emotion in a conversation with a student or colleague, and that they could change the expression of their emotion in the ST and LT.

I wasn't happy with myself, a lot of stress. All sorts of things were happening. Of course, this is true for everyone - all sorts of things happen that can make you sad or nervous or angry. Learning to deal with that is mainly what I got from the mindfulness course. Things are more pleasant now. Of course, stress and stuff still happen, but I find it easier to deal with. Yes (T18, ST)

I spend all day in discussions, don't I? Yes, I do that better now, I think. I could still do better, but I'm also someone who's quick to show my feelings. Sometimes it's better to do that less and just stay calm. Suppose a student doesn't do what he or she is supposed to, then I can be very fixed in my way of questioning and about the planning. Then I think "OK, no, let's do it differently". Then I sit back in my chair, I feel my back and my seat and my feet on the ground. "Okay, stay calm, it's not going to help anyone if I let my feelings show, the point is to get the student moving, not me." (T28, LT)

Standing up for yourself

Almost half of the teachers indicated that they were taking better care of themselves, without feeling guilty or selfish in both the ST and LT. At school, this resulted in saying 'No' more often, which made them feel less tired.

I now take time and make space for myself … I take good care of myself. (T12, ST)

Yes, I think I'm more visible than before. Yes, I make my presence more obvious … I think so ... yes … I think so. (T29, ST)

I've become very aware that those moments of rest in the day are really important and that for you it's important to be consciously present about what you're doing … and that you get a lot more done and that when in contact with people, you work much more from your own point of view, like "what do I want, what do I think? If I didn't do that, I'd just lose myself and then I'd be busy all day doing all kinds of things. I'd just go on and on and on, and at the end of the day I'd be completely exhausted. (T27, LT)

These teachers indicated having gained more insights in their own automatic, not always helpful, patterns, and most of the teachers described behavioural changes that arose from being in the present (Theme 3), awareness (Theme 4), taking distance (de-identifying) (Theme 6), and accepting (Theme 7).

I'm exercising more, doing more sport (T2, ST)

I think I'm now listening a bit more, that's what I'm trying to do. I'm trying not to be continually caught between things all the time, but to listen more and be more normal ... that's what I'm doing now. It's very difficult though. (T33, ST)

[I'm] reacting less strongly to situations. (T39, ST)

And one important thing that I've resolved is about eating. I've always taken very bad care of myself in terms of eating habits. In fact, I still do, well, not "always". Now, of my five working days, I do okay on four. At least, I pay attention to it by actually sitting down on the couch in the morning, before starting the day, quietly eating my bowl of muesli or drinking my cup of coffee, quietly looking around. Yes, I never used to do any of that. (T11, LT)

This means that not all of the teachers indicated that they had succeeded in making behavioural changes.

So, I don't allow myself those moments of rest. I don't give myself the time to keep applying it. (T18, LT)

Theme 9: Communication skills

Communicating implies listening, asking questions, and enhancing the ability to connect with others. Two subthemes were distinguished: communicating with students, and communicating with colleagues and others. Although no expectations prior to the intervention were mentioned, participants reported both ST- and LT-experiences.

Communicating with students

The teachers mentioned that because of the intervention, their communication with students in the ST and LT had become less automatic or impulsive: more patience and attention, more to-the-point, less anger, and describing their own emotions earlier. Some teachers even did mindfulness exercises to calm their students.

Yes, I now involve the pupils a bit more, in the lesson. I'm a bit more creative about preparing stuff and things like that. And, on the other hand, I've also learned that when you're in front of a class, the ambiance and being connected with your students is very important to achieve things, so getting the ambiance right to do things together. (T27, ST)

Yes. Well, I've always had a reasonable to very good relationship with my students, so I don't often have this ... I can sometimes be a bit finicky, but I've never really come under pressure or had arguments with students about that. But even there I do notice

it, yes. I think I've become a bit more tolerant. I think maybe that's the right word. I've become more tolerant, less quick to say, "you have to do it", let's listen first. (T9, LT)

Yes, that I am called in more often by colleagues because a pupil is sad or because they say "can you take a look, he's totally upset, can I let him go home safely? Yes. Yes. I don't know if it was really like that during the training or if I made it up myself, that's how it works, but at a certain point we were breathing and I had this image of "I breathe in like this, like that, and then that goes through all those thoughts, then I breathe out like that and that makes the thoughts lighter or something". I do this exercise with my students, saying "well, look at this". That's how it works for me and when I'm with Installation Technology, I use an expansion vessel. Let's see what fits. (T19, LT)

Communicating with colleagues and others

After the course, the teachers indicated that they were also more aware of their communication with colleagues and others in both the ST and LT. They were more open-minded, had closer relationships, showed more self-disclosure, and were more vulnerable.

Then you can often be a bit friendlier to your colleagues, that's right, you can. I think things are getting, uh, better. (T9, ST)

Then they tell me, "I think you've changed in the past year; you've become more open". That I don't only laugh and party, but that I'm more open to show my vulnerability. Yes. So that's good. Mostly I hear that am more open. (T12, LT)

Theme 10: Showing compassion towards yourself and others

Showing compassion (being kinder) and empathy to others was experienced as an important effect of the course. Teachers reported that they felt more compassion and empathy towards themselves and their colleagues in the ST and LT. More specifically, they saw the commonality between their own struggles and those of their colleagues, recognising the shared humanity.

So, accepting things as they are [yes], that's one and uhm... yes things that you can't change, worry less about those and yes be kinder to yourself, that's what I got out of it as well. I'm very good at being negative about myself … [hmm] but in any case now I'm more conscious of that so I think, 'why should I be so negative about myself? (T2, ST)

Yesterday, I'm always nice to my students. Always. Always. I always find the students the very, very, very nicest. I always have a great relationship with them. It's only when they're really annoying, not doing their homework and so on, then I lash out and say,

"listen a minute, I'm not going to enjoy this, of course, but you can't always freeride". But that's necessary too. That's also part of the learning process. (T16, ST)

Stupid mistakes I made today; well, I don't need to get worked up about them the next day. I Just think … that's what happened, too bad … something like that. (T10, LT)

Theme II: Knowledge of mindfulness and mindfulness skills

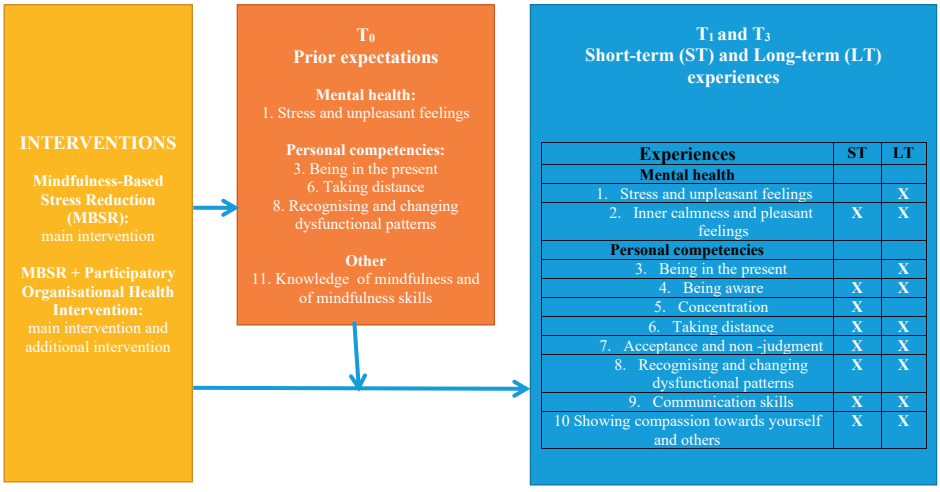
At the start of the MBSR course, participating teachers aimed to obtain knowledge about the effects of mindfulness, and about mindfulness techniques, to achieve peace-of-mind, and to prevent stress and burnout complaints. In addition, they indicated that they were very eager to learn mindfulness skills.

Yes, and I do hope I'll learn something, uhm, like a few techniques or ways of calming myself. (T5, PE)

Yes, well, I hope that I'll get a few extra clues to timely ward off possible stress, burn-out symptoms or things like that. That's what I'm hoping for. (T24, PE)

Coherence between the themes and the short- and long-term effects

Their prior expectations about ways to reduce the amount of stress and unpleasant feelings, and to increase being in the present, taking distance, recognising and changing dysfunctional patterns, and increasing their knowledge of mindfulness and of mindfulness skills were largely or partly met. The ST- and LT-experiences regarding mental health outcomes and personal competencies are closely linked. Hence, the effects (among others personal competencies) appeared to be sustained in the LT (see Figure 1).



Experiences	ST	LT
Mental health		
1. Stress and unpleasant feelings		X
2. Inner calmness and pleasant feelings	X	X
Personal competencies		
3. Being in the present		X
4. Being aware	X	X
5. Concentration	X	
6. Taking distance	X	X
7. Acceptance and non -judgment	X	X
8. Recognising and changing dysfunctional patterns	X	X
9. Communication skills	X	X
10 Showing compassion towards yourself and others	X	X

Figure 1 Participants' prior expectations (T_0) and short-term (T_1) and long-term (T_3) experiences

Boundary conditions (context elements)

Expectations regarding the course process itself

The teachers expected an open-minded, quiet, kind, professional mindfulness trainer, who could guide the group process during the MBSR course. Furthermore, they looked for a mindfulness course group, characterized by a safe, respectful, confidential mood with enthusiastic and involved participants. However, many participants mentioned that the character of the group was of less importance.

> *I have no expectations. I don't have the idea that this is something we have to do as a group. I think, I even expect that mindfulness is something very personal, something you do for and with yourself, and I have no expectations regarding the group. Perhaps you mean that they can help me with something or that I could help them with something; that kind of thing? I see it as something private, something personal. (T9, PE)*

> *I do it for myself, so I don't give a damn if people say, "I think it's a waste of time". I'm like, "I'm convinced that it's something that can help me, so for me it's 'I'm just going for it'". Yes (T24, PE)*

After the MBSR course

For many of the participating teachers, the core components of the MBSR course were the body scan, yoga exercises, sitting meditation, and particularly, the day of silence. The opinions about the walking meditation varied. Many teachers experienced the course group as being safe and confidential. For many, it appeared to be too hard to practice the formal mindfulness exercises. On the other hand, many teachers used the informal exercises, such as attention to routine activities, attention to breathing, and the 'three-minutes breathing space'.

Organisational health intervention

The organisational health intervention showed no effects in the quantitative analysis (see Chapter 5). The answers given during the interviews at T_1 with the participants, 14 teachers, five HR consultants (HR) and the external facilitator, corresponded with these results. Four important explanations for this outcome were mentioned by the interviewees.

First, the preparation phase (establishment of a participatory group; commitment of management; communication to the teachers, and creating readiness for change) was too brief. Second, the slow decision-making process by the management, and the undoing of decisions already made.

> *The decision-making process at the ROC is lengthy, it always involves many layers. The team manager has to give an opinion, the director, … that all makes getting something done quickly very difficult. ..... The interim director was very enthusiastic about creating a rest room. So, in November, someone new started and said, "I'm not going to do that, that's my final decision!" (HR1)*

Third, the low commitment and learned helplessness of teachers.

> *The employees in the working group actually contributed greatly, especially in the beginning and they really thought with us, ('what's wrong with this, what could we do together in the things we can influence') ..... but they're now so busy with their day-to-day issues. I wonder if they're even aware that they had such a great influence. (HR2)*

Fourth, the present organisational culture of Dutch secondary vocational schools and the authoritarian leadership style of the schools' directors – marked by control, top-down communication, and the belief that the 'employees' point of view is of limited value' – was also mentioned as a possible explanation for the lack of effects of the intervention.

> *The director forms an obstacle, an impeding factor. The fire's gone out. I think that makes people feel a lot less free about taking initiatives. Within the project, that's no longer possible. ..... That people may become more cautious about taking initiatives or perhaps it is a confirmation of 'yes, you see, that's what always happens if we take the initiative, whatever we do… it's always wrong. (HR3)*

Discussion

Our study provides insights into teachers' prior expectations to participation in an MBSR course and into their ST- and LT-experiences regarding mental health outcomes and personal or mindfulness/prosocial competencies. Moreover, we explored teachers' and HR professionals' experiences with the organisational health intervention.

The teachers who participated in MBSR indicated that the course had affected their mental health. More specifically, they experienced that their level of stress and unpleasant feelings were reduced, and that their inner calmness and pleasing feelings had increased. Moreover, their development of personal competencies appeared to have been stimulated. Teachers reported an increase in being in the present and being aware of physical sensations, thoughts, emotions, and behaviour, which resulted in their being able to take distance (more reflection during and after their actions). Their acceptance of and non-judgmental attitude in difficult situations which could activate unpleasant

feelings were improved. Insights in dysfunctional patterns increased and most experienced behavioural changes: making conscious choices; reducing your targets; better handling of emotions; and standing up for themselves. Communicating with students, colleagues and others also improved, and compassion towards themselves and others increased. The ST-experiences regarding mental health outcomes and personal or mindfulness/prosocial competencies seem to be sustained in the LT (see Table 3).

Some teachers only used mindfulness as an awareness tool. The MBSR course had enhanced their awareness and insights in their own behavioural patterns, but they did not succeed in making any changes to their behaviour. Furthermore, a majority reported that their expectations about the reduction of stress and unpleasant feelings, and the increase of being in the present, taking distance, recognising and changing dysfunctional patterns, and knowledge of mindfulness and of mindfulness skills were largely or partly met.

Their experiences with the – apparently unsuccessful – organisational intervention were less positive; the teachers and HR consultants experienced that it was difficult to achieve changes in the complicated structure of and processes in secondary vocational schools.

Theoretical implications

Our data, as presented in Figure 1 and Table 3, support the mindfulness and prosocial competencies as mentioned in Figure 2. However, while the data suggest the sequential ordering of competencies as visualized in Figure 1, we have not found strong empirical support for this ordering in our study. We argue that our findings might indicate possible interrelationships between themes of personal competencies (Table 3), which could be revealed in a hypothesized 'process of change' model (see Figure 2). This is in line with the theoretical perspectives about the process of mindfulness meditation [25-28], and with Hölzel et al.'s theoretical model [6], which was inspired by the previous four authors [25-28]. 'Personal competencies' is a 'deductive concept' (see Chapter 4) and the specific competencies are inductively developed (see Figure 1). The first component, attention regulation, in Hölzel's model [6] refers to 'concentration' in our 'process of change' model. The second component, 'body awareness', corresponds to 'being aware'. 'Emotion regulation', the third component, forms a part of 'recognising and changing dysfunctional patterns'. Lastly, 'change in perspective on the self' corresponds with 'taking distance'.

The hypothesized 'process of change' model (see Figure 2) adds several other personal competencies: 'being in the present'; 'acceptance and commitment'; 'communicating'; and 'showing compassion towards yourself and others'. The model suggests a circular and iterative process rather than a linear one. The 'process of change' model was assessed by interviewing MBSR participants, during and after the course, about the competencies they developed and about their interrelations.

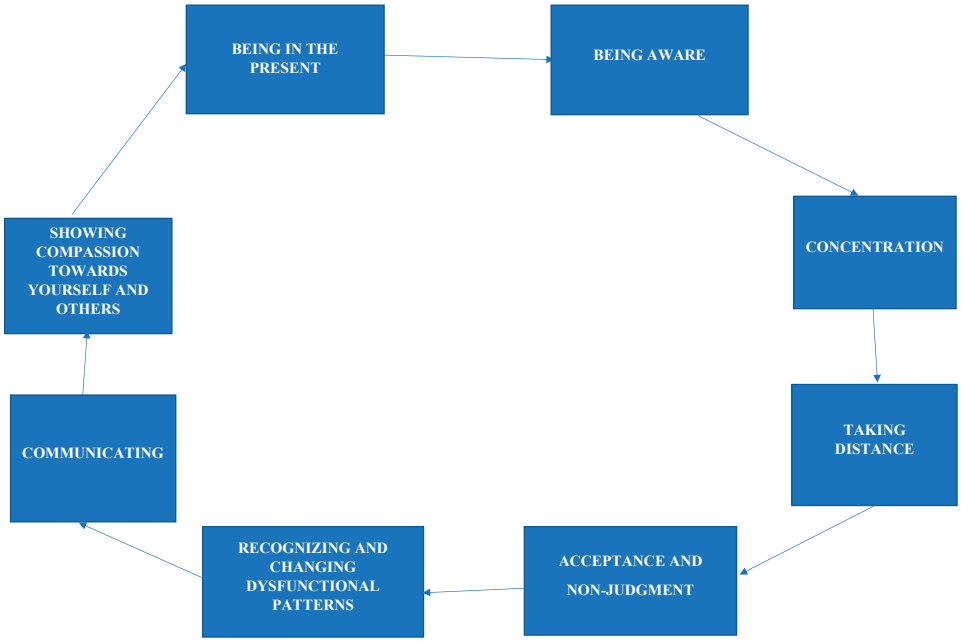


Figure 2 Hypothesized process of change model.

Furthermore, our findings show similarities with previous qualitative studies on the MBSR experiences [9, 13, 38]. 'Being aware', 'taking distance', 'acceptance and non-judgment', 'regulating your emotions', 'communicating with others', and 'showing compassion towards yourself and others' were important themes.

Last but not least, the outcomes of our study reveal remarkable parallels with the personal or mindfulness/prosocial competencies needed by Dutch secondary vocational teachers [4]. Essential personal competencies needed and cultivated by MBSR are: 'being aware', 'taking distance or self-reflection', 'regulating your emotions', and 'self-regulation'. As mentioned earlier, these personal or mindfulness/prosocial competencies exist in 'caravans' [24]. For teachers in particular, the availability of these kinds of competencies will enable them to accumulate resources (in this case additional competencies; gain circle) [22], herewith increasing their capacity to meet (new/additional) challenges/demands. This will result in greater well-being and work engagement.

Practical implications

In our articles on the protocol (see Chapter 4) and the quantitative results of the cluster randomised controlled trial (see Chapter 4), we mentioned the teachers' exceptionally low score for stress at baseline, given that one in five employees in the educational sector reported stress or burnout complaints in 2017 [2]. It seems that the target group for our intervention – teachers with the highest stress scores – did not participate in our study.

We also had difficulties recruiting enough participants and the large number of drop-outs, caused by lack of time, personal circumstances, not fulfilling expectations, and lack of motivation (see Chapter 5). COR theory [21, 22] offers a plausible explanation; it states that those individuals who lack primary resources (e.g., awareness, taking distance, and social ties), and those who lack secondary resources (e.g., time, suffering from high job and/or private demands), are less capable of resource gain and more vulnerable to resource loss [22]. Ironically, those who were most in need of obtaining resources, were unable to participate. They were caught in a 'loss cycle' [22] and were unable to invest enough to gain more resources. Individuals with average stress, less job and/or private demands, and more time would be more likely to participate in the MBSR course and would obtain relative easily more resources, ending up in an upwards (gain) spiral [22]. This phenomenon is called the Matthew effect (or accumulated advantage) where "the rich get richer and the poor get poorer". Those teachers who begin with an advantage (good health, time, knowledge, coping skills) in comparison to their counterparts accumulate more advantage over time, and those teachers who begin at a disadvantage become more disadvantaged over time [39-41].

The participating teachers were able to take advantage of the gain cycle: they could invest enough resources (time; energy; good health/less stress; coping skills) to gain more resources (personal competencies). More careful selection could stimulate participation of teachers who lack resources, using criteria such as the extent of stress/burnout complaints, willingness, presenteeism and absenteeism rate, and genuine understanding of teachers' needs by the management team (see Chapter 5). Insights in the teachers' needs gives management the opportunity to provide participating teachers with sufficient and appropriate resources (for example, participating in the course during working hours, energy, social support, gain basic coping skills) to break the loss cycle and generate a gain cycle, characterized by an accumulation of resources (acquire personal competencies during the course).

A positive approach, for instance by emphasizing work pleasure instead of stress, was a great stimulation when recruiting teachers for the study [42]. However, the organisational health intervention sometimes distracted from the person-centred MBSR course. Teachers participated for their own sake instead of in response to the organisation's problems.

Throughout the MBSR course teachers were encouraged to practice mindfulness exercises. However, this practice decreased after the course.

Strengths and limitations

The longitudinal design of our study, interviewing participating teachers at three time points (T_0, T_1, and T_3) is a strength. This enabled us to determine the sustainability of the findings and possible developments over time, complementing our quantitative study (see Chapter 5). Other strengths were the number of interviews, and the focus on positive outcomes.

However, we note a number of limitations. First, the teachers were self-selected, and thus motivated to participate in the MBSR course. Second, some invited teachers did not accept participation or declined to be interviewed at three time points. Therefore, we are not certain whether all experiences, that are of interest given the focus of our study, are included [43]. Another consequence of our approach is that we could not detect indications for the effect of prior expectations on subsequent experiences of participants.

Recommendations for future research

Our qualitative study focused on self-reported data from participating teachers. In future studies, observer, supervisor, or students' observations of actual teachers' behaviour could also be used to increase data reliability and validity.

Although many teachers seemed to benefit from MBSR, the sample was based on self-selection. Future research should focus on questions such as whether mindfulness should be offered to all teachers, and what are the best circumstances to offer the course.

Furthermore, it would be interesting to interview the same participating teachers at multiple time points during the MBSR course so that the development of personal or mindfulness/prosocial competencies could be detected, and to enable studying the impact of prior expectations on experiences about mental health and personal competencies.

For verification of our hypothesized 'process of change' model (see Figure 2), interviews focusing on the interrelationships between mindfulness and prosocial competencies among teachers are required, ideally supplemented with written evaluations of participants.

Lastly, an organisational health intervention requires, among others, serious commitment from the school's director and managers, adequate communication and, engagement of teachers, establishing an involved participatory group with a manager as chair, and choosing the right problems in the workplace with the possibility of quick wins.

Conclusions

The experiences of the participating teachers strongly suggest that MBSR, in addition to the attention paid to substantial and educational skills in the formal curriculum, reduces stress, increases inner calmness, and cultivates important personal or mindfulness/prosocial competencies among teachers to help them cope with their very demanding jobs. Therefore MBSR can be recommended to teachers working at this and other types of educational institute.

Additionally, we report that the design and implementation of an organisational intervention in secondary vocational schools is no easy task.

Abbreviations

COR: Conservation Of Resources; CRCT: Cluster Randomised Controlled Trial; ECPR: Ethics Committee on Practice-Based Research at HAN University of Applied Sciences;

HR: Human Resources; JD-R: Job Demands-Resources; LT: Long-Term; METC: Medical Ethics Committee at Radboud University Medical Centre; MBCT: Mindfulness-Based Cognitive Therapy; MBSR: Mindfulness-Based Stress Reduction; ST: Short-Term

References

1. Van der Steeg M, Gerritsen S. Teacher evaluations and pupil achievement: evidence from classroom observations [CPB Discussion Paper 230]. 2013: CPB Netherlands Bureau for Economic Policy Analysis.
2. Douwes M, Hooftman W. Arbobalans 2018: Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of working conditions 2018. Quality of work, impacts and measures in the Netherlands] (Dutch). 2019, Leiden: TNO.
3. Schelvis RMC, Wiezer NM, Blatter BM, van Genabeek JAGM, Oude Hengel KM, Bohlmeijer ET, et al. Evaluating the implementation process of a participatory organizational level occupational health intervention in schools. BMC Public Health. 2016; 16(1).
4. MBO Raad. Het kwalificatiedossier van de docent mbo [The qualification dossier of the teacher in secondary vocational schools]. . 2015: MBO Raad.
5. Chiesa A, Calati R, Serretti A. Does mindfulness training improve cognitive abilities? A systematic review of neuropsychological findings. Clinical Psychology Review. 2011; 31(3): 449-464.
6. Hölzel BK, Lazar SW, Gard T, Schuman-Olivier Z, Vago DR, Ott U. How Does Mindfulness Meditation Work? Proposing Mechanisms of Action From a Conceptual and Neural Perspective. Perspectives on Psychological Science. 2011; 6(6): 537-559.
7. Vago DR, David SA. Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness. Frontiers in Human Neuroscience. 2012; 6: 296-296.
8. Lao S-A, Kissane D, Meadows G. Cognitive effects of MBSR/MBCT: A systematic review of neuropsychological outcomes. Consciousness and Cognition. 2016; 45: 109.
9. Morgan P, Simpson J, Smith A. Health Care Workers' Experiences of Mindfulness Training: a Qualitative Review. Mindfulness. 2015; 6(4): 744-759.
10. Emerson L-M, Leyland A, Hudson K, Rowse G, Hanley P, Hugh-Jones S. Teaching Mindfulness to Teachers: a Systematic Review and Narrative Synthesis. Mindfulness. 2017; 8(5): 1136-1149.
11. Lomas T, Medina JC, Ivtzan I, Rupprecht S, Eiroa-Orosa FJ. The impact of mindfulness on the wellbeing and performance of educators: A systematic review of the empirical literature. Teaching and Teacher Education. 2017; 61: 132.
12. Eby LT, Allen TD, Conley KM, Williamson RL, Henderson TG, Mancini VS. Mindfulness-based training interventions for employees: A qualitative review of the literature. Human Resource Management Review. 2019; 29(2): 156.
13. DeMauro AA, Jennings PA, Cunningham T, Fontaine D, Park H, Sheras PL. Mindfulness and Caring in Professional Practice: an Interdisciplinary Review of Qualitative Research. Mindfulness. 2019; 10(10): 1969-1984.
14. Roeser RW, Skinner E, Beers J, Jennings PA. Mindfulness Training and Teachers' Professional Development: An Emerging Area of Research and Practice. Child Development Perspectives. 2012; 6(2): 167-173.
15. Bensing JM, Verheul W. The silent healer: The role of communication in placebo effects. Patient Education and Counseling. 2010; 80(3): 293.
16. Cécile RLB, Astrid RB. How qualitative studies can strengthen occupational health research. Scandinavian Journal of Work, Environment & Health. 2021; 47(2): 91-93.
17. Ramanadhan S, Revette AC, Lee RM, Aveling EL. Pragmatic approaches to analyzing qualitative data for implementation science: an introduction. Implementation Science Communications. 2021; 2(1).

18. Demerouti E, Bakker AB, de Jonge J, Janssen PPM, Schaufeli WB. Burnout and engagement at work as a function of demands and control. Scandinavian Journal of Work, Environment & Health. 2001; 27(4): 279-286.
19. Demerouti E, Bakker AB, Nachreiner F, Schaufeli WB. The job demands-resources model of burnout. Journal of Applied Psychology. 2001; 86(3): 499-512.
20. Schaufeli WB, Taris TW. A Critical Review of the Job Demands-Resources Model: Implications for Improving Work and Health. Bridging Occupational, Organizational & Public Health. 2014: 43-68.
21. Hobfoll SE, Shirom A. Conservation of resources theory: applications to stress and management in the workplace. In Golembiewski RT. Handbook of Organization behavior 57-81, 2000.
22. Westman M, Hobfoll SE, Chen S, Davidson OB, Laski S. Organizational stress through the lens of Conservation of Resources (COR) theory. In Perrewé PL, Ganster DC. Exploring interpersonal dynamics.: Elsevier Science/JAI Press; 167-220, 2005.
23. Hobfoll SE. Conservation of resources: a new attempt at conceptualizing stress. The American Psychologist. 1989; 44(3): 513.
24. Hobfoll SE. Conservation of resource caravans and engaged settings. Journal of Occupational and Organizational Psychology. 2011; 84(1): 116.
25. Baer RA. Mindfulness training as a clinical intervention: A conceptual and empirical review. Clinical Psychology-Science and Practice. 2003; 10(2): 125-143.
26. Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. Assessment. 2006; 13(1): 27-45.
27. Brown KW, Ryan RM, Creswell JD. Mindfulness: Theoretical Foundations and Evidence for Its Salutary Effects. Psychological Inquiry. 2007; 18(4): 211-237.
28. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. Journal of Clinical Psychology. 2006; 62(3): 373.
29. Carver CS, Scheier MF. Self-regulation of action and affect. In Vohs KD, Baumeister RF. Handbook of self-regulation: Research, theory, and applications., 2nd ed., New York, NY: The Guilford Press; 3-21, 2011.
30. Smith H, Novak P. Buddhism: a concise introduction. 2003: Harper Collins.
31. Wolf EM, Viranjini G, Jennifer D, Cynthia JP, Frederick MH, Anita S. Body awareness: construct and self-report measures. PLoS ONE. 2009; 4(5): e5614-e5614.
32. Kerr CE, Josyula K, Littenberg R. Developing an observing attitude: an analysis of meditation diaries in an MBSR clinical trial. Clinical Psychology & Psychotherapy. 2011; 18(1): 80-93.
33. Garland EL, Gaylord SA, Fredrickson BL. Positive Reappraisal Mediates the Stress-Reductive Effects of Mindfulness: An Upward Spiral Process. Mindfulness. 2011; 2(1): 59-68.
34. Bland JM. Cluster randomised trials in the medical literature: two bibliometric surveys. BMC Medical Research Methodology. 2004; 4: 21.
35. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 2007; 19(6): 349-357.
36. Boeije H. Analysis in qualitative research. 2009: Sage Publications Ltd.
37. Hsieh H, Shannon SE. Three approaches to qualitative content analysis. Qualitative Health Research. 2005; 15(9): 1277-1288.
38. Verweij H, van Ravesteijn H, van Hooff MLM, Lagro-Janssen ALM, Speckens AEM. Does Mindfulness Training Enhance the Professional Development of Residents? A Qualitative Study. Academic Medicine. 2018; 93(9): 1335.

39. Dannefer D. Aging as Intracohort Differentiation: Accentuation, the Matthew Effect, and the Life Course. Sociological Forum. 1987; 2(2): 211-236.
40. Merton RK. The Matthew Effect in Science, II: Cumulative Advantage and the Symbolism of Intellectual Property. Isis. 1988; 79(4): 606-623.
41. O'Rand AM. The precious and the precocious: understanding cumulative disadvantage and cumulative advantage over the life course. The Gerontologist. 1996; 36(2): 230.
42. Schueller SM. Preferences for positive psychology exercises. Journal of Positive Psychology. 2010; 5(3): 192-203.
43. Klingbeil DA, Renshaw TL. Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base. School Psychology Quarterly. 2018; 33(4): 501-511.

Chapter 7

General Discussion

This chapter provides the general discussion of this dissertation. As mentioned in the General Introduction, I have worked for almost two decades as a consultant/trainer/coach focused on work and health for business organisations. There, I have addressed themes like stress, burnout, motivation, and work engagement. That experience led me to make three research choices. First, I chose to conduct a study on the effectiveness of MBSR training for employees with a lot of stress. Second, I chose an additional organisational health intervention and third, I chose teachers in Dutch secondary vocational schools as my target group.

The overall goal of this dissertation is to contribute to the body of scientific and practical knowledge about MBSR and its effects on employees' mental health and other work-related variables (e.g. work performance, personal competencies, and work-related perceptions). The first subgoal is to examine the effectiveness of MBSR as an individual-focused intervention on employees' mental health (especially that of teachers in secondary vocational schools in the Netherlands) and on other work-related variables. The second subgoal is to provide insight into the additional effectiveness of a participatory, preventive organisational health intervention on individuals' mental health and other work-related variables. The third subgoal is to explore the effects of MBSR and an additional organisational health intervention on the personal competencies (e.g. coping strategies for stress) of teachers in secondary vocational schools.

This final chapter starts with a critical reflection on the theoretical, methodological, and practical implications of the main findings of this dissertation related to the five research questions formulated in the General Introduction. Second, I will discuss the ethical considerations of MBSR in a corporate setting. Third, I will discuss the main limitations of the studies and suggest directions for future research.

Reflection on the main findings

Finding 1

Finding 1 is related to Research Question 1:

> *According to the scientific literature, what are the effects of MBSR on employees' mental health and on other work-related variables (e.g. personal competencies)?*

The results of our systematic review suggest that MBSR may be a sound strategy for improving employees' psychological functioning. The strongest mental health variables were reduced levels of emotional exhaustion (a dimension of burnout), stress, psychological distress, depression, anxiety, and occupational stress. Improvements were found in terms of the extent of mindfulness, personal accomplishment (a dimension of burnout), (occupational) self-compassion, quality of sleep, and relaxation.

Theoretical implications

Scholars have many hypotheses about the working mechanisms that underlie mindfulness practice and lead to mental health outcomes. Shapiro et al. [1] suggests that the combination of exposure or willingness to experience difficult emotions (e.g. anxiety, distress, anger), awareness of these emotions, and observation of these emotions allows people to dis-identify with and better regulate difficult emotions. Another hypothesis, put forth by Alberts & Hülsheger [2], suggests that awareness of thoughts, awareness of bodily sensations, and self-compassion help people deal with stress. Gu et al. [3] found that mindfulness, rumination, and worry are significant mediators of the effects of MBSR on mental health outcomes. Van der Velden et al. [4] also reported effects caused by compassion and meta-awareness.

Hölzel et al. [5] – who were inspired by four theoretical perspectives about the process of mindfulness meditation [1, 6-8] – identified four interacting components through which mindfulness works and which stimulate the process of enhanced self-regulation. The first, *attention regulation*, enhances performance and is a prerequisite for staying engaged in meditation [5]. It is related to 'concentration' in our proposed process of change model. The second component, *body awareness*, increases observation skills while focusing on (subtle) bodily sensations [5]. It corresponds to 'being aware' in our proposed model.

The third component, *emotion regulation* [1], includes two strategies and forms a part of 'recognising and changing dysfunctional patterns' in our proposed process of change model. The first strategy, *emotion regulation*, *reappraisal or reconstruction*, involves approaching ongoing emotional reactions in a non-judgemental way and with acceptance. This increases positive reappraisal (i.e. the reconstruction of stressful events as beneficial and meaningful). The second strategy, *exposure, extinction, and reconsolidation*, includes meeting unpleasant emotions (e.g. fear, sadness, anger) by turning towards them rather than turning away, and discovering that these unpleasant emotions pass. This increases non-reactivity to one's inner experiences [5].

The fourth component, *change in perspective on the self*, involves detachment from identification or decentring [1], i.e., developing the 'observer perspective' [9]. This corresponds with 'taking distance' in our proposed process of change model. These four interacting components mutually facilitate each other, creating a gain spiral [10].

Our findings suggest possible interrelations between personal competencies (see Chapter 6, Table 6.3: for example, 'taking distance' precedes 'acceptance and non-judgement', which in turn precedes 'recognising and changing dysfunctional patterns') that could be revealed in a proposed process of change model (see Figure 6.2). This is in line with the four theoretical perspectives about the process of mindfulness meditation [1, 6-8] and the four components of Hölzel et al.'s theoretical model [5].

The proposed process of change model adds several personal competencies: 'being in the present'; 'acceptance and commitment'; 'communicating'; and 'showing compassion

towards yourself and others'. The model suggests a circular and iterative process rather than a linear one. The proposed process of change model was assessed by interviewing MBSR participants, during and after the course, about the competencies they developed and the interrelationships between them (see Finding 7).

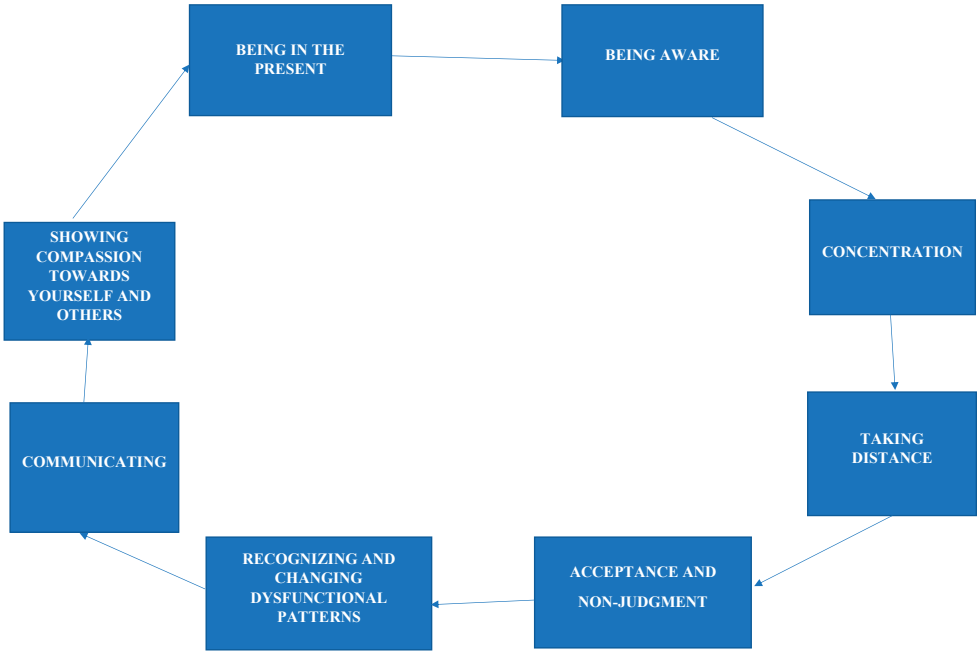


Figure 1 Proposed process of change model.

Furthermore, our findings (see Chapter 6 in this dissertation) show similarities with previous qualitative studies on participants' experiences with MBSR training [11-13]. Being aware, taking distance, acceptance and non-judgement, regulating your emotions, communicating with others, and showing compassion towards yourself and others were important themes.

Methodological implications

Despite the promising results from the studies in our systematic review, we concluded that some methodological issues made it difficult to draw strong conclusions about the effects of MBSR on employees' mental health. Moreover, we identified a lack of clarity around the outcome variables: mental health outcomes sometimes partly overlapped; sometimes the same outcome was measured using different assessment instruments; and sometimes the distinction between outcomes was unclear. Most studies focused on the short-term effects of MBSR; only a few studies also considered the long-term effects. Due

to the different lengths of the MBSR training, we could not conclude anything about the effects of training length on the results.

Other methodological problems we encountered in our systematic literature review were: publication bias; level of evidence (we found no evidence meeting the requirements for Level 1); small sample sizes; often heterogeneous samples; samples largely consisting of health care professionals and, to a lesser extent, teachers, which did not represent the target population of employees in general; self-selection bias; and a lack of descriptions of the instructors' skill levels and the content of the MBSR training. Goldberg et al. [14] and Van Dam et al. [15] mentioned similar methodological limitations in the research on mindfulness.

Most studies on MBSR contain quantitative data, while qualitative data is also needed to deepen the research ([12, 16]; also see Chapter 2). The qualitative studies on mindfulness had the same methodological weaknesses and challenges as the quantitative studies [15, 16], such as data collection strongly concentrated on self-reports (excluding second- and third-person data); exclusion of drop-outs; mindfulness practice and data analysis not always fully specified; and emphasising benefits and paying less attention to adverse events [17].

To overcome some of these methodological limitations, we made some practical choices in our study (see Chapter 4). We used the original MBSR programme as the main intervention. It is the most common form of secular mindfulness-based training [18] and was developed by Kabat-Zinn [19]. The programme consists of eight 2.5-hour weekly group sessions plus homework (45 minutes of daily home exercise six days a week, and one day with seven hours of silence).

Other strengths of our study were the use of homogeneous samples (i.e. teachers in Dutch secondary vocational schools), studying both the short- and long-term effects of MBSR, the use of mixed methods (qualitative and quantitative data), and having all instructors be qualified MBSR trainers. Although the study was innovative in many ways, it did not address all the weaknesses of earlier studies (e.g. self-selection bias, self-reporting of data, the Hawthorne effect).

Practical implications

Based on our systematic review, we concluded that the great diversity in mindfulness interventions used in the workplace made it difficult to compare the efficacy of such interventions. No firm conclusions could be drawn about the effects of specific mindfulness programmes for different groups and/or under specific conditions. Chaskalson & Hadley [18] noted that although an increasing number of organisations offer MBSR programmes, they all use a format with fewer and shorter sessions. The original MBSR programme seemed to be too demanding for busy employees [18]. More research is needed to determine whether a shortened version of the programme would produce the same short- and long-term effects.

Finding 2

Finding 2 was related to Research Questions 2 and 3:

> *2) To what extent is MBSR training feasible and acceptable? What are meaningful mental health variables and other work-related variables (e.g. personal competencies) to include in a large-scale randomised controlled trial on the effects of MBSR?*
> *3) What is an appropriate study protocol for investigating the effects of MBSR and an additional organisational health intervention on the mental health of teachers in Dutch secondary vocational schools and on other work-related variables (work performance, personal competencies, work-related perceptions)?*

To answer Research Question 2, we conducted a pilot study in a specialised hospital. The results are described in Chapter 3 of this dissertation.

Since the pilot study suggested that the MBSR programme was feasible and acceptable, we developed a study design (described in Chapter 4) that could be used to evaluate the short-term and long-term effectiveness of MBSR – a person-focused intervention to enhance mindfulness– both within and outside the context of an additional organisational health intervention. Dutch teachers in secondary vocational schools were the chosen target group because they suffer from stress and burnout complaints that could cause considerable problems at work. The study comprised a cluster randomised controlled trial (CRCT) that was planned to be conducted in at least three secondary vocational schools. We recruited teachers at these schools from three types of courses: Care, Technology, and Economy.

The allocation of groups of teachers to the intervention programme was randomised. Teachers at each school were assigned to intervention group 1 (IG 1), intervention group 2 (IG 2), or the waiting-list group (WG). IG 1 received MBSR training and IG 2 received MBSR training combined with an additional organisational health intervention. WG, the control group, received MBSR training one year later.

The primary outcome variable of the study was mindfulness, which was measured using the Dutch version of the Five Facet Mindfulness Questionnaire (FFMQ-NL). In the conceptual model, the effects of teachers' mindfulness resulting from the intervention programmes (MBSR training and MBSR training combined with an additional organisational health intervention) was related to salient (secondary outcome) variables: mental health outcomes (e.g. burnout, work engagement), work performance, work-related perceptions (job demands and job resources), and personal competencies (e.g. occupational self-efficacy). We collected data before (T_0) and immediately after the MBSR training (T_1), and three (T_2) and nine months (T_3) after the training. The power analysis revealed a required sample size of 66 teachers (22 in each group).

Theoretical implications

When selecting the outcome variables to include in the pilot study, we started from a list of the 15 most important mental health/personal competency variables (as mentioned in the systematic review in Chapter 2). The results of the pilot study suggested that mindfulness, burnout, stress level, quality of sleep, positive emotions at work, negative emotions at work, self-efficacy, and worrying were meaningful mental health /personal competency variables to include in a large-scale randomised controlled trial on the effects of MBSR.

The conceptual model had a descriptive and heuristic character (see Chapter 4; Figure 4.1). In it, the relationships between the two interventions (MBSR and MBSR with an additional organisational health intervention) and the two clusters of outcome variables (i.e. mental health outcomes and work performance) were mediated by two clusters of variables that were presented in the middle of the model. The first cluster contained personal competencies, which might be able to reveal the working mechanisms of mindfulness; the second cluster contained work characteristics (work-related perceptions). Unfortunately, the limited amount of data meant we could not apply methods of mediation analysis to explore the working mechanisms in the empirical part of the study (see Chapter 5).

Methodological implications

As mentioned in Finding 1, we made some practical choices in our study protocol (described in Chapter 4) to overcome the methodological limitations that we discovered in the studies in the systematic review (see Chapter 2). In contrast to most of those studies, ours was a cluster randomised controlled trial that included an additional organisational health intervention, used a mixed-methods design (quantitative and qualitative), and took measurements at four times (spanning pre-intervention to nine months post-intervention).

The combination of two complementary interventions (see Chapter 4), an individual-focused MBSR training and an additional organisational health intervention required a CRCT. In such a CRCT, groups of subjects (i.e. schools) are randomised rather than individual subjects (i.e. teachers) (Bland, 2004). We performed cluster randomisation at the school level because doing so gave us the opportunity to study the effects of an additional organisational health intervention that could not be directed towards selected teachers and to control for 'contamination' across individuals (i.e. ensuring the effects on one teacher did not influence the effects on another teacher in the same course) [20].

At the first secondary vocational school, participating teachers from one course (Care, Technology, Economy) were assigned to IG 1 (MBSR), teachers from another course were assigned to IG 2 (MBSR and an additional organisational health intervention), and teachers from the third course were assigned to the waiting list group (WG). The allocation was different at each school. A researcher who was not involved in assigning

courses/participants to the groups prepared consecutively numbered sealed opaque envelopes. Each envelope contained a paper indicating the treatment assignment at the school level. The schools received their envelopes from a researcher who was unaware of the randomisation sequence. The school representative could then open the envelope in the presence of the researcher, thus informing the researcher of the treatment assignment (see Chapter 4).

Cluster randomisation at the school level (see Chapter 4), for example the course care as WG, could cause disappointment at the course level, because many care teachers were strongly motivated to participate in the MBSR training. Disappointed teachers might quit the study or look for other opportunities to participate in mindfulness practices (e.g. MBSR training elsewhere, mindfulness app, reading about mindfulness, formal and informal exercises). Biased research data could be the result.

The study was based on self-selection, as we depended on voluntary participation by teachers. It was likely that the characteristics of the teachers who participated in the study differed from those who did not participate or dropped out early. Unfortunately, we did not investigate the characteristics of non-participating teachers or drop-outs (40% of teachers who began MBSR training dropped out before completing it).

A CRCT involves more complex design and analysis than an RCT [21], so we needed more participating schools and teachers to achieve adequate statistical power. Recruiting more schools (five instead of three) and teachers was no easy task. Unfortunately, we could not compare the three courses (Care, Technology, Economy), because we did not recruit enough teachers from Technology and Economy (see Chapter 5, Table 5.4). It seemed important to investigate the specific reasons why teachers from the three courses chose to participate, partially participate (drop out) or not participate. This will be discussed more extensively in the methodological implications of Finding 5.

Practical implications

The MBSR training (and the additional organisational health intervention) required a lot of time and effort from the teachers, who experienced work pressure, time pressure, and possible stress complaints. This seemed to be a barrier for participation or a reason for premature drop-out.

Future participation might be stimulated by a genuine understanding of employees' needs on the part of the management team and cooperation within the organisation, by a careful selection of participants (using criteria such as the extent of stress/burnout complaints, and presenteeism and absenteeism rates), by reducing possible barriers in the context of a health programme: more commitment of teachers (and management), and by offering teachers the opportunity to participate in the training during working hours.

Finding 3 / Effect of the additional organisational health intervention

Finding 3 is related to Research Question 4a:

What are the effects of an organisational health intervention on the mental health of teachers and on other work-related variables?

The quantitative data from our CRCT leads us to conclude that the additional organisational health intervention had no effect on the teachers' mental health, work performance, personal competencies (e.g. occupational self-efficacy), or work-related perceptions/work characteristics (job demands and job resources).

Theoretical implications

The key points of participatory action research [22] are effective ingredients for workplace stress interventions and organisational health interventions. These involve taking a bottom-up approach; composing a participatory group; fostering active participation by stakeholders (e.g. employees) and collaboration between researchers and stakeholders; using stakeholders' knowledge, skills, and perceptions; and creating joint ownership of problems and solutions [23]. Solutions from stakeholders appeared more effective than solutions adopted from others [24].

The belief that one is the master of one's own behaviour and can influence others and the environment is crucial [25]. In other words, an organisational health intervention should target individuals' occupational self-efficacy: the belief in their own ability in a specific domain of work. The most effective way to enhance self-efficacy is through mastery of experiences [23, 26]. By taking part in the organisational intervention or even by experiencing its effects, we assumed the intervention could positively influence occupational self-efficacy among teachers (see Chapter 4).

A process evaluation to assess the requirements/conditions for successful implementation of the additional organisational health intervention should be performed using the theoretical framework from Nielsen and Randall [27] (see Chapter 4). The implementation process can moderate or mediate the intervention's potential effects on health and well-being [27]. Successful implementation is a prerequisite for exposure to the intervention and therefore for having possible health effects.

The framework enabling us to link intervention processes to intervention outcomes consists of three themes of process components: 1) intervention design and implementation, determining the maximum level of intervention exposure; 2) intervention context; and 3) participants' mental models [27] (also see Chapter 4, Table 6). Successful implementation of an organisational health intervention is a complex undertaking, requiring customisation for any school. This seems to conflict with the requirement of treatment fidelity (i.e. the reliability of the administration of the intervention). Therefore, a realist randomised controlled trial [28] that fits the (tailor-made) intervention to the organisational context, may be more appropriate than a (C) RCT with standardised interventions.

Methodological implications

The lack of effects caused by the organisational health intervention could be related to poor implementation [27]. The interviewees mentioned four possible explanations for this outcome (see Chapter 6).

First, the preparation phase (establishing a participatory group, obtaining commitment from management, communicating to the teachers, and creating readiness for change) may have been too brief. Employees' perceptions and appraisal of the organisational intervention may not be strongly affected by a serious communication strategy. The second and related explanation is that slow decision-making processes by management at the participating schools (and the undoing of decisions already made) frustrated the implementation process.

The third possible explanation is the teachers' low levels of commitment and learned helplessness [29]. Learned helplessness of teachers refers to passivity, not responding to and influencing an event because the teachers do not think that speaking up or taking other actions would matter. This learned behaviour – feeling a lack of control caused by experiencing uncontrollable events – is particularly typical in the education sector [30].

The fourth possible explanation is the organisational culture of Dutch secondary vocational schools and the sometimes authoritarian leadership style of the schools' directors. These are marked by control, top-down communication, and the belief that employees' points of view are of limited value. Such attitudes may not have facilitated the implementation of the intervention.

A possible fifth explanation is that negative experiences with earlier individual-focused or organisation-focused stress interventions (which may have resulted in scepticism or minimal commitment) may have negatively influenced the results. As a result of classical conditioning, such earlier negative experiences may prevent positive results from future work stress interventions. When conducting a work-stress intervention, it is always important to take into account any previous positive and negative experiences with an intervention [31].

Future research should be directed towards the determinants of successful implementation, like positive experiences with an intervention and the time available for conducting the intervention.

Practical implications

Our CRCT study (Chapter 4) required standardisation of the additional organisational health intervention. However, Bonell et al. [28] and Nielsen and Noblet [32] emphasised tailoring an intervention to the organisational context and asked the crucial question: *Which interventions work, for whom and under what circumstances?* Realist randomised controlled trials [28] may offer a solution to this paradox.

Combining two complementary interventions in our study (see Chapter 4) required us to set up a CRCT. We started with recruitment, which was a two-step process. First,

we had to recruit secondary vocational schools. This was surprisingly difficult, perhaps because the schools were too busy with day-to-day business and organisational changes. Next, we had to recruit busy teachers from three courses (Care, Technology, and Economy) at the participating schools. This was also difficult, mainly due to the heavy time investment, teachers' reluctance to attend MBSR training with colleagues, and the chance of being assigned to the control group. We initially recruited three schools but later realised we would need schools to attract enough teachers to the study to achieve adequate statistical power [21].

Finding 4 / Effects of MBSR on work-related perceptions

Finding 4 is related to Research Question 4b:

What are the effects of MBSR on teachers' work-related perceptions?

The quantitative data from our CRCT leads us to conclude that, contrary to our expectations, the MBSR training showed no effects on teachers' work-related perceptions (job demands and job resources).

Theoretical and methodological implications

In accordance with other studies ([33, 34]; see Chapter 2), MBSR showed no significant effects on work characteristics (job demands and job resources) (see Chapter 5).

Practical implications

The person-focused MBSR intervention may not be appropriate for changing work-related perceptions. The simple message seems to be: only use a person-focused intervention like MBSR to teach employees to better cope with stressful situations, not to try to modify their perceptions of stressful workplaces or organisations.

Finding 5 / Effects of MBSR on mental health

Finding 5 is related to Research Question 4c:

What are the effects of MBSR on teachers' mental health?

The quantitative data from our CRCT leads us to conclude that although teachers did not exhibit changes in work-related perceptions (no decrease in their job demands and no increase in job resources) after the MBSR training, they felt more mindful and lowered their organisational commitment. Moreover, their mental health improved in the short- and long-term, as reflected in fewer sleep quality complaints, fewer negative emotions, fewer negative work-home interactions, and more dedication during working hours. These results may suggest that enhanced mindfulness enabled the teachers to mentally disengage from work during leisure time (the MBSR lowered their organisational commitment),

which allowed them to experience fewer symptoms of psychological strain. There were no effects on stress level.

Theoretical implications

Our conceptual model (see Chapter 4) was inspired by the Job Demands-Resources model (JD-R model), which describes the relationships between job demands, job resources, personal resources, stress, and work engagement [35]. High job demands exhaust employees' mental and physical resources and may therefore lead to stress complaints or even burnout (an energetic or health impairment process). Similarly, job resources are positively associated with work engagement (a motivational process) [36]. Additional psychological theories, like Hobfoll's conservation of resources theory [37], are needed to detect and explain the underlying psychological processes (e.g. loss cycle and gain cycle) and to explain the relationships between demands, resources, and outcomes [35, 38].

Conservation of resources (COR) theory [39, 40], a general theory of motivation and stress, is valuable for reflecting on teachers' motivations for participating in the MBSR course. The theory's basic assumption is that people strive to maintain, obtain, and create resources that they value as beneficial for meeting current and future challenges in work and life [37]. An important principle of the COR theory is that employees must invest resources, such as time and money, to prevent resource loss and gain other resources to protect themselves against occupational stress and burnout complaints [40]. Hobfoll [37] distinguishes four types of resources: 1) objects that have physical presence and may be linked to socio-economic status (e.g. shelter and clothing); 2) good health and work resources (e.g. social relations and status at work); 3) energy resources (e.g. time, money, and knowledge); and 4) personal resources (e.g. individual traits and coping skills). These resources are not isolated distinct variables but exist in 'caravans' (i.e. highly correlated mutually reinforcing resources; [37].

For teachers in particular, the availability of more work resources (e.g. challenging work, autonomy, and social support), energy resources (e.g. time), and personal resources (e.g. self-efficacy, optimism, and coping skills) enables them to meet challenges/demands and, ultimately, results in greater work engagement and well-being. This mechanism generates an upwards spiral (gain cycle) that is characterised by an accumulation of resources [37]. In addition to this gain cycle, the COR theory also describes a loss cycle, implying that those with fewer resources are more vulnerable to resource loss (e.g. diminished mastery or self-efficacy, and decreased social support) and are less capable of resource gain [40].

In the context of our research, two reinforcing types of resources [37] are relevant: good (mental) health and personal competencies. It is interesting to reflect on why teachers, who have busy schedules and experience stress, still find time to participate in an MBSR course, as this requires a serious time investment (i.e. an energy resource) [37]. This time investment is only reasonable if teachers expect it to provide worthwhile effects.

Methodological implications

Study population: the Matthew effect

In Chapter 5, which presented the quantitative results of the CRCT, we mentioned the teachers' exceptionally low scores for stress at baseline, given that one in five employees in the education sector reported stress or burnout complaints in 2017 [41]. It seemed that the target group for our intervention(s) – teachers with the highest stress scores – were not part of the sample in our study. The COR theory [39, 40] offers a plausible explanation; it states that those individuals who lack primary resources (e.g. awareness, taking distance, and social ties), and those who lack secondary resources (e.g. time, suffer from high job and/or private demands), are less capable of resource gain and more vulnerable to resource loss [40].

Ironically, those who were most in need of obtaining resources were unable to participate. This may imply that they were caught in a loss cycle [40] and were unable to invest enough to gain more resources. Individuals with average stress, fewer job and/or private demands, and more time were more likely to participate in the MBSR course and to obtain more resources relatively easily. This resulted in an upwards (gain) spiral characterised by an accumulation of resources (acquiring personal competencies during the course) [40].

Dannefer [42] calls this phenomenon the Matthew effect after the Parable of the Talents in the Bible. The Matthew effect (or accumulated advantage) means the rich get richer and the poor get poorer. In other words, those teachers who begin with an advantage (good health, time, knowledge, coping skills) over their counterparts accumulate more advantages over time, and those teachers who begin at a disadvantage become more disadvantaged over time [42-44].

The teachers who participated in this study were able to take advantage of the gain cycle: they could invest enough resources (time, energy, good health/less stress, coping skills) to gain more resources (personal competencies). This is in accordance with the resource caravan thesis, which states that resources are developed simultaneously, are highly correlated, and tend to travel in caravans [45]. Teachers who lack resources could be stimulated to participate in studies such as ours if researchers used inclusion criteria like the extent of stress/burnout complaints, willingness, presenteeism and absenteeism rate, and genuine understanding of teachers' needs by the management team (see Chapter 5). A better understanding of teachers' needs would give management the opportunity to provide participating teachers with sufficient and appropriate resources (e.g. participating in the course during working hours, energy, social support, basic coping skills) to break the loss cycle and generate a gain cycle.

Non-significant and small effect sizes for many outcome measures

Limited data prevented us from testing the suggested relationships between variables in the conceptual model (see Chapter 4): the outcome variables (mental health, work

performance), mediating variables (personal competencies, work-related perceptions/ work characteristics), and the moderating variable 'personality characteristics' (e.g. the Big Five).. However, testing the conceptual model was not our primary aim (see Chapter 4), because we used the model in a descriptive, heuristic manner to explore relationships between variables.

Unfortunately, the personality characteristics variable (e.g. Big Five) showed too few internal consistencies (Cronbach's alpha) in our study. Moreover, in their meta-analysis, Buric et al. [46] found no significant relationships between personality characteristics (Big Five) like neuroticism and extraversion and positive and negative effects of mindfulness. Therefore, personality characteristics may be less important to future research about mindfulness.

There are several possible explanations for the non-significant and small effect sizes of many mental health outcomes. First, attention to mindfulness may have been triggered in the WG when they filled in the online questionnaires. Because the WG was aware of the MBSR training, they may have searched for mindfulness apps, exercises, or books, which might have caused the (non-significant) improvement of some of their outcomes (e.g. 'the total mindfulness score and all mindfulness dimensions, except non-reactivity'; see Chapter 5, Table 5.5).

Second, given that one in five employees in the education sector reported stress or burnout complaints in 2017 [41], the intervention group's exceptionally low score for stress at baseline is remarkable. It seems that the target group for our intervention(s) – teachers with the highest stress scores – did not participate in our study. Most participants were women with a relatively high average age and many years of work experience (see Chapter 5, Table 5.4). Therefore, we might have encountered a 'healthy worker effect' [47] and an absence of younger workers who were perhaps too busy to participate in the MBSR training.

Third, we assumed the organisational health intervention would stimulate dialogue between management and teachers and therefore positively influence the balance between job demands (work pressure) and job resources (autonomy, feedback, relationships), and the personal competency 'occupational self-efficacy' (see Chapter 4). As mentioned earlier, the intervention's lack of effects could have been caused by poor implementation [48].

Practical implications

There are many possible barriers to participating in an MBSR course: limited time, low expectations, little motivation, lower levels of perceived health, lack of management approval, and negative perceptions of an organisation's commitment to employee health [49]. This leads us to question how the core target group can be reached in future research and how non-participation can be reduced.

Participation might be stimulated by a genuine understanding of employees' needs by the management team and cooperation within the organisation; by careful selection of

participants using criteria such as the extent of stress/burnout complaints, presenteeism and absenteeism rate; and by reducing possible barriers (in the context of a health programme: more commitment and the possibility to participate in the training during working hours).

As indicated, our participants reported less stress than expected. Still, 40% of participants dropped out of the programme. Even for people with little stress, following an MBSR programme is time consuming and requires persistence, especially the homework. Reasons given for drop-out were a lack of time, personal circumstances, the programme not fulfilling expectations, and a lack of motivation (see Chapter 5).

Medical research has shown that the nocebo response, a negative placebo, is stronger in patients who are already stressed [50], so negative expectations of an intervention may be reinforced by stress. That is why it seems to be important to induce positive emotions and thus make the intervention(s) a positive experience [31].

The MBSR programme (see Chapter 4) includes homework that consists of 45 minutes of daily home exercise six days a week. This is a considerable time investment. There are two ways to reduce it: decrease the amount of homework and/or shorten and adjust the MBSR intervention. Remarkably, a study by Ter Avest et al. [51] found no a significant relationship between more frequent formal home practice and a reduction in depressive symptoms. However, in their systematic review and meta-analysis, Parsons et al. [52] found a small but significant association between the extent of formal home practice and intervention outcomes. Calcagni et al. [53] showed that shortened, adjusted MBSR interventions seem to be as successful as lengthier treatment programmes. Finally, in the context of finding time and a framework to practice, brief and informal mindfulness practices [54, 55] appear to be promising means for making the MBSR training more feasible.

Finding 6 / Effect of MBSR on work performance

Finding 6 is related to Research Question 4d:

What are the effects of MBSR on teachers' work performance?

The quantitative data from our CRCT leads us to conclude that the MBSR training had no effects on teachers' work performance.

Theoretical and methodological implications

In accordance with other studies ([33]; see Chapter 2), our MBSR programme had few significant effects on work performance (see Chapter 5). MBSR can cultivate important personal competencies among teachers, reduce stress, and increase inner calmness. However, it does not seem to improve competencies that improve work performance.

Practical implications

Although the person-focused MBSR intervention may not be appropriate for improving work performance, it improved the teachers' short- and long-term mental health and may increase their motivation and sustainable employability.

Finding 7

Finding 7 is related to Research Question 5:

> *What are the secondary vocational school teachers' expectations and short- and long-term experiences with regard to mental health and personal competencies as a result of MBSR?*

The teachers' experiences we collected via interviews (qualitative data) also strongly suggest that MBSR can reduce stress, increase inner calmness, and cultivate important personal competencies that help teachers cope with their very demanding jobs.

Theoretical implications

The *conservation of resources theory* [39, 40] is also valuable for reflecting on teachers' short- and long-term experiences. How and which post-participation short- and long-term personal competencies were obtained?

As mentioned, these resources exist in 'caravans', i.e., highly correlated mutually reinforcing resources [45]. For teachers in particular, the availability of more work resources (e.g. challenging work, autonomy, and social support), energy resources (e.g. time), and personal resources (e.g. self-efficacy, optimism, and coping skills) will enable them to accumulate resources (gain circle) and meet challenges/demands. Ultimately, this will result in greater work engagement and well-being.

Methodological implications

Since mindfulness research on employees across occupational sectors is a relatively new phenomenon, our interview study suggested a need for qualitative data. That would allow researchers to investigate in depth whether a mindfulness intervention significantly affects personal competencies and to capture the mechanisms by which mindfulness practice leads to mental health. For example, unresolved or suppressed emotions may resurface during mindfulness training, increasing self-consciousness.

There is also a need for qualitative data collected via individual interviews, focus groups, or observations. It would allow researchers to thoroughly investigate key aspects of an intervention (e.g. the mindfulness training programme) and examine those factors that lead to successful implementation in an organisation (e.g. time to participate, support of superiors).

We only interviewed the participating teachers. However, interviewing their supervisors and students and asking about the teachers' behaviour at different times could

increase data reliability and validity. Investigating drop-outs could also provide relevant information. There is a particular need for qualitative data collected via interviews and observations to detect personal competencies and mechanisms of mindfulness.

In the fifth (qualitative) study (see Chapter 6), we explored prior expectations about the MBSR training and an additional health intervention. The participants' prior expectations were not mentioned as a possible moderating variable in the conceptual model (see Chapter 4), but they could result in a placebo effect because the teachers expected the interventions to lead to experiences [31]. Therefore, we present a revised conceptual model (Figure 7.1) that includes participants' prior expectations as a moderating variable and the additional variables (personal competencies) we found (see Chapter 6). The dotted arrow refers to the direct influence of the interventions on mental health and work performance.

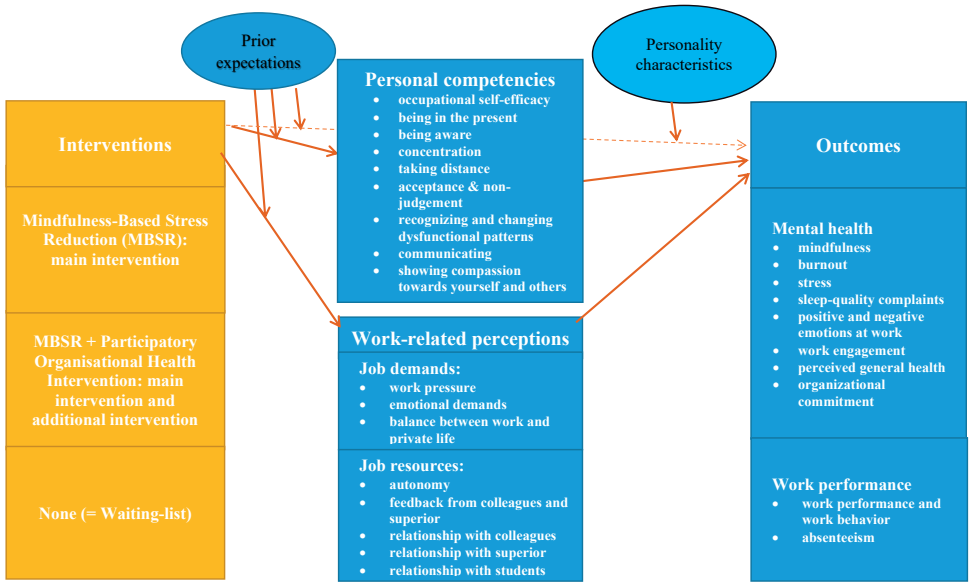


Figure 2: Revised conceptual model

The outcomes of our study (see Chapter 6) revealed remarkable parallels with the personal competencies needed by Dutch secondary vocational teachers (MBO Raad, nd). Essential personal competencies cultivated by MBSR were being aware, taking distance or self-reflection, regulating your emotions, and self-regulation.

Practical implications

As discussed under Finding 4, barriers to participation in the intervention(s) need to be reduced. Several stakeholders could facilitate the teachers' participation. For instance, supervisors could notice stress complaints and discuss them openly with the teachers.

Sometimes, attention from the supervisor is sufficient; in other cases, action is needed, possibly in consultation with the HR officer. Colleagues and family could offer social and emotional support. The organisation could provide quiet rooms and sufficient breaks: in short, an adequate stress and health policy. And, of course, the teachers are responsible for communicating their stress complaints and dealing with and discussing them.

Ethical considerations regarding MBSR in a corporate setting

We share the view of [56]: mindfulness interventions like MBSR have positive effects on employees' well-being, but there are still a lot of research issues to solve in the workplace [57]. An increasing number of organisations are using mindfulness practices like MBSR and mindfulness-based cognitive therapy [58]. Scientists and journalists are even using descriptions like 'hype' [15] and 'mindfulness revolution' [59]. But not everyone supports the use of MBSR in organisations.

Recently, there has been a critical debate in the scientific literature between scholars from two dominant schools who are conducting organisation research about applying mindfulness practices in business contexts [60, 61]. One school adopts a positivist approach and focuses on measurable outcomes, such as reduced stress and perceiving mindfulness as a humanist concept for employees. They claim that mindfulness should be used as a systematic intervention for employees' mental health [8, 62]. The other school criticises the appropriation of mindfulness in a Western corporate context [59], ignoring the roots in spirituality [63] and the depoliticisation and privatisation of stress [59]. They assert that happiness is an inside job and an individual's own responsibility.

These critics cite several kinds of risks for employees. First, the boundaries between private and work spheres dissolve because highly personal practices, like mindfulness, are transmitted into corporate control [64]. Second, a spiritual practice like MBSR that assumes the guise of a humanistic concept is exploited to gain control over employees' minds and bodies [65]. Third, according to neoliberal logic, mindfulness is a self-help technique that targets the individual and attempts to change employees in ways that optimise their emotions, cognitions, and behaviour to improve work performance and make them better resources, while ignoring the social, political, and economic dimensions of suffering [59, 66]. Greater work demands [67] and less organisational responsibility for the quality of work [68] are possible consequences. Finally, according to Walsh [65], mindfulness is misused as an organisational control mechanism to achieve quick corporate goals. In short, the first school looks individualistic and pragmatic, whereas the second school could be characterised as critical to the neoliberal society.

Purser [59] is one critic of using mindfulness in an organisational setting; according to him, the dominant narrative of neoliberal mindfulness has troubling undertones. First, 'stress is a private, subjective, interior affair – a problem for individuals to deal with' (p.

106). Second, he is concerned by the make-ability and the ethos of self-responsibility. The reverse of self-mastery is blaming yourself: 'I only have myself to blame for being mindless' (p. 106).

Although these comments are valid and cannot be simply ignored, I believe Purser's arguments are ideological and lack an empirical foundation. He does not use different people's experiences to substantiate his theoretical analysis (e.g. telling a single mother with three kids and two jobs that stress is her own fault is blaming the victim and different than telling an employee to 'be mindful and there will be no stress').

There has been little empirical research on the ethical considerations of mindfulness practices [61] and other health interventions in organisations. One example of the latter is Van Berkel et al.'s [69] investigation about what constitutes a risk factor to occupational health (i.e. not being able to perform your job). Strikingly, employers assert that the risk factors are employee-related (e.g. lifestyle); according to employees and labour unions, the risk factors are prevailingly work-related [69]. The differences in the definitions of risk factors given by the stakeholders in that study correspond to the classification of preventive stress reduction interventions at work: work-related or primary (e.g. reducing high workload, increasing autonomy, leadership training) and employee-related or secondary/tertiary (e.g. MBSR training or cognitive-behavioural coaching/therapy) [70].

Ihl et al. [61] found that organisational members (e.g. employees, supervisors) interpret mindfulness practices (formal exercises like paying attention to the body and informal exercises like paying full attention to what one is doing or experiencing at a certain moment; [2]) on an organisational level as human resource management tools that encourage work performance and productivity; on a group level, they interpret them as a social means to develop group efficiency; and on an individual level, they interpret them as a tool for self-actualisation and life enhancement. Especially the organisation-level interpretations [61] refer to Purser's criticism [59]: using mindfulness for business (work performance and productivity); reducing employees to (human) resources; and putting employees under pressure to adapt their personalities, thoughts, emotions, and behaviour to design an optimal workforce.

However, I believe it is unrealistic and undesirable to wait until an organisation's problems are solved before you give employees the tools to deal with stressful situations. Instead, it seems important to give the employees tools (in this case, mindfulness tools) to deal with the unruly reality of organisations while simultaneously trying to change work settings (e.g. with organisational health interventions). I agree with Habermas [71] that employees should be given the tools they need to bridge the gap between their 'lifeworld' and the system (of the organisation), and to support the employee in coping with the less-than-ideal reality in organisations.

In choosing MBSR – a prevailingly individual-focused approach – as the main intervention, we took the risk of insufficiently acknowledging the impact of the work context on mental health. In view of this and the question '*Who is responsible for the*

employee's mental health?' we used an integrated approach that included both an individual-focused intervention (MBSR) and an organisation-focused intervention [72]. This reflects the responsibility of both the employee and the employer. In my opinion, postponing individual-oriented interventions until an ideal workplace is created seems unrealistic and undesirable for employees' mental health.

Limitations of this Study

As indicated in the description of our findings, our study has some limitations. First, all data were self-reported and may therefore be biased [73]. Second, we had no 'active' control group (e.g. using relaxation training or cognitive-behavioural approach training), so results must be interpreted cautiously. Third, it appeared that the target group for our intervention(s) – teachers with the highest stress scores – were not part of the sample in our study. Fourth, 40% of our participants dropped out of the programme and we did not interview them. Finally, because the organisational health intervention was implemented at several schools with differing organisational conditions, treatment fidelity (i.e., the reliability of the administration of the intervention) may have been less optimal [73]. These limitations are translated into directions for future research.

Directions for future research

There are nine possible avenues for future research. First, our study focused on self-reported data from participating teachers (first-person data). Future studies could increase data reliability and validity by adding observations of the teachers' behaviour (e.g. regulating unpleasant emotions like sadness and anger; prioritising; expressing their own needs; saying 'no' more often) from observers, supervisors, or students. Second, the interpretation of results could be facilitated by using 'active' control groups to consider the amount of non-specific attention participants receive (i.e. the Hawthorne effect; [74]).

Third, reaching the core target group (teachers with a high level of stress) would require a careful selection of participants before T_0, based on their mental health outcomes. More research work is needed to determine which settings are particularly suitable for which types of mindfulness courses. Mindfulness training needs to be implemented with care because it cannot be assumed that it works for everyone and under all circumstances. Walsh and Arnold [65] showed the dark side of employee mindfulness: it can have a moderating effect on the relationship between abusive leadership and employees' psychological well-being. In other words, mindfulness can exacerbate decreases in well-being. Therefore, a thoroughly executed needs analysis should precede future mindfulness interventions to ensure appropriateness.

Fourth, future research should pay attention to the conditions under which the intervention takes place to reduce the Matthew effect and the risk of dropout. It should be used during working hours and with good facilities. Otherwise, the MSBR training itself could add a stressor to the work environment.

Fifth, future research could focus on the effects of MBSR programme length and the amount of homework on the results. Carmody and Baer [75] concluded that '... adaptations that include less class time may be worthwhile for populations for whom reduction of psychological distress is an important goal and for whom longer time commitment may be a barrier to their ability or willingness to participate' (p. 627).

Sixth, we recommend an integrated approach that combines both an individual-focused intervention and an organisation-focused intervention, while simultaneously abiding by the determinants of successful implementation [30]. Among other factors, an organisational health intervention in this setting requires tailoring the intervention to the organisational context [28, 32], gaining serious commitment from the school's director and managers, ensuring adequate communication, engaging teachers, establishing an involved participatory group with a manager as chair, and choosing the right problems in the workplace with the possibility of quick wins.

Seventh, it would be interesting to interview the same teachers at multiple times during the MBSR course to try to detect the development of personal competencies. Supervisors' and students' observations of the teachers' behaviour at different times could also be used to increase data reliability and validity.

Eighth, possible causal relationships and reversed causations between the variables need to be analysed to explore the working mechanisms of MBSR. Sufficient data are needed to test and possibly validate the adequacy of our conceptual model (consisting of outcomes, mediating, and moderating variables; see Figure 7.1).

Ninth, we recommend that future research consider possible gender differences and differences between technical/economics ('hard') and psychological/caring ('soft') professionals in terms of readiness to participate in MBSR training and effects on employees' mental health.

To conclude

There is great need for an integrated approach to work-related stress that combines an individual-focused intervention (like MBSR) and an organisation-focused intervention. Stress is certainly not a self-imposed, private, subjective, and interior matter that employees must deal with alone. We must avoid the suggestion that an individual employee is completely responsible for their experience of work stress and for relieving it. MBSR is one possible promising intervention, not a panacea for all problems and all

employees. The implementation of an organisation-focused intervention is not a cure-all, and it requires special attention.

The MBSR training required a lot of time and effort from teachers who also experienced work pressure, time pressure, and possible stress complaints. This seemed to be a barrier to participation, especially for the core target group (stressed employees), or a reason for premature drop-out. More research is needed to determine whether a shorter version of the programme would produce the same short- and long-term effects and which other measures can facilitate participation.

In short, MBSR seems to be a valuable intervention that improves teachers' mental health in the short- and long-term, and it may improve teachers' motivation and sustainable employability.

References

1. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. Journal of Clinical Psychology. 2006; 62(3): 373.
2. Alberts HJEM, Hülsheger UR. Applying mindfulness in the context of work: mindfulness-based interventions. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 100-132, 2015.
3. Gu J, Strauss C, Bond R, Cavanagh K. How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. Clinical Psychology Review. 2015; 37: 1-12.
4. Van der Velden AM, Kuyken W, Wattar U, Crane C, Pallesen KJ, Dahlgaard J, et al. A systematic review of mechanisms of change in mindfulness-based cognitive therapy in the treatment of recurrent major depressive disorder. Clinical Psychology Review. 2015; 37: 26-39.
5. Hölzel BK, Lazar SW, Gard T, Schuman-Olivier Z, Vago DR, Ott U. How Does Mindfulness Meditation Work? Proposing Mechanisms of Action From a Conceptual and Neural Perspective. Perspectives on Psychological Science. 2011; 6(6): 537-559.
6. Baer RA. Mindfulness training as a clinical intervention: A conceptual and empirical review. Clinical Psychology-Science and Practice. 2003; 10(2): 125-143.
7. Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. Assessment. 2006; 13(1): 27-45.
8. Brown KW, Ryan RM, Creswell JD. Mindfulness: Theoretical Foundations and Evidence for Its Salutary Effects. Psychological Inquiry. 2007; 18(4): 211-237.
9. Kerr CE, Josyula K, Littenberg R. Developing an observing attitude: an analysis of meditation diaries in an MBSR clinical trial. Clinical Psychology & Psychotherapy. 2011; 18(1): 80-93.
10. Garland EL, Gaylord SA, Fredrickson BL. Positive Reappraisal Mediates the Stress-Reductive Effects of Mindfulness: An Upward Spiral Process. Mindfulness. 2011; 2(1): 59-68.
11. DeMauro AA, Jennings PA, Cunningham T, Fontaine D, Park H, Sheras PL. Mindfulness and Caring in Professional Practice: an Interdisciplinary Review of Qualitative Research. Mindfulness. 2019; 10(10): 1969-1984.
12. Morgan P, Simpson J, Smith A. Health Care Workers' Experiences of Mindfulness Training: a Qualitative Review. Mindfulness. 2015; 6(4): 744-759.
13. Verweij H, van Ravesteijn H, van Hooff MLM, Lagro-Janssen ALM, Speckens AEM. Does Mindfulness Training Enhance the Professional Development of Residents? A Qualitative Study. Academic Medicine. 2018; 93(9): 1335.
14. Goldberg SB, Tucker RP, Greene PA, Simpson TL, Kearney DJ, Davidson RJ. Is mindfulness research methodology improving over time? A systematic review. PloS one. 2017; 12(10): e0187298.
15. Van Dam NT, van Vugt MK, Vago DR, Schmalzl L, Saron CD, Olendzki A, et al. Mind the Hype: A Critical Evaluation and Prescriptive Agenda for Research on Mindfulness and Meditation. Perspectives on Psychological Science. 2018; 13(1): 36-61.
16. Frank P, Marken M, Developments in Qualitative Mindfulness Practice Research: a Pilot Scoping Review. 2022, Springer. p. 17.
17. Farias M, Maraldi E, Wallenkampf KC, Lucchetti G. Adverse events in meditation practices and meditation-based therapies: a systematic review. Acta Psychiatrica Scandinavica. 2020; 142(5): 374.
18. Chaskalson M, Hadley SG. Mindfulness: historical and contemplative context and recent developments. In Reb J, Atkins PWB. Mindfulness in organizations. Foundations, research and applications. Cambridge: Cambridge University Press; 42 - 66, 2015.

19. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. 1990, New York: Delacorte.
20. Edwards SJ, Braunholtz DA, Lilford RJ, Stevens AJ. Ethical issues in the design and conduct of cluster randomised controlled trials. BMJ (Clinical research ed.). 1999; 318(7195): 1407-1409.
21. Campbell MK, Elbourne DR, Altman DG. Consort statement: extension to cluster randomised trials. BMJ: British Medical Journal (International Edition). 2004; 328(7441): 702-708.
22. McVicar A, Munn-Giddings C, Seebohm P. Workplace stress interventions using participatory action research designs. International Journal of Workplace Health Management. 2013; 6(1): 18-37.
23. Schelvis RMC, Oude Hengel KM, Wiezer NM, Blatter BM, van Genabeek JAGM, Bohlmeijer ET, et al. Design of the Bottom-up Innovation project - a participatory, primary preventive, organizational level intervention on work-related stress and well-being for workers in Dutch vocational education. BMC Public Health. 2013; 13(1): 1-15.
24. Ouweneel E, Schaufeli W, Le Blanc P. Van preventie naar amplitie: Interventies voor optimaal functionerende werknemers: Interventies voor optimaal functioneren. Gedrag en Organisatie. 2009; 22: 118.
25. Ng TWH, Sorensen KL, Eby LT. Locus of control at work: a meta-analysis. Journal of Organizational Behavior. 2006; 27(8): 1057-1087.
26. Bandura A. Health promotion from the perspective of social cognitive theory. Psychology & Health. 1998; 13(4): 623-649.
27. Nielsen K, Randall R. Opening the black box: Presenting a model for evaluating organizational-level interventions. European Journal of Work and Organizational Psychology. 2013; 22(5): 601-617.
28. Bonell C, Fletcher A, Morton M, Lorenc T, Moore L. Realist randomised controlled trials: A new approach to evaluating complex public health interventions. Social Science & Medicine. 2012; 75(12): 2299.
29. Seligman MEP. Learned Helplessness. Annual Review of Medicine. 1972; 23(1): 407-412.
30. Schelvis RMC, Decreasing work stress in teachers (Doctoral dissertation). 2017, VU Amsterdam
31. Bensing JM, Verheul W. The silent healer: The role of communication in placebo effects. Patient Education and Counseling. 2010; 80(3): 293.
32. Nielsen KM, Noblet A. Organizational interventions: Where we are, where we go from here? . In Nielsen K, Noblet A. Organizational interventions for health and well-being: A handbook for evidence-based practice: Routledge; 1-22, 2018.
33. Allen TD, Eby LT, Conley KM, Williamson RL, Mancini VS, Mitchell ME. What Do We Really Know About the Effects of Mindfulness-Based Training in the Workplace? Industrial and Organizational Psychology-Perspectives on Science and Practice. 2015; 8(4): 652.
34. Jamieson SD, Tuckey MR. Mindfulness interventions in the workplace: A critique of the current state of the literature. Journal of Occupational Health Psychology. 2017; 22(2): 180-193.
35. Schaufeli WB, Taris TW. A Critical Review of the Job Demands-Resources Model: Implications for Improving Work and Health. Bridging Occupational, Organizational & Public Health. 2014: 43-68.
36. Demerouti E, Bakker AB, de Jonge J, Janssen PPM, Schaufeli WB. Burnout and engagement at work as a function of demands and control. Scandinavian Journal of Work, Environment & Health. 2001; 27(4): 279-286.
37. Hobfoll SE. Conservation of resources: a new attempt at conceptualizing stress. The American Psychologist. 1989; 44(3): 513.
38. Bakker AB, Xanthopoulou D, Demerouti E. How does chronic burnout affect dealing with weekly job demands? A test of central propositions in JD-R and COR-theories. Applied Psychology. 2023; 72(1): 389.

39. Hobfoll SE, Shirom A. Conservation of resources theory: applications to stress and management in the workplace. In Golembiewski RT. Handbook of Organization behavior 57-81, 2000.
40. Westman M, Hobfoll SE, Chen S, Davidson OB, Laski S. Organizational stress through the lens of Conservation of Resources (COR) theory. In Perrewé PL, Ganster DC. Exploring interpersonal dynamics.: Elsevier Science/JAI Press; 167-220, 2005.
41. Douwes M, Hooftman W. Arbobalans 2018: Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of working conditions 2018. Quality of work, impacts and measures in the Netherlands] (Dutch). 2019, Leiden: TNO.
42. Dannefer D. Aging as Intracohort Differentiation: Accentuation, the Matthew Effect, and the Life Course. Sociological Forum. 1987; 2(2): 211-236.
43. Merton RK. The Matthew Effect in Science, II: Cumulative Advantage and the Symbolism of Intellectual Property. Isis. 1988; 79(4): 606-623.
44. O'Rand AM. The precious and the precocious: understanding cumulative disadvantage and cumulative advantage over the life course. The Gerontologist. 1996; 36(2): 230.
45. Hobfoll SE. Conservation of resource caravans and engaged settings. Journal of Occupational and Organizational Psychology. 2011; 84(1): 116.
46. Buric I, Farias M, Driessen JMA, Brazil IA. Individual differences in meditation interventions: A meta-analytic study. British Journal of Health Psychology. 2022; 27(3): 1043.
47. Li CY, Sung FC. A review of the healthy worker effect in occupational epidemiology. Occupational Medicine. 1999; 49(4): 225-229.
48. Jenny GJ, Brauchli R, Inauen A, FÜLlemann D, Fridrich A, Bauer GF. Process and outcome evaluation of an organizational-level stress management intervention in Switzerland. Health Promotion International. 2015; 30(3): 573-585.
49. Toker S, Heaney CA, Ein-Gar D. Why won't they participate? Barriers to participation in worksite health promotion programmes. European Journal of Work and Organizational Psychology. 2015; 24(6): 866-881.
50. Wasan AD, Kaptchuk TJ, Davar G, Jamison RN. The Association Between Psychopathology and Placebo Analgesia in Patients with Discogenic Low Back Pain. Pain Medicine. 2006; 7(3): 217.
51. Ter Avest MJ, Greven CU, Huijbers MJ, Wilderjans TF, Speckens AEM, Spinhoven P. Prospective associations between home practice and depressive symptoms in mindfulness-based cognitive therapy for recurrent depression: A 15 months follow-up study. Cognitive Therapy and Research. 2021; 45(2): 250-261.
52. Parsons CE, Crane C, Parsons LJ, Fjorback LO, Kuyken W. Home practice in Mindfulness-Based Cognitive Therapy and Mindfulness-Based Stress Reduction: A systematic review and meta-analysis of participants' mindfulness practice and its association with outcomes. Behaviour Research and Therapy. 2017; 95: 29.
53. Cristián Coo C, Marisa S, Susana L, Miguel B-B, David M-R, Rosa Martínez B. Differential Effects of Mindfulness-Based Intervention Programs at Work on Psychological Wellbeing and Work Engagement. Frontiers in Psychology. 2021; 12.
54. Shankland R, Tessier D, Strub L, Gauchet A, Baeyens C. Improving Mental Health and Well-Being through Informal Mindfulness Practices: An Intervention Study. Applied Psychology: Health and Well-Being. 2021; 13(1): 63.
55. Verger N, Shankland R, Strub L, Kotsou I, Leys C, Steiler D. Mindfulness-based programs, perceived stress and well-being at work: The preferential use of informal practices. European Review of Applied Psychology. 2021; 71(6).

56. Asuka S, Kotaro I, Kazuhiro W, Yumi A, Emiko A, Hisashi E, et al. What Kind of Intervention Is Effective for Improving Subjective Well-Being Among Workers? A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Frontiers in Psychology. 2020; 11.
57. Good DJ, Lyddy CJ, Glomb TM, Bono JE, Brown KW, Duffy MK, et al. Contemplating mindfulness at work: an integrative review. Journal of Management. 2016; 42(1): 114-143.
58. Islam G, Holm M, Karjalainen M. Sign of the times: Workplace mindfulness as an empty signifier. Organization. 2022; 29(1): 3-29.
59. Purser RE. McMindfulness. How mindfulness became the new capitalist spirituality. 2019: Repeater Books.
60. Badham R, King E. Mindfulness at work: A critical re-view. Organization. 2021; 28(4): 531-554.
61. Ihl A, Strunk K, Fiedler M. Interpretations of mindfulness practices in organizations: A multi-level analysis of interpretations on an organizational, group, and individual level. Organization. 2022; 29(6): 1099-1132.
62. Hülsheger UR, Feinholdt A, Nübold A. A low-dose mindfulness intervention and recovery from work: Effects on psychological detachment, sleep quality, and sleep duration. Journal of Occupational & Organizational Psychology. 2015; 88(3): 464-489.
63. Hyland T. McMindfulness in the workplace: vocational learning and the commodification of the present moment. Journal of Vocational Education & Training. 2015; 67(2): 219-234.
64. Case P, Gosling J. The spiritual organization: critical reflections on the instrumentality of workplace spirituality. Journal of Management, Spirituality & Religion. 2010; 7(4): 257-282.
65. Walsh MM, Arnold KA. The bright and dark sides of employee mindfulness: Leadership style and employee well-being. Stress and Health. 2020; 36(3): 287.
66. Cederström C, Spicer A. The wellness syndrome. 2015: Polity Press.
67. Endrissat N, Islam G, Noppeney C. Enchanting Work: New Spirits of Service Work in an Organic Supermarket. Organization Studies. 2015; 36(11): 1555-1576.
68. Purser RE. Critical perspectives on corporate mindfulness. Journal of Management, Spirituality & Religion. 2018; 15(2): 105-108.
69. van Berkel J, Meershoek A, Janssens RM, Boot CR, Proper KI, van der Beek AJ, et al. Ethical considerations of worksite health promotion: an exploration of stakeholders' views. BMC Public Health. 2014; 14(1): 458-458.
70. Venema A, Hooftman W, Fijan D, Swart C, Jansse EE. Arbobalans 2020. Kwaliteit van de arbeid, effecten en maatregelen in Nederland [Balance of Working Conditions 2020. Quality of work, impacts and measures in the Netherlands] (Dutch). 2020: TNO (Netherlands Organisation for Applied Scientific Research).
71. Habermas J. The theory of communicative action. 1984, Cambridge: Cambridge Polity Press.
72. Van der Klink JJL, Bültmann U, Burdorf A, Schaufeli WB, Zijlstra FRH, Abma FI, et al. Sustainable employability - definition, conceptualization, and implications: A perspective based on the capability approach. Scandinavian Journal of Work, Environment & Health. 2016; 42(1): 71-79.
73. Klingbeil DA, Renshaw TL. Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base. School Psychology Quarterly. 2018; 33(4): 501-511.
74. Wickström G, Bendix T. The "Hawthorne effect"--what did the original Hawthorne studies actually show? Scandinavian Journal of Work, Environment & Health. 2000; 26(4): 363-367.
75. Carmody J, Baer RA. How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. Journal of Clinical Psychology. 2009; 65(6): 627-638.

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Appendices

Summary
Samenvatting (Dutch summary)
Curriculum vitae
Dankwoord (Acknowledgements)

Summary

An increasing number of employees suffer from work stress, especially those working in health care and education. In 2019, almost one in six Dutch employees and one in five Dutch teachers mentioned stress and burnout complaints. Of all Dutch employees, health care professionals and teachers, especially teachers in secondary vocational schools, reported the highest work pressure, defined as a combination of high job demands and little professional autonomy. Many interventions are aimed to decrease work stress or teach employees to deal with it. However, the effects of these interventions on actual work stress and mental health are still largely unknown.

This thesis describes the effects of a combination of two interventions on the mental health of teachers working in secondary vocational schools: mindfulness-based stress reduction (MBSR), being a person-centred intervention and an organisational intervention aimed to influence job demands and resources.

In **Chapter 1**, I described how my personal motivation and ambition for this dissertation – largely based on almost 20 years of experience as a consultant/trainer/coach in work and health – inspired me to study the effectiveness of MBSR, being an individual-focused secondary/tertiary health intervention. I chose to combine MBSR with an additional, primary organisational health intervention because stress results from a complex interaction between environmental factors (work and personal circumstances) and the individual. Since teachers in secondary vocational schools report the highest work pressure of all Dutch employees, we chose them to be the target group in our study. After all, maintaining and improving the high quality of education in the Netherlands requires healthy teachers.

In this dissertation, we applied a conceptual (heuristic) model inspired by the Job Demands-Resources (JD-R) model because of its distinction between person (personal resources) and job characteristics (job demands and resources) and its generic applicability to work situations. Accordingly, we used the International Labour Organization's definition of work stress, which is based on the JD-R model: '... the harmful physical and emotional response caused by an imbalance between the perceived demands and the perceived resources and abilities of individuals to cope with those demands'.

The overall goal of this dissertation is to contribute to the body of scientific and practical knowledge about MBSR/mindfulness and its effects on employees' mental health and other work-related variables (e.g., work performance, personal competencies, and work-related perceptions). The first subgoal of this study is to increase scientific knowledge about the effectiveness of MBSR as an individual-focused intervention on employees' mental health (especially of teachers in secondary vocational schools) and on other work-related variables. The second subgoal is to provide insight into the additional effectiveness of a participatory, preventive organisational health intervention on individuals' mental health and other work-related variables. The third subgoal is to explore the effects of

MBSR and an additional organisational health intervention on the personal competencies of teachers in secondary vocational schools.

Based on the overall goal and the three subgoals, we formulated five research questions:

1) According to the scientific literature, what are the effects of MBSR on employees' mental health and on other work-related variables?
2) To what extent is MBSR training feasible and acceptable? What are meaningful mental health variables and other work-related variables (e.g., personal competencies) to include in a large-scale randomised controlled trial on the effects of MBSR?
3) What is an appropriate study protocol for investigating the effects of MBSR and an additional organisational health intervention on the mental health of teachers in Dutch secondary vocational schools and on other work-related variables (work performance, personal competencies, work-related perceptions)?
4) What are the effects of MBSR and an organisational health intervention on the mental health of teachers in Dutch secondary vocational schools and on other work-related variables?
    a. What are the effects of an organisational health intervention on the mental health of teachers and on other work-related variables?
    b. What are the effects of MBSR on teachers' work-related perceptions?
    c. What are the effects of MBSR on teachers' mental health?
    d. What are the effects of MBSR on teachers' work performance?
5) What are the secondary vocational schoolteachers' expectations and short- and long-term experiences with regard to mental health and personal competencies as a result of MBSR?

Chapter 2 presents the results of a systematic review wherein the effects of MBSR and mindfulness-based cognitive therapy (MBCT) on employees' mental health were investigated. Our review identified 23 studies: 22 on the effects of MBSR and one on the effects of MBSR combined with some aspects of MBCT. Of the 23 studies, two were of high methodological quality, 15 were of medium quality, and six were of low quality. We did not perform a meta-analysis due to the emergent and relatively uncharted nature of the topic, the exploratory character of this study, and the diversity of outcomes in the studies included.

We found that the strongest outcomes were reduced levels of emotional exhaustion (a dimension of burnout), stress, psychological distress, depression, anxiety, and occupational stress. Improvements were found in terms of mindfulness, personal accomplishment (being a dimension of burnout), (occupational) self-compassion, quality of sleep, and relaxation. The results of this systematic review suggest that MBSR may help to improve employees' mental functioning.

We discovered some other remarkable findings as well. Nine of the 23 studies did not measure levels of mindfulness. This is striking because measuring mindfulness is important to determine whether an MBSR programme has successfully taught people what it is designed for: becoming more mindful. Another remarkable finding is that most of the outcome measures used in those studies were focused on negative symptoms (e.g., burnout, stress level). Only a few were focused on positive symptoms (e.g., quality of sleep, work engagement), on symptoms relating to work performance, on aspects of the process, or on personal competencies (as mediating variables). Greater focus on these other measures may have been more suitable for capturing the mechanisms by which mindfulness practice leads to behavioural outcomes or to outcomes referring to work characteristics (job demands and job resources).

Chapter 3 presents the results of a pilot study evaluating the feasibility and acceptability of a MBSR training programme, the usefulness of instruments to examine positive and negative symptom-focused mental health variables, and the changes in these variables. Those variables were used to test the predictive validity of the training for health care professionals. Thirty health care professionals participated in this non-randomised pre-post intervention pilot study. They filled in a mental health questionnaire – being a combination of several existing questionnaires – twice: at baseline and post-intervention. Baseline and post-intervention differences were tested with paired samples *t*-tests and Wilcoxon signed-rank tests.

We used a five-item questionnaire to ask the participants' assessment of the training. The recruitment and retention of participants, which is quite challenging in such research designs, appeared to be successful. Participants rated the training itself as positive but rated its influence on daily life as only moderately positive. In comparison with baseline, at post-intervention, participants showed significant improvements in general mindfulness, the burnout dimension of personal accomplishment, quality of sleep, positive emotions, and self-efficacy. We observed a significant decrease in the burnout dimension of emotional exhaustion, stress levels, negative emotions at work, and worrying. No significant changes were found for the burnout dimension of mental distance or work engagement. The measures showed ample within-person differences and low, medium, or high effect sizes.

Ultimately, the current trial approach to the MBSR training seemed feasible and acceptable. Our results suggest that mindfulness, burnout, stress level, quality of sleep, positive emotions at work, negative emotions at work, self-efficacy, and worrying are meaningful mental health variables to be included in a larger-scale randomised controlled trial on the effects of MBSR.

Chapter 4 presents a study protocol for a cluster randomised controlled trial (CRCT) on MBSR, based on factors of the systematic review (Chapter 2) and the pilot study (Chapter 3). The CRCT - consisting of quantitative and qualitative components - was aimed to study the effects of MBSR and an additional organisational health intervention on the mental health and work-related perceptions of teachers in Dutch secondary

vocational schools who suffer from stress and burnout complaints. The study design made it possible to evaluate the short- and long-term effectiveness of MBSR, a person-focused intervention, both within and outside the context of an additional organisational health intervention.

The proposed study design comprised a CRCT trial to be conducted in at least three secondary vocational schools. Participating teachers are recruited from three types of courses: Care, Technology, and Economy. The allocation of groups of teachers to the intervention programme is randomised at school level. Teachers at each school – clustered at the level of the type of course - are assigned to Intervention Group 1 (IG 1), Intervention Group 2 (IG 2), or the Waiting list Group (WG). IG 1 receives a MBSR training and IG 2 receives a MBSR training combined with an additional organisational health intervention. The WG, the control group, is given the possibility to receive a MBSR training one year later.

The primary outcome variable of the proposed study was mindfulness, which is measured with the Dutch version of the Five Facet Mindfulness Questionnaire (FFMQ-NL). In the conceptual model, the effects of teachers' mindfulness resulting from the intervention programmes (MBSR training and MBSR training combined with an additional organisational health intervention) were related to salient (secondary outcome) variables: mental health outcomes (e.g., burnout, work engagement), work performance, work-related perceptions (job demands and job resources), and personal competencies (e.g., occupational self-efficacy). The data are collected before (T_0) and immediately after the MBSR training (T_1), and three (T_2) and nine months (T_3) after the training. The power analysis revealed a required sample size of 66 teachers (22 in each group).

The proposed study aims to provide insight into 1) the short- and long-term effects of MBSR on teachers' mental health, 2) the possible enhancing effects of the additional organisational health intervention, and 3) the teachers' experiences with the interventions (working mechanisms, steps in the mindfulness change process). Strengths of this study design are the use of both positive and negative outcomes, the wide range of outcomes, both outcome and process measures, longitudinal data, mixed methods, and an integrated approach. Although the proposed study protocol does not address all weaknesses of the studies in the systematic review (e.g., self-selection bias, self-reporting of data, the Hawthorne effect), it is innovative in many ways and expected to contribute to both the scientific and practical debates on how to beat work-related stress and occupational burnout, and how to enhance work engagement and work performance.

Chapter 5 presents the quantitative results of a CRCT that we conducted with 120 teachers to test the effectiveness of MBSR combined with an organisational health intervention. Based on the study protocol in Chapter 4, we recruited five Dutch secondary vocational schools to participate. For each school teachers – clustered on course level - were assigned to IG1 (MBSR), IG2 (MBSR and an organisational health intervention), or to the WG. The primary outcome variable was mindfulness. Secondary outcomes

included other mental health outcomes, work performance, personal competencies, and work-related perceptions. Using a questionnaire, data was collected before (T_0), immediately after (T_1), and three (T_2) and nine months (T_3) after the MBSR training and analysed applying repeated measures between-subjects designs.

Since we found no effects for the additional organisational health intervention, we merged the data from IG 1 and IG 2 (into one IG). We found that MBSR had positive short-term effects on the total mindfulness score, on its dimensions 'observing' and 'non-reactivity', and on the work engagement dimension 'dedication'. Long-term effects were an increase of the total mindfulness score, and its dimensions 'observing', 'non-reactivity', and on 'non-judging', and a decrease in sleep quality complaints, negative emotions, and negative work-home interaction. Teachers in the IG exhibited a larger short- and long-term decrease in organisational commitment. No significant differences were found for work performance, personal competencies, and work-related perceptions. Although teachers did not perceive a decrease in job demands after the training, they felt more mindful and lowered their organisational commitment. Their mental health improved and their dedication to work increased. These findings may suggest that enhanced mindfulness enabled them to mentally disengage from work during their leisure time, which allowed them to experience fewer symptoms of psychological strain.

Chapter 6 – the qualitative component of the CRCT described in chapter 5 - explores the study participants' prior expectations of the MBSR course and the additional health intervention. We reported on their short- and long-term experiences regarding mental health outcomes and personal competencies. Analysis of the qualitative data, collected by means of interviews at T_0, resulted in five themes that were related to prior expectations of the MBSR course. Data analysis at T_1 and T_3 resulted in ten themes regarding short- and long-term experiences with the MBSR course, four of which were the same as at T_0: one mental health outcome (stress and unpleasant feelings) and three personal competencies ('being in the present', 'taking distance', and 'recognising and changing dysfunctional patterns'). The fifth 'other' theme at T_0 was 'knowledge of mindfulness and of mindfulness skills'.

The six additional themes regarding experiences were one mental health outcome (inner calmness and pleasant feelings) and five personal competencies ('being aware', 'concentration', 'acceptance and non-judgement', 'communicating', and 'showing compassion towards yourself and others'). Our results suggest that in addition to increasing attention on substantial and educational skills in the formal curriculum, MBSR could reduce stress, increase inner calmness, and cultivate important personal competencies among teachers.

Chapter 7 starts with a critical reflection on the theoretical, methodological, and practical implications of the main findings of this dissertation, which are related to the five research questions. Next, we go into a discussion of the ethical considerations of

MBSR in a corporate setting and the main limitations of our studies. The chapter ends with suggested directions for future research.

The results of our systematic review suggest that MBSR may be a sound strategy for improving employees' mental functioning. The great diversity in mindfulness interventions in the workplace makes it difficult to compare the efficacy of all kinds of different interventions, so no firm conclusions can be drawn about the effects of specific mindfulness programmes for different groups and/or under specific conditions.

Based on the results of the systematic review and a pilot study, we decided that a CRCT with quantitative and qualitative components was the most relevant design for our study. We did not find any effects of the additional organisational health intervention. This may have been caused by suboptimal implementation.

We conclude that although the teachers' work-related perceptions did not improve after the MBSR training (they did neither perceive a significant decrease in their job demands nor an increase in their job resources), they felt more mindful and lowered their organisational commitment. Their mental health improved in the short- and long-term. These results may suggest that the enhanced mindfulness enabled them to mentally disengage from work during leisure time, which allowed them to experience fewer symptoms of psychological strain. The interventions had no significant effects on their perceived stress levels.

It seemed that the target group for our intervention(s) – teachers with the highest stress scores within the teaching population – were not part of the sample in our study. This phenomenon, in which the rich get richer and the poor get poorer, is called the Matthew effect (or accumulated advantage). In other words, those teachers who begin with an advantage (good health, time, knowledge, and coping skills) compared to their counterparts accumulate more advantages over time, and those teachers who begin with a disadvantage become more disadvantaged over time.

Since mindfulness research on employees across occupational sectors is a relatively new phenomenon, qualitative data are needed to investigate in depth whether a mindfulness intervention significantly affects personal competencies, and to capture the mechanisms by which mindfulness practice leads to mental health.

The MBSR training (and the additional organisational health intervention) required a lot of time and effort from the teachers who experienced work pressure, time pressure, and possible stress complaints. This seemed to be a barrier for participation in our studies or a reason for premature drop-out. More research is needed to determine whether a shorter version of the programme would produce the same short- and long-term effects.

There is a great need for an integrated approach to work-related stress that combines an individual-focused intervention (like MBSR) and an organisation-focused intervention. Stress is certainly not a self-imposed, private, subjective, and interior matter that employees should deal with alone. We must avoid the suggestion that individual employees are completely responsible for their experiences of work stress and for relieving

these. MBSR is one possible promising intervention, yet not a panacea for all problems and all employees.

Future research should focus on, and do justice to, the following issues:

- Determining which settings are suitable for which types of mindfulness courses. Mindfulness training needs to be implemented with care, because it cannot be assumed that it works for everyone and under all circumstances.
- Paying attention to the conditions under which an MBSR intervention takes place to reduce the Matthew effect (i.e., the rich get richer, and the poor get poorer) and the risk of drop-out (by training during working hours and with good facilities). Otherwise, MSBR training could add another stressor to the work environment.
- Determining the effects of the length of the MBSR programme and the amount of homework on the results of the training.
- Using an integrated approach that combines both an individual-focused intervention and an organisation-focused intervention, while simultaneously abiding by the determinants of successful implementation. An organisational-health intervention requires, among other things, tailoring the intervention to the organisational context, gaining serious commitment from the school's director and managers, ensuring adequate communication, engaging teachers, establishing an involved participatory group with a manager as chair, and choosing the right problems in the workplace with the possibility of quick wins.
- Determining possible gender differences and differences between technical/economical ('hard') and psychological/caring ('soft') professionals in terms of readiness to participate in MBSR training and effects on employees' mental health.

Samenvatting

Het aantal Nederlandse werknemers dat last heeft van werkstress groeit, vooral in de gezondheidszorg en het onderwijs. In 2019 gaven één op de zes Nederlandse werknemers en één op de vijf docenten aan dat ze stress en burnout klachten hadden. De hoogste werkdruk, een combinatie van hoge werkeisen en weinig professionele autonomie, komen we tegen bij zorgprofessionals en bij docenten, met name MBO-docenten. Veel interventies zijn gericht op reductie van werkstress of op het leren van docenten om beter met deze stress om te gaan. Nog grotendeels onbekend is wat de effecten van deze interventies op werkstress en mentale gezondheid zijn.

Dit proefschrift beschrijft de effecten van een combinatie van twee interventies op de mentale gezondheid van MBO-docenten: mindfulness-based stress reduction (MBSR), een persoonsgerichte interventie, en een organisatiegerichte interventie, gericht op de beïnvloeding van werkeisen en energiebronnen in het werk.

In hoofdstuk 1 beschrijf ik hoe mijn persoonlijke motivatie en ambitie voor dit proefschrift – vooral gebaseerd op mijn bijna 20-jarige werkervaring als consultant/trainer/coach op het terrein van arbeid & gezondheid – mij inspireerden om de effecten van MBSR, een persoonsgerichte (secundaire/tertiaire) gezondheidsinterventie, te onderzoeken. Ik heb ervoor gekozen om MBSR te combineren met een additionele, (primaire) organisatiegerichte gezondheidsinterventie, omdat stress immers voortkomt uit een complexe interactie van omgevingsfactoren (werk en persoonlijke omstandigheden) en de persoon. MBO-docenten zijn de doelgroep in onze studie, omdat zij de hoogste werkdruk van alle Nederlandse werknemers ervaren. Het behouden en verbeteren van de hoge kwaliteit van het Nederlandse onderwijs vereist natuurlijk gezonde docenten.

In dit proefschrift maken we gebruik van een conceptueel (heuristisch) model, gebaseerd op het Werkstressoren-EnergieBronnen (WEB) model. Dit model maakt een onderscheid tussen de persoon (persoonlijke hulpbronnen) en werkkenmerken (werkeisen en energiebronnen in het werk) en is algemeen toepasbaar in werksituaties. Verder hanteren we de definitie van werkstress van de Internationale Arbeidsorganisatie (ILO), gebaseerd op het WEB model: "… schadelijke fysieke en emotionele respons veroorzaakt door een disbalans tussen ervaren werkeisen en ervaren energiebronnen in het werk en de vaardigheden van personen om met deze werkeisen om te gaan".

Het hoofddoel van deze dissertatie is het leveren van een bijdrage aan de wetenschappelijke en praktische kennis over MBSR/mindfulness en de effecten van deze interventie op de mentale gezondheid van werknemers en op andere werk-gerelateerde variabelen (werkprestatie, persoonlijke competenties, werkkenmerken). Het eerste subdoel is het vergroten van de wetenschappelijke kennis over de effecten van MBSR, een persoonsgerichte interventie, op de mentale gezondheid van werknemers (met name MBO-docenten) en op andere werk-gerelateerde variabelen. Het tweede subdoel is het verschaffen van inzicht in de additionele effecten van een participatieve, preventieve

organisatiegerichte interventie op de mentale gezondheid van werknemers en op andere werk-gerelateerde variabelen. Het derde subdoel is het onderzoeken van de effecten van MBSR en een additionele organisatiegerichte interventie op de persoonlijke competenties van MBO-docenten.

Naar aanleiding van het hoofddoel en de drie subdoelen, formuleerden we vijf onderzoeksvragen:

1. Wat zijn volgens de wetenschappelijke literatuur de effecten van MBSR op de mentale gezondheid van werknemers en op andere werk-gerelateerde variabelen?
2. In welke mate is de MBSR training haalbaar en aanvaardbaar? Wat zijn betekenisvolle variabelen op het terrein van mentale gezondheid en andere werk-gerelateerde variabelen (zoals persoonlijke competenties), die onderzocht kunnen worden in een 'large-scale gerandomiseerde gecontroleerde trial' naar de effecten van MBSR?
3. Wat is een geschikt studieprotocol om de effecten van MBSR en een additionele, organisatiegerichte gezondheidsinterventie op de mentale gezondheid van Nederlandse MBO-docenten en op andere werk-gerelateerde variabelen (werkprestatie, persoonlijke competenties, ervaren werkkenmerken) te onderzoeken?
4. Welke effecten hebben MBSR en een organisatiegerichte gezondheidsinterventie op de mentale gezondheid van Nederlandse MBO-docenten en op andere werk-gerelateerde variabelen?
    a. Wat zijn de effecten van een organisatiegerichte gezondheidsinterventie op de mentale gezondheid van Nederlandse MBO-docenten en op andere werk-gerelateerde variabelen?
    b. Wat zijn de effecten van MBSR op de ervaren werkkenmerken van MBO-docenten?
    c. Wat zijn de effecten van MBSR op de mentale gezondheid van MBO-docenten?
    d. Wat zijn de effecten van MBSR op de werkprestatie van MBO-docenten?
5. Wat zijn de verwachtingen van MBO-docenten en de korte- en lange-termijn ervaringen op het terrein van mentale gezondheid en persoonlijke competenties met betrekking tot MBSR?

In hoofdstuk 2 staan de resultaten van een 'systematic review', waarin de effecten van MBSR en van mindfulness-based cognitieve therapie (MBCT) op de mentale gezondheid van werknemers werden onderzocht. In de review werden 23 studies geïdentificeerd: 22 rondom de effecten van MBSR en één rondom de effecten van MBSR in combinatie met sommige aspecten van MBCT. Van de 23 studies hadden twee een hoge methodologische kwaliteit, 15 hadden een gemiddelde kwaliteit en zes een lage kwaliteit. We hebben geen meta-analyse uitgevoerd, vanwege de nieuwe en relatief onbekende aard van het

onderwerp, het exploratieve karakter van deze studie en de grote diversiteit van uitkomsten in de geïncludeerde studies.

Wij ontdekten de volgende meest robuuste uitkomsten: afname van emotionele uitputting (een dimensie van burnout), (werk)stress, psychologische onrust, depressie en angst. Toenames vonden we bij mindfulness, persoonlijke prestatie (een dimensie van burnout), zelf-compassie (in het werk), slaapkwaliteit en ontspanning. De resultaten van deze systematic review suggereren dat MBSR een bijdrage kan leveren aan de mentale gezondheid van werknemers.

We ontdekten ook andere opvallende zaken. Negen van de 23 studies deden geen meting naar mindfulness. Opmerkelijk, omdat het meten van mindfulness van belang is om te bepalen of de MBSR training deelnemers succesvol leert waarvoor de training is ontworpen: het meer mindful worden. Een ander opvallend gegeven is dat de meeste uitkomstmaten in deze studies gericht zijn op negatieve symptomen, zoals burnout en stressniveau. Slechts enkele zijn gericht op positieve symptomen zoals slaapkwaliteit en bevlogenheid, op werkprestatie, op procesaspecten, of op persoonlijke competenties (als mediërende variabelen). Een grotere focus op deze variabelen is wellicht geschikter om de mechanismen te ontrafelen, waardoor het praktiseren van mindfulness resulteert in gedragsuitkomsten of in veranderingen in de ervaring van werkkenmerken (werkeisen en energiebronnen in het werk).

In hoofdstuk 3 staan de resultaten van een pilot studie naar de uitvoerbaarheid en aanvaardbaarheid van een MBSR training, de bruikbaarheid van vragenlijsten om positieve en negatieve symptoom-gerichte mentale gezondheidsvariabelen te onderzoeken, en de veranderingen in deze variabelen. Deze variabelen werden gebruikt om de predictieve validiteit van de training voor zorgprofessionals te testen. Dertig zorgprofessionals participeerden in deze niet-gerandomiseerde pre-post interventie-studie. Zij vulden op twee momenten een mentale gezondheidsvragenlijst – samengesteld uit diverse bestaande gevalideerde vragenlijsten – in: vóór (baseline) en na de training (post-intervention). De verschillen tussen de twee momenten zijn getoetst met paired samples *t*-tests en Wilcoxon signed-rank tests.

We gebruikten een vragenlijstje van vijf items om de deelnemers de training te laten beoordelen. De werving en de retentie (behoud) van de deelnemers, een hele uitdaging bij deze onderzoekdesigns, bleek succesvol. De deelnemers gaven een positief oordeel over de training, maar beoordeelden de invloed op het dagelijks leven als gemiddeld positief. In vergelijking met baseline, laten de deelnemers na de training significante verbeteringen zien in mindfulness algemeen, de burnout dimensie persoonlijke prestatie, slaapkwaliteit, positieve emoties en geloof in eigen kunnen. We zagen een significante afname in de burnout dimensie emotionele uitputting, stressniveau, negatieve emoties op het werk en piekeren. In de burnout dimensie mentale afstand en bevlogenheid vonden we geen significante veranderingen. De metingen lieten veel 'within-person' verschillen zien met lage, medium of hoge effectgrootte (= maat voor praktische betekenis of significantie).

De huidige opzet van de MBSR training en het gebruik van de vragenlijst lijken uitvoerbaar en aanvaardbaar. Onze resultaten suggereren dat mindfulness, burnout, stressniveau, slaapkwaliteit, positieve en negatieve emoties op het werk, geloof in eigen kunnen en piekeren betekenisvolle mentale gezondheidsvariabelen zijn, die geïncludeerd kunnen worden in een large-scale gerandomiseerde gecontroleerde trial met betrekking tot de effecten van MBSR.

Hoofdstuk 4 presenteert een studie protocol voor een cluster gerandomiseerde gecontroleerde trial (CRCT) voor MBSR, gebaseerd op factoren in de systematic review (hoofdstuk 2) en op de pilot studie (hoofdstuk 3). De doelstelling van de CRCT – bestaande uit kwantitatieve en kwalitatieve componenten - was het onderzoeken van de effecten van MBSR en een additionele, organisatiegerichte gezondheidsinterventie op de mentale gezondheid en op de ervaren werkkenmerken (werkeisen en energiebronnen in het werk) van MBO-docenten, die last hebben van stress en burnout klachten. De studie-opzet gaf de mogelijkheid om de korte- en lange-termijn effecten van MBSR, een persoonsgerichte interventie, te onderzoeken, al dan niet in samenhang met een additionele, organisatiegerichte gezondheidsinterventie.

De voorgestelde onderzoeksopzet bestaat uit een CRCT trial, die in tenminste drie ROC's wordt uitgevoerd. De deelnemende docenten worden geworven binnen drie opleidingen: Gezondheidszorg, Techniek en Economie. Bij iedere school worden de docenten, geclusterd per opleiding, at random toegewezen aan één van de twee interventies - InterventieGroep 1 (IG1) en InterventieGroep 2 (IG2) - of aan de WachtlijstGroep (WG). IG1 krijgt een MBSR training, IG2 een MBSR training gecombineerd met een additionele, organisatiegerichte gezondheidsinterventie. WG, de controlegroep, krijgt over één jaar de mogelijkheid om een MBSR training te volgen.

De primaire uitkomstvariabele van de geplande studie is mindfulness, gemeten met de Nederlandse versie van de Five Facet Mindfulness Questionnaire (FFMQ-NL). In het conceptuele model wordt het mindfulness-niveau van de docenten, een gevolg van de twee interventie-programma's (MBSR of MBSR in combinatie met een organisatiegerichte interventie), gekoppeld aan belangrijke secundaire uitkomstvariabelen: mentale gezondheidsuitkomsten (zoals burnout en bevlogenheid), werkprestatie, ervaren werkkenmerken (werkeisen en energiebronnen in het werk) en persoonlijke competenties (zoals geloof in eigen kunnen op het werk). Data wordt verzameld vóór (T_0), direct na de training (T_1), en drie (T_2) en negen maanden (T_3) na de training. De power-analyse liet zien dat de minimale steekproef bestaat uit 66 MBO-docenten (22 in elke groep).

Het geplande onderzoek wil inzicht geven in 1) de korte-termijn en lange-termijn effecten van MBSR op de mentale gezondheid van docenten, 2) de mogelijk versterkende effecten van een additionele, organisatiegerichte gezondheidsinterventie, en 3) de ervaringen van de docenten met de interventies (werkzame mechanismen; stappen in het veranderproces van mindfulness). De kracht van deze onderzoeksopzet bestaat uit het gebruik van zowel positieve als negatieve uitkomsten, de brede reikwijdte

van de uitkomsten, zowel uitkomstmaten als procesmaten, longitudinale data, zowel kwantitatieve als kwalitatieve componenten en een geïntegreerde benadering. Ondanks het gegeven dat deze onderzoeksopzet niet alle beperkingen van de studies in de systematic review adresseert (zoals zelfselectie bias, zelfrapportage van data, het Hawthorne effect), is het innovatief in verschillende opzichten en wordt verwacht dat het onderzoek kan bijdragen aan de wetenschappelijke en praktische debatten hoe om te gaan met werkstress en burnout, en hoe bevlogenheid en werkprestatie kunnen worden gestimuleerd.

Hoofdstuk 5 presenteert de kwantitatieve resultaten van een CRCT, die we uitvoerden onder 120 docenten om de effectiviteit van MBSR in combinatie met een organisatiegerichte gezondheidsinterventie te onderzoeken. Gebaseerd op het studie protocol in hoofdstuk 4, zijn vijf Nederlandse ROC's geworven. Per ROC werden de docenten geclusterd op opleidingsniveau toegewezen aan IG1 (MBSR), IG2 (MBSR en een organisatiegerichte gezondheidsinterventie) of aan WG. De primaire uitkomstvariabele was mindfulness. Secundaire uitkomstvariabelen waren mentale gezondheidsuitkomsten, werkprestatie, persoonlijke competenties en ervaren werkkenmerken. Met behulp van een vragenlijst werd data verzameld vóór (T_0), direct na (T_1), en 3 (T_2) en 5 maanden (T_3) na de MBSR training en geanalyseerd aan de hand van 'herhaalde metingen met between-subjects designs'.

We hebben de data van IG1 en IG2 samengevoegd in één IG, omdat de additionele, organisatiegerichte interventie geen effecten liet zien. We ontdekten dat MBSR positieve korte-termijn effecten heeft op de totale mindfulness score, op de mindfulness dimensies 'observeren' en 'niet-reageren' en op de bevlogenheidsdimensie 'toewijding'. Lange-termijn effecten waren een toename op de totale mindfulness score en op de mindfulness dimensies 'observeren', 'niet-reageren' en 'niet-oordelen' en een afname van slaapklachten, negatieve emoties en negatieve werk-thuis interactie. Docenten in de IG lieten een korte- én lange-termijn afname zien in betrokkenheid bij de organisatie. Voor werkprestatie, persoonlijke competenties en ervaren werkkenmerken (werkeisen en energiebronnen in het werk) zijn geen verschillen gevonden. Hoewel ROC-docenten geen afname in ervaring van de werkeisen na de training ervaarden, voelden zij zich meer mindful en hadden ze een lagere betrokkenheid bij de organisatie. Hun mentale gezondheid verbeterde en de toewijding bij het werk was gegroeid. Deze bevindingen suggereren dat de toename van het mindfulness niveau docenten de mogelijkheid biedt om mentaal afstand te nemen van het werk in hun vrije tijd, waardoor ze minder symptomen van psychologische druk ervaren.

Hoofdstuk 6 – het kwalitatieve deel van de CRCT die staat beschreven in hoofdstuk 5 - exploreert de verwachtingen van de deelnemers van de MBSR training en van de additionele, organisatiegerichte interventie. De korte-termijn en de lange-termijn ervaringen betreffende de mentale gezondheid en de persoonlijke competenties worden gerapporteerd. Analyse van de kwalitatieve data, via interviews verzameld op T_0, resulteerde in vijf thema's betreffende de verwachtingen van de MBSR training.

Data-analyse op T_1 en T_3 resulteerde in tien thema's betreffende korte- en lange-termijn ervaringen met de MBSR training, waarvan vier overeenkomen met de thema's op T_0: een mentale gezondheidsuitkomst (stress en onplezierige gevoelens) en drie persoonlijke competenties ('in het nu zijn', 'afstand nemen' en 'herkennen en veranderen van dysfunctionele patronen'). Het vijfde 'andere' thema op T_0 was 'kennis van mindfulness en van mindfulness vaardigheden'.

De zes additionele thema's betreffende ervaringen waren één mentale gezondheidsuitkomst (innerlijke kalmte en plezierige gevoelens) en vijf persoonlijke competenties ('bewust zijn', 'concentratie', 'acceptatie en niet-oordelen', 'communiceren' en 'het tonen van compassie naar jezelf en anderen'). De resultaten suggereren dat als aanvulling op de groeiende aandacht voor inhoudelijke en educatieve vaardigheden in het formele curriculum voor MBO-docenten, MBSR stress kan reduceren, innerlijke kalmte kan doen toenemen en belangrijke persoonlijke of mindfulness/pro-sociale competenties van MBO-docenten kan bevorderen.

Hoofdstuk 7 start met een kritisch reflectie op de theoretische, methodologische en praktische implicaties van de belangrijkste bevindingen in dit proefschrift, die gekoppeld zijn aan de vijf onderzoeksvragen. Vervolgens besteden we aandacht aan de ethische bespiegelingen van MBSR in een corporate setting en de belangrijkste beperkingen van onze studies. Het hoofdstuk eindigt met suggesties voor toekomstig onderzoek.

De resultaten van de systematic review suggereren dat MBSR een gedegen strategie is om de mentale gezondheid van werknemers te verbeteren. De grote diversiteit in mindfulness interventies op de werkplek maakt het erg lastig om de effectiviteit van de verschillende interventies te vergelijken. Er kunnen dus geen stevige conclusies worden getrokken over de effecten van de specifieke mindfulness programma's voor verschillende doelgroepen en/of onder specifieke condities.

Op basis van de resultaten van de systematic review en de pilot studie, kwamen we tot de conclusie dat een CRCT met kwantitatieve en kwalitatieve componenten het meest relevante design was voor ons onderzoek. We vonden geen effecten van de additionele, organisatiegerichte interventie. Suboptimale implementatie zou de oorzaak kunnen zijn.

We concluderen dat ondanks het gegeven dat de ervaren werkkenmerken van de docenten niet verbeterden na de MBSR training (zij ervaarden geen significante afname in hun ervaren werkeisen noch een significante toename in hun energiebronnen op het werk), de docenten zich toch meer mindful voelden en dat hun betrokkenheid bij de organisatie afnam. Zowel op de korte-termijn als op de lange-termijn verbeterde hun mentale gezondheid. Deze resultaten suggereren dat het toegenomen mindfulness niveau hen in staat stelde om mentaal afstand te nemen van het werk in hun vrije tijd, waardoor ze minder psychologische druk ervaarden. De interventies hadden geen significant effect op de waargenomen stress-levels.

Het lijkt erop dat de doelgroep van onze interventies – docenten met de hoogste stress-scores binnen de docentenpopulatie – geen deel uitmaakten van de steekproef in

dit onderzoek. Dit verschijnsel, 'in which the rich get richer and the poor get poorer', noemen we het Matthew effect (of 'accumulated advantage'). Met andere woorden, de docenten die in het voordeel zijn (goede gezondheid; meer tijd; meer kennis; meer coping-vaardigheden) in vergelijking met andere docenten, vergaren weer meer voordelen in de loop van de tijd, en de docenten, die starten met een achterstand, staan na verloop van tijd nog meer op achterstand.

Aangezien mindfulness-onderzoek onder werknemers over de sectoren heen een relatief nieuw verschijnsel is, zijn kwalitatieve data nodig om diepgaand te onderzoeken of een mindfulness interventie een significant effect heeft op persoonlijke competenties en om de mechanismes te ontrafelen waardoor het praktiseren van mindfulness leidt tot mentale gezondheid.

De MBSR training (en de additionele, organisatiegerichte gezondheidsinterventie) vroeg veel tijd en een grote inspanning van de MBO-docenten, die last hadden van werkdruk, tijdsdruk en stressklachten. Dit leek een barrière om deel te nemen aan ons onderzoek of een reden voor vroegtijdige drop-out. Meer onderzoek is nodig om te bepalen of een kortere versie van het MBSR programma dezelfde korte-termijn en lange-termijn resultaten oplevert.

Er is een grote behoefte aan een geïntegreerde benadering van werkstress, waarbij een persoonsgerichte interventie zoals MBSR gecombineerd wordt met een organisatie-gerichte interventie. Stress is zeker geen zelfopgelegde, subjectieve privé-zaak, die werknemers maar zelf moeten oplossen. De suggestie dat individuele werknemers volkomen verantwoordelijk zijn voor de eigen ervaringen van werkstress en voor het verlichten hiervan moet worden vermeden. MBSR is één mogelijke, veel belovende interventie, maar zeker geen panacee voor alle problemen en voor alle werknemers.

Toekomstig onderzoek dient de focus te leggen op en recht te doen aan de volgende thema's:

- Vaststellen welke situaties geschikt zijn voor welk type mindfulness interventie. Mindfulness training vraagt om een zorgvuldige implementatie, omdat we er niet vanuit kunnen gaan dat het voor iedereen werkt onder alle omstandigheden.
- Aandacht geven aan de voorwaarden waaronder de MBSR interventie plaatsvindt om het Matthew effect ('the rich get richer, and the poor get poorer') te reduceren en het risico op drop-out (door de training in werktijd te geven en met goede faciliteiten). Indien dat niet gebeurt, kan de MBSR training een extra stressor zijn in de werkomgeving.
- Vaststellen van de effecten van de omvang van het MBSR programma en de hoeveelheid huiswerk op de trainingsresultaten.
- Toepassen van een geïntegreerde benadering, die een persoonsgerichte en organisatiegerichte benadering combineert, en tegelijkertijd oog heeft voor de determinanten van een succesvolle implementatie. Een organisatiegerichte gezondheidsinterventie vereist onder andere maatwerk in de organisatiecontext,

commitment van het bestuur en management van de school, adequate communicatie, betrokken docenten, een actieve participatieve werkgroep met een manager als voorzitter en de keuze van de juiste problemen in de werksituatie met de mogelijkheid tot 'quick wins'.

- Vaststellen van mogelijke genderverschillen en verschillen tussen technische/economische ('hard') en psychologisch/zorg ('soft') professionals met betrekking tot de bereidheid tot participatie in de MBSR training en effecten op de mentale gezondheid van medewerkers.

Curriculum Vitae

Math. Janssen (Nederweert, 18-07-1958) groeide op tussen de bomen. Zijn vader was boomkweker. Na het gymnasium startte hij met biologie (tot kandidaats), om die studie vervolgens te verruilen voor sociale en arbeid- & organisatiepsychologie aan de Katholieke Universiteit Nijmegen. Na zijn studie volgde hij nog diverse opleidingen, waaronder een opleiding tot trainer en verschillende coaching opleidingen, waaronder de Rationeel-Emotieve Training/ therapie (RET) en de ZelfKennisMethode (ZKM) van prof. Hubert Hermans. Op het Centrum voor Mindfulness van Jon Kabat-Zinn in de VS volgde hij de opleiding voor mindfulness trainer.
De aandacht voor de relatie tussen arbeid & (mentale) gezondheid is een rode draad in zijn werkzame leven. Hij werkte onder andere bij de FNV en Schouten & Nelissen. Momenteel is hij binnen de HAN University of Applied Sciences werkzaam bij een deeltijdbachelor Management in de Zorg (MiZ) als hoofddocent en mandaathouder HR, en is hij lid van de kenniskring van het lectoraat Arbeid & Gezondheid.

Math woont samen met Marieke en heeft twee studerende kinderen, Kas en Mira.

Dankwoord

"It's not stress that kills us, it's our reaction to it."
Hans Selye **(grondlegger van de eerste wetenschappelijke stress-theorie)**

Een proefschrift schrijf je niet alleen. Een heel scala van mensen heeft hieraan de afgelopen jaren een bijdrage geleverd. Die wil ik graag allemaal bedanken op deze plaats, een aantal met naam en toenaam.

De promotie begeleidingsgroep

Beate van der Heijden, mijn promotor. Tijdens onze eerste kennismaking had ik meteen het idee 'dat komt goed'. Vriendelijk, open, betrokken, zeer hard werkend, inhoudelijk goed. Zeer secuur in jouw commentaar. Al jouw track changes heb ik aandachtig verwerkt. Opbeurend in de periodes dat het soms tegen zat; stimuleren om door te gaan.

Yvonne Heerkens, copromotor en feitelijk mijn 'dagelijks' begeleider. Rots in de branding. Sommige mensen zijn bepalend voor het realiseren van mijn promotie. Jij hoort daar absoluut bij. Niks was jou te veel. Je ging met emeritaat, maakt uitstapjes en verre reizen, en in de tussentijd voorzie je in Patagonië mijn stukken van commentaar. Eindeloos heb je me geholpen met het coderen van talloze transcripten, gaf je suggesties, voerden we discussies, redigeerde je teksten met oog voor punten en komma's. Ik heb erg veel van jou geleerd.

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Hubert Korzilius, copromotor. Jij bent later aangesloten, omdat methodologische ondersteuning onontbeerlijk bleek. Ik ben erg dankbaar voor jouw methodologische en statistische input, een solide basis voor mijn onderzoek. Ik keek ook altijd uit naar jouw commentaar dat de kwaliteit van de artikelen zeer ten goede kwam.

Pascale Peters, copromotor. Creatief, bevlogen, inspirerend, theorie-gedreven. Andere gezichtspunten, nieuwe perspectieven liet je zien. Je nodigde me uit om die toe te passen en daarmee de artikelen te verrijken.

Josephine Engels, copromotor. Dank dat ik welkom was in de kenniskring van het lectoraat Arbeid & Gezondheid. Je hebt menig abstract en artikel doorgespit in verband met het review artikel. En samen met Yvonne gezocht naar financiering.

Co-auteur

Wietske Kuijer. Jij bent bij het eerste artikel, de systematic review, nauw betrokken geweest. Veel abstracts en artikelen hebben we samen beoordeeld. Dank daarvoor!

Andere 'ondersteuners'

Manfred te Grotenhuis (2018 overleden), statisticus en socioloog. Jij gaf in 2016 op aansprekende wijze het vak 'multiple regressie-analyse'. Theorie en voorbeelden koppelde je moeiteloos aan elkaar. Jij hebt mij te midden van die jonge studenten weer over de SPSS-drempel geholpen ('10 schermen tegelijkertijd open laten staan') en mij uitgedaagd om aan het tentamen deel te nemen. Dat tentamen ging erg goed en was belangrijk voor mijn zelfvertrouwen. Dank daarvoor!

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Thomas Pelgrim, informatiespecialist HAN Studiecentra. Direct na de publicatie van ons systematic review kwam jij bij de HAN werken en wilde je graag met mij jouw commentaar op het review artikel bespreken. Ik had er aanvankelijk weinig zin in, omdat ik het beschouwde als 'mosterd na de maaltijd'. Ons gesprek pakte totaal anders uit. Jij gaf zeer zinvolle feedback, onder andere op onze zoekstring, waar ik enthousiast van werd.

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Manuscriptcommissie en promotiecommissie

Prof. Inge Bleijenbergh, voorzitter van de manuscriptcommissie. Heel fijn dat u op het laatste moment het voorzitterschip op u wilde nemen.

Ook heel veel dank voor de andere leden van de manuscriptcommissie: **Prof. Sabine Geurts, Prof. Ute Hülsheger, Dr. Harald Miedema en Prof. Wilmar Schaufeli.**

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Mindfulness trainers en begeleider van de organisatiegerichte gezondheidsinterventie

Ted, Wendy en Simone, ik wil jullie als mindfulness trainers van harte bedanken voor jullie tomeloze inzet onder soms wat uitdagende omstandigheden.

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Riki en **Otto,** jullie zijn twee belangrijke mensen in mijn leven. Ik ben blij dat jullie mijn paranimfen willen zijn. **Riki**, mijn oudste zus, samen opgegroeid en studententijd gedeeld. Een levenslange, innige verbondenheid. **Otto**, ontmoet in studententijd en vanaf dat moment een warme, duurzame vriendschap. Otto, letterlijk en figuurlijk hebben we, samen met Berry en Marieke, al een heel levenspad afgelegd.

Jaap, de intensiteit van onze wandelingen kan binnenkort toenemen. Al te vaak moest ik in het verleden aangeven: "Geen tijd. Binnenkort wel. Oh nee, toch niet. ……!

Richard, Toine, Jorke, dank voor de heerlijke fietstochten de afgelopen maanden. Het hielp me weer over de drempel en ik kon weer genieten van samen op de racefiets. Mindfulness bij anderen onderzoeken is gemakkelijker dan mindful omgaan met mijn eigen verlies van gezondheid.

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Marieke, een promotietraject van je partner is zeker niet alleen een feest. En dan druk ik me eufemistisch uit. Het onderzoeksonderwerp mindfulness leidt niet vanzelfsprekend tot een mindful houding bij de onderzoeker, je partner. Soms integendeel. Dus dat vroeg nogal wat van jouw draagkracht. Maar goed, jij stimuleerde me en haalde me over om met dit promotietraject te starten, terwijl ik lange tijd mijn twijfels had. Je geloofde echt dat ik dit traject op een goede manier kon afronden en hebt me van harte gesteund. Al heb je tussendoor daar wellicht soms spijt van gehad. Ik heb wel de belofte gedaan dat er meer ruimte, vrije tijd komt voor ons.

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Kas en Mira, jullie, die mij – samen met Marieke - het meest dierbaar zijn, hebben de meeste last van mijn promotiedruk gehad: weinig tijd, vaak vermoeid, humeurig, kortaf, wat chagrijnig. Fysiek aanwezig, maar mentaal vaak afwezig. Tjonge, hoe mindful! Knap dat jullie dit doorstaan hebben. Of jullie hierna nog ooit willen promoveren weet ik niet.

"To let go is not to adjust everything to my desires, but to take each day as it comes and to cherish the moment.
To let go is not to criticize and regulate anyone, but to try to become what I dream I can be."

Fragment uit het gedicht *Letting go* van *Nelson Mandela.*