Mindfulness practice improves managers' job demands-resources, psychological detachment, work-nonwork boundary control, and work-life balance – a randomized controlled trial

Received 29 July 2021
Revised 15 November 2021
29 December 2021
9 February 2022
Accepted 28 February 2022

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Abstract

Purpose – Contemporary workplaces undergo frequent reorganizations in order to stay competitive in a working life characterized by globalization, digitalization, economic uncertainty, and ever-increased complexity. Managers are in the frontline of these challenges, leading themselves, organizations and their employees in high stress environments. This raises questions on how to support managers' work-life sustainability, which is crucial for organizational sustainability. Mindfulness has been related to enhanced capacities to cope with challenges that are associated with organizational change. The authors evaluated short- and long-term effects of an eight-week mindfulness-based intervention in a company setting, which was going through reorganization.

Design/methodology/approach – Forty managers (42.5% males), mean age 54.53 (SD 5.13), were randomized to the mindfulness intervention or a non-active wait-list control. Self-report data were provided on individual sustainability factors in a work context: job demands and resources, psychological detachment, i.e. possibilities for letting go of work-related thoughts during leisure, control over work-nonwork boundaries, work-life balance, and mindfulness at baseline, postintervention, and at 6-month follow-up.

Findings – Linear mixed models (LMMs) analysis (all ps < 0.005 to 0.05) showed that the intervention group had a larger decrease in job demands and a smaller decrease in job resources, a larger increase in psychological detachment, work-nonwork boundary control, work-life balance, and mindfulness from baseline to postintervention when compared with the reference group. These initial effects were sustained at 6-month follow-up.

Originality/value – The study provides evidence that mindfulness practice can enhance managers' long-term capacity to cope with challenging working conditions, and increase their work-life sustainability in times of organizational change and disruption.

Keywords Boundary management, Follow-up, JD-R model, Organizational change, Sustainable development
Paper type Research paper

Funding: This research was funded by NordForsk (no: 74809).

International Journal of Workplace Health Management
Vol. 15 No. 4, 2022
pp. 493-514
Emerald Publishing Limited
1753-8351
DOI 10.1108/IJWHM-07-2021-0146

Introduction

Contemporary working life is characterized by globalization, digitalization, economic uncertainty, and ever-increased complexity (Mack and Khare, 2016). Corporations undergo frequent reorganizations with a focus on improvement, in order to stay competitive (Sikdar and Payyazhi, 2014). Such reorganizations most often regard costs, management, and decision making (van Hoek *et al.*, 2010). However, organizational change has also been associated with increased stress (Wisse and Sleebos, 2016), turnover, and reduced organizational performance (Rusly *et al.*, 2012). Managers are in the frontline of these challenges (Nielsen and Daniels, 2012) leading themselves, organizations and their employees in complex, high-stress environments. These conditions entail psychosocial demands, which may increase risks for burnout and ill-health (Campbell Quick and Henderson, 2016), and subsequent productivity loss and societal costs due to increased sickness absenteeism (Schmidt *et al.*, 2019). In Sweden, between 2014 and 2019, there has been a sharp, five-fold increase in managers' long-term sickness absenteeism due to stress-related psychological ill-health, resulting from increased work demands and decreased control over work-nonwork boundaries (Previa, 2019). These developments raise questions on how to improve managers' work-life outcomes, which are crucial for individual, organizational, and societal sustainability.

Sustainability in a work context has been defined as being able to meet work demands without putting one's future health and participation in working life at risk (Carayon, 2006). Within the emerging field of the psychology of sustainability and sustainable development, a focus has been placed upon how organizations can work in more healthy ways, nurture the health and motivation of their employees (Manuti and Giancaspro, 2019), and focus on the management of change and skills (Stern, 2021). The role of managers in this context, beyond their own work-life sustainability, is vital for sustainable leadership and human resource practices that will have an impact on the organization (Manzoor *et al.*, 2019). In this respect, positive relational-leadership approaches (Iqbal *et al.*, 2020), have been put forth as dynamic ways in which managers may create alignment with the human resource management of their organizations. According to a recent study, managers' sustainability may be promoted through the training of soft skills, such as improved interpersonal skills and stress management (Katic *et al.*, 2019). In this context, a previous review study (Avili and Dent, 2015) showed that mindfulness facilitates individual and organizational cognition so that they become more able to efficiently meet the challenges, complexities and uncertainties associated with organizational change.

The present study aimed to contribute to existing literature by investigating short- and long-term work-life sustainability effects of a mindfulness-based intervention targeted at managers during reorganization.

Theoretical background

The job demands-resources (JD-R) model (Demerouti *et al.*, 2001) postulates that psychosocial work characteristics, in terms of job demands and resources, have implications for work-related outcomes through two processes (Bakker *et al.*, 2005). These include the health impairment process, which implies that high job demands predict stress and burnout, and the motivational process, which implies that high job resources predict work engagement – energy and mental resilience, enthusiasm and absorption in work. Work stress has consistently been found to increase due to job demands, i.e. aspects of work that require sustained mental, physical or emotional exertion (Demerouti *et al.*, 2001). Job resources, on the other hand, defined as the physical, psychological, social or organizational aspects of work that enable the achievement of work goals, reduce work demands, stimulate growth, learning, and development (Demerouti *et al.*, 2001), have been associated with the fulfilment of psychological needs and buffer the impact of job demands on burnout (Bakker *et al.*, 2005). For

instance, job resources have been shown to weaken the association between job demands and burnout by facilitating efficient and healthy coping with job demands (Lesener *et al.*, 2019). The JD-R model has recently been extended to include personal resources such as optimism, self-efficacy and resilience, where an increase of these resources has been found to improve wellbeing and job performance (Lupsa *et al.*, 2019).

Taken together, high job demands may lead to negative health consequences, but resources may buffer the impact of job demands on ill-health. Time off work, that usually occurs during off-work hours, weekends and holidays, is crucial to enable recovery from increased stress-load that has built up during work (de Bloom *et al.*, 2009). However, work-related stress may interfere with the potential to unwind during leisure (de Bloom *et al.*, 2009) and lead to prolonged stress and poor health (McEwen, 1998).

The mechanism underlying difficulties to unwind involves an inability to "switch off" work-related thoughts and emotions during leisure time (Kompier *et al.*, 2012), i.e. poor psychological detachment. In contrast, not being occupied with work-related thoughts during leisure provides opportunities to relax and build up resources (Sonnentag *et al.*, 2010). Psychological detachment is a key factor for sufficient recovery from the effort expended during work (Sonnentag, 2018), and earlier studies indicate that psychological detachment may prevent prolonged physiological activation (Brosschot *et al.*, 2006), and negative load reactions from one working day spilling over into the next day (Geurts and Sonnentag, 2006), therefore further promoting sufficient rest and recovery (Sonnentag, 2018; Sonnentag *et al.*, 2010).

Psychological detachment has also been shown to promote work-life balance (Althammer *et al.*, 2021; Hamilton Skurak *et al.*, 2018). Work-life balance, i.e. a balance between the demands of work and non-work (Haar, 2013), is vital for health and wellbeing (OECD, 2013), whereas work-life conflict, i.e. incompatibility between work- and non-work demands (Greenhaus and Beutell, 1985), has serious consequences for stress-related ill-health (Borgmann *et al.*, 2019). In this context, managers in Sweden have been found to be a group that is specifically at risk for not being able to unwind during leisure time, i.e. having poor psychological detachment (Swedish Work Environment Authority, 2016).

In this respect, individuals' management of the boundaries between work- and non-work (Ashforth *et al.*, 2000; Kossek *et al.*, 2012), and especially their psychological interpretations of control over their work-non-work boundary environment (Kossek *et al.*, 2012), have been associated with increased psychological detachment (Mellner, 2016), as well as decreased work-life conflict (Chen *et al.*, 2009; Kossek *et al.*, 2012) and improved work-life balance (Mellner *et al.*, 2014).

Although a large body of previous research has identified risk factors for work stress and related ill-health, there is yet limited research on the positive antecedents that can reduce managers' work-place stress and improve their psychological resources. One potential key mechanism for improved psychological resources is mindfulness (Bergin and Pakenham, 2016; Bränström and Duncan, 2014; Roche *et al.*, 2014). Mindfulness has been defined as enhanced, receptive attention to, and awareness of the present moment, without evaluation, judgment or cognitive filters (Brown *et al.*, 2007). Also, mindfulness entails the capacity to step back from one's present moment experience, and therefore enables an increased understanding of the interplay between one's thoughts, emotions and behaviors (Brown *et al.*, 2007).

Mindfulness has a long tradition in the East originating from the Buddhist psychology tradition concerning teachings on how the mind, emotions and consciousness works (Rapgay and Bystrisky, 2009). Mindfulness has become increasingly popular in the West due to the growing use of scientifically developed and standardised Mindfulness-Based Programs (MBP). In addition to traditional mindfulness practice, these programs include contemporary psychological practice, with the aim to improve psychological health and wellbeing. One of the most evaluated and adopted programs is Mindfulness-Based Stress Reduction (MBSR) which was developed for people with chronic health problems and those suffering from

psychological and emotional stress (Kabat-Zinn, 1982, 2005). The MBSR-training aims to enable participants to explore habitual physical, emotional and cognitive patterns of reacting, and to make a radical shift in their relationship to their thoughts, feelings, and body sensations, as well as to outer circumstances (Crane *et al.*, 2017). At its core, MBSR is based on experiential learning, and participants learn about and practice different forms of mindfulness, including practices of yoga, sitting meditation, body scan, and walking meditation as well as mindful breathing, eating, speaking and listening, and mindfulness of daily activities (Kabat-Zinn *et al.*, 2017). The MBSR-program also include psychoeducational components about the function of the cognitive attentional networks, the neurobiological basis for emotions, and the neurobiological response to stress and relaxation (Kabat-Zinn *et al.*, 2017).

With regard to effects of single components of MBSR, Sauer-Zavala *et al.* (2013) compared yoga, sitting meditation, and body scan among undergraduate students. Findings showed that yoga was related to greater increases in psychological wellbeing as compared to the other two practices; both yoga and sitting meditation were related to greater decreases in difficulties with emotion regulation than body scan; and sitting meditation was related to greater increases in nonevaluation of observed stimuli than body scan. In another study among undergraduate students, Kropp and Sedlmeier (2019) compared effects of body scan, mindful breathing, and loving kindness meditation. It was shown that body scan had greater effects on self-compassion, emotion regulation and experience, and life satisfaction than mindful breathing, whereas loving kindness meditation had a stronger effect on concentration than mindful breathing. A study among veterans with post-traumatic stress disorder (PTSD) and depression examining body scan and mindful breathing showed that both practices similarly reduced PTSD symptoms and depression (Colgan *et al.*, 2016).

When comparing the overall MBSR-program with a passive control, a recent review and meta-analysis of studies conducted in nonclinical samples (Querstret *et al.*, 2020) showed that MBSR significantly reduced symptoms of depression, anxiety, distress, worry, and stress, as well as significantly improved wellbeing. Other MBPs, based upon the foundational approach and structure of MBSR, have since been developed with particular aims across a broad range of settings, including hospitals (Botha *et al.*, 2015), for expectant couples (Lönnberg *et al.*, 2020), sustainability (Mellner *et al.*, 2021; Wamsler *et al.*, 2021), and schools (Laundy *et al.*, 2021), with adapted curriculum elements and tailored to these specific contexts and populations. In the past decades, studies investigating MBPs have increased steadily (Crane *et al.*, 2017), and meta-analyses have demonstrated the efficacy of these programs for a wide array of outcomes including stress, anxiety, depressive symptoms, and distress (Creswell, 2017; Khoury *et al.*, 2015, Virgili, 2015).

Adding to this knowledge, mindfulness practice has recently been associated with increased prosocial characteristics (Donald *et al.*, 2019), and cognitive flexibility (Marais *et al.*, 2020). The increased ability to accept the way things are in each moment, i.e. cognitive flexibility, has also been shown to be crucial for the impact of mindfulness practice on stress biology (Lindsay *et al.*, 2018). In addition, mindfulness has been proposed to lead to changes in self-processing through the development of self-awareness, self-regulation and prosocial characteristics (Vago andand Silbersweig, 2012). This has been supported by neurocognitive studies pointing to that mechanisms implicated in mindfulness practice involve attention control, self-awareness, and emotion-regulation (Jha *et al.*, 2010; Tang *et al.*, 2015). In particular, positive changes from mindfulness practice have been demonstrated in locations of the brain that are associated to the functions of emotion-regulation, self-referential processing and perspective-taking (Hölzel *et al.*, 2010), all of which are important for emotional intelligence.

Emotional intelligence refers to multiple capabilities including both intrapersonal and interpersonal intelligence in terms of knowing and handling one's own, but also others' emotions (Rezyani and Khosravi, 2019). Emotional intelligence has been proposed to be characterized by the four domains: (1) self-awareness; (2) self-management; (3) social awareness;

(4) and social skills that are adopted at appropriate times and in sufficient frequency to be effective in the situation at hand (Goleman *et al.*, 2013; Rezyani and Khosravi, 2019).

Based on a consolidation of the empirical studies of mindfulness programs, Hölzel *et al.* (2011) have proposed a framework to describe the mechanisms by which mindfulness practice carries positive impacts. This framework proposes that there are four main mechanisms of mindfulness: (1) attention regulation; (2) body awareness; (3) emotion regulation and (4) change in one's perspective of self. Bränström and Duncan (2014) have added further evidence supporting this model, suggesting that mindfulness practice contributes to a modification of attention and an increased ability to adjust cognitions. This in turn contributes to decreased negative affect and increased positive affect (Bränström and Duncan, 2014). Furthermore, a meta-analysis of empirical studies assessing which mechanisms mediate the positive impact of mindfulness interventions on clinical outcomes showed: strong evidence for the role of decreased cognitive and emotional reactivity, respectively, in mediating the positive effects of mindfulness practice; moderate evidence for the role of increased mindfulness as well as decreased rumination and worry, respectively, in mediating the positive effects of mindfulness practice; and preliminary but insufficient evidence for the role of increased self-compassion and psychological flexibility, respectively, in mediating the positive effects of mindfulness practice (Gu *et al.*, 2015).

More recently, studies assessing the applications of mindfulness practice in working life have been emerging (Baminiwatta and Solangaarachchi, 2021). In this context, mindfulness has been proposed as a key personal resource within the JD-R model (Bakker and de Vries, 2021), as it may enhance self-efficacy in managing negative emotions related to job demands (Liu *et al.*, 2021), reduce work stress (Grover *et al.*, 2017), as well as improving emotional intelligence (Cotler *et al.*, 2017) and proactive behavior (Bakker and de Vries, 2021), which may help individuals to recognize and regulate their fatigue in an effective way (Bakker and de Vries, 2021).

Moreover, Wolever *et al.* (2012) have shown that mindfulness (delivered in a randomized controlled study at the workplace) compared with a control group showed significantly greater improvements on perceived stress, sleep quality, and autonomic functioning. In another randomized controlled study (McConachie *et al.*, 2014), the effectiveness of a mindfulness-based stress management workshop on psychological distress and well-being was examined. Significantly greater reductions in distress were seen in the intervention group compared with control group and thought suppression decreased over time in the intervention group only.

By using self-report measures of mindfulness, but not applying any intervention, Dane and Brummel (2013) found that work mindfulness was associated with better job performance and lower turnover intention, and Malinowski and Lim (2015) showed that self-reported mindfulness predicted work engagement and general well-being. These relationships were furthermore mediated by e.g. positive job-related affect and hope, optimism, resiliency, and self-efficacy.

Finally, Johnson *et al.* (2020) conducted an integrative literature review and found that mindfulness-based training can be an effective intervention for organizations to improve mental health, wellbeing and performance among employees, based on studies at both the individual, workplace, group and organizational levels. They concluded that in order to improve personal and professional growth and performance, leaders and managers should consider incorporating mindfulness-related practices as part of their professional development training for employees at all levels.

Aim

Although there has been a sharp increase of intervention studies of mindfulness among employees within different work-place environments, randomized controlled studies with longer follow-up periods are still limited (Vonderlin *et al.*, 2020). Moreover, studies

investigating the impact of mindfulness practice on workplace-specific outcomes are largely missing (Lomas *et al.*, 2017). Furthermore, the few studies that have targeted managers, although indicating that mindfulness practice may improve their wellbeing and resilience, vary greatly in quality and strength (Donaldson-Feilder *et al.*, 2019). Also, these earlier studies did not explore whether increased mindfulness was the mechanism through which other outcomes were obtained (Donaldson-Feilder *et al.*, 2019). Taken together, further studies are needed in order to evaluate whether the associations previously found can be attributed to mindfulness practice and whether they are sustained after the training, and consequently, whether mindfulness practice can be considered a promising avenue for enhancing managers' work-life sustainability.

Therefore, the aim of this study was to evaluate short- and long-term effects of a mindfulness-based intervention targeted at managers in a company setting undergoing a reorganization. Moreover, we investigated if mindfulness practice also led to a change in the level of mindfulness. Specifically, we hypothesized that the intervention would lead to decreased job demands, and increased job resources, psychological detachment, work-nonwork boundary control, work-life balance, and mindfulness.

Method

The study was approved by the regional ethics committee in Stockholm (dnr 2016/167-31/5).

Procedure and participants

The principal investigator (PI) and first author of the present study contacted the HR-department at a large Swedish telecom company active at the global market, presented the study aim and invited the company to participate. An initial information meeting about the study was then held with top-level management at the headquarters, after which the company accepted to participate. Next, top-level management at the headquarters delivered lists to the HR-department with e-mail addresses of the managers working at their respective units. The HR-department then distributed an e-mail to a random selection of one hundred managers with an invitation from the PI to participate in the study. A total of sixty managers volunteered to participate in the study. As the study was designed to include forty managers in total, due to that the intervention group format included a maximum of twenty participants, the inclusion criteria was that the participating managers should be present at work during the intervention period in order to be able to part-take in the intervention if they would be allocated to the intervention group. From the forty included managers, a final randomization into the intervention and reference group, respectively, was made by the HR-department. The randomizations were conducted by using an online tool for research studies: www.random.org.

The PI and all researchers/co-authors of the present study were blinded to the group allocation.

Approximately at the same time as the start of the intervention, the participating company initiated a reorganization including budget cuts, merging and/or reorganization of business units, and laying off 3,000 of its employees in Sweden, nearly twenty percent of its local workforce.

An information meeting about the study was held about one month before the intervention, when the participants were not yet allocated to the study groups. All participants were given the exact same information about the study at this meeting. This information regarded that the intervention was an eight-week mindfulness-based training program. However, no detailed explanations on mindfulness, including potential mechanisms and expected effects, were given. Information also concerned that there would be a random selection of participants to the intervention group and reference group, respectively. Moreover, information was given that the managers allocated to the reference group would be

able to undergo the mindfulness program after the finalization of the study, i.e. after the 6-month follow-up.

Information on group allocation was given about a week after the meeting. At this time, three of the managers who had been allocated to the mindfulness intervention needed to change to the reference group due to newly scheduled and unforeseen business trips during the intervention period. Thus, they changed place with another three managers who were originally allocated to the reference group, which were included in the intervention group instead. As such, there was not a complete randomization of study participants to the two groups.

All participants responded anonymously to a web-questionnaire one week prior to the start of the intervention, one day after the intervention ended, and finally, six months after the intervention ended. The responses from each participant were linked across all three data collections. Two reminders were sent via anonymous email to all participants after two weeks and after one month, respectively.

Statistical power was calculated based on mean scores of mindfulness at postintervention.

In the study sample (see Table 1), there were no significant differences between the intervention group and the reference group in sociodemographic background factors or in

	Intervention	Reference	Condition comparisons	*df*	*p*
Gender	*(n, %)*	*(n, %)*	$X^2 = 0.902$	2	0.637
Male	8 (40)	9 (45)			
Female	12 (60)	11 (55)			
Age	*(Mean, SD)*	*(Mean, SD)*	$t = 2.352$	34	0.025
	47.33 (5.73)	43.61 (3.50)			
Marital status	*(n, %)*	*(n, %)*	$X^2 = 1.200$	2	0.549
Single	2 (10)	3 (15)			
Married/co-habiting	17 (85)	17 (85)			
In a relationship	1 (5)				
Children at home	*(n, %)*	*(n, %)*	$X^2 = 0.364$	1	0.546
Yes	16 (89)	17 (94)			
No	2 (11)	1 (6)			
Education	*(n, %)*	*(n, %)*	$X^2 = 1.032$	2	0.597
College	1 (6)	–			
University <3 years	2 (11)	2 (11)			
University >3 years	15 (83)	16 (89)			
Managerial position	*(n, %)*	*(n, %)*	$X^2 = 3.340$	3	0.342
Department manager	7 (35)	8 (40)			
Group manager	11 (55)	8 (40)			
Expert manager	1 (5)	4 (20)			
Other	1 (5)				
Managerial responsibilities	*(n, %)*	*(n, %)*			
Budget	13 (65)	15 (75)	$X^2 = 0.476$	1	0.490
Operations	18 (90)	17 (85)	$X^2 = 0.229$	1	0.633
Staff	19 (95)	19 (95)	$X^2 = 0.000$	1	1.000
Weekly work hours	*(Mean, SD)*	*(Mean, SD)*	$t = 0.29$	37	0.773
	45 (5.99)	44 (5.23)			
	Intervention	Reference	Condition comparisons	*df*	*p*
Previous meditative practice	*(n, %)*	*(n, %)*	$X^2 = 2.500$	1	0.114
Yes	6 (30)	2 (10)			
No	14 (70)	18 (90)			

Note(s): Presented with frequencies (*n*), percentages (%), means and standard deviations (SD); *t* tests, and Chi-square tests were performed

Table 1. Socio-economic background characteristics and previous meditative practice for the intervention and reference group, respectively ($N = 40$)

previous mindfulness/meditation experience. The exception was for age, such that the intervention group was significantly older than the reference group ($t = 2.35$, df 34, $p < 0.025$). There was an even gender distribution in the sample and a majority lived with a partner, had children in the household, was highly educated, held either a department or group managerial position, and had budget, operative as well as staff responsibilities. A majority had no previous experience of mindfulness/meditative practice. The intervention group reported significantly lower baseline scores on job demands ($t = 2.09$, df 34, $p < 0.044$), resources ($t = -2.22$, df 34, $p < 0.032$), and work-nonwork boundary control ($t = -2.72$, df 34, $p < 0.010$) than the reference group. No significant differences were found between completers and dropouts on socioeconomic background factors and outcome scores at the baseline assessment. At the 6-month follow-up 38.2% of the managers reported no changes in their managerial position during the past six months, 41.2% reported changes in terms of increased responsibility, 2.9% reported changes in terms of decreased responsibility, and 17.6% reported changes in terms of no longer holding a managerial position. Moreover, 39.3% of the managers reported that during the past six months there had been a reduction in staff for which they were responsible, whereas 60.7% reported that there had not been any reduction in staff for which they were responsible. There were no significant differences between the intervention group and the reference group with regard to whether there had been any changes in their managerial position during the past six months ($t = -0.316$, df 32, $p < 0.754$) or with regard to whether the reorganization had resulted in a reduction of staff for which the managers were responsible ($t = 0.374$, df 26, $p < 0.712$).

Intervention

The mindfulness-based program in the present study consisted of the evidence-based Mindfulness-Based Stress Reduction program (MBSR) (Kabat-Zinn, 1982, 2005; Querstret *et al.*, 2020), an eight-week structured group format including weekly 2.5-h group sessions. The program followed the MBSR curriculum (for detailed program curriculum, see Kabat-Zinn *et al.*, 2017), with the exception of a one day retreat as this was not possible within the participants' working hours.

MBSR was combined with emotional intelligence practices (Goleman *et al.*, 2013) based on Google's Search Inside Yourself program (SIY) (Tan, 2012). The original two-day SIY program was developed specifically for teaching workplace mindfulness and emotional intelligence skills as a way to enhance compassionate leadership skills, and increase personal fulfillment, empathy, motivation and efficiency in the workplace. The program builds on the premise that positive changes in individuals, lead to positive relationships as well as positive approaches to work-related change processes (Tan, 2012). The focus is on attention training (cognition), self-knowledge and self-mastery (emotion) with the aim of creating mental habits that are useful for developing trust and productive collaborations. A recent study (Caporale-Berkowitz *et al.*, 2021) showed that the SIY-program increased mindfulness and the "awareness of emotion" components of emotional intelligence, but not the "management of emotion" components.

The mindfulness-based program in the present study was chosen as it is tailored for managers in a workplace setting. This specific program has been developed by a Swedish mindfulness company with more than ten years of experience in facilitating mindfulness programs in work organizations. The program was delivered by one of the mindfulness company's trainers certified within the MBSR-program and the SIY-program, respectively, and with more than ten years of personal mindfulness practice, experience in facilitating mindfulness programs and handling group processes in work organizations, and had a previous professional background as a company manager.

Participants were provided with app-based audio recordings ranging between five and forty five minutes in length, and were encouraged to practice daily in between the weekly

program sessions, starting with the shorter mindfulness/meditation practices at the beginning of the program and continuing with the longer ones as the program progressed. The participants were also encouraged to practice mindfulness informally in their daily life, including mindful listening and speaking, a minute of silence before meetings, mindful eating, and noticing experiences. There was no pronounced encouragement to continue the mindfulness training after the intervention program ended.

The reference group was on a waiting list, and was enrolled into the program after the entire intervention period, i.e. when all three data collections were completed.

Measures

Job demands were measured by a 5-item scale developed specifically for managers' work conditions (Berntson *et al.*, 2012; Stengård *et al.*, 2013). The items were rated on a 4-point Likert scale, higher ratings indicated higher level of job demands. Example item: " There are conflicts between administrative work, service development, and in employee contact" (baseline $\alpha = 0.86$).

Job resources were measured by a 6-item scale developed specifically for managers' work conditions (Berntson *et al.*, 2012; Stengård *et al.*, 2013). The items were rated on a 4-point Likert scale, higher ratings indicated a lower level of job resources. Example item: "Your operation does not have the resources to cope with peak loads". The items were reversed such that higher ratings indicated a higher level of job resources (baseline $\alpha = 0.85$).

Psychological detachment was measured by four items from the Recovery Experience Questionnaire (Sonnentag and Fritz, 2007). The items were rated on a 5-point Likert scale (1 Strongly disagree; 5 Strongly agree). Example item: "When I come home I can easily relax and 'switch off' from work" The items were reversed when needed such that higher ratings indicated good possibilities for psychological detachment (baseline $\alpha = 0.85$).

Work-nonwork boundary control was measured by three items from the Work Life Indicator (Kossek *et al.*, 2012). Responses were made on a 5-point Likert scale (1 Not agree at all; 5 Totally agree). Example item: "I control whether I keep my work and personal life separated" (baseline $\alpha = 0.83$).

Work-life balance was measured by a 3-item scale (Haar, 2013). Responses were made on a 5-point Likert scale (1 Strongly disagree; 5 Strongly agree). Example item: "I manage to balance the demands of my work and personal life well" (baseline $\alpha = 0.91$).

Mindfulness was measured by the Swedish validated version (Lilja *et al.*, 2011) of the 39-item version of the Five Facet Mindfulness Questionnaire, FFMQ (Baer *et al.*, 2006). The facet Observing was however excluded as it has been found to not be a component of the confirmed overall mindfulness construct (Baer *et al.*, 2006). Thus, the four facets Describing, Acting with Awareness, Non-judging, and Non-reactivity were included in the present study.

Respondents were asked to rate their experience of the included statements in general. Responses were made on a 5-point Likert scale (1 Never or very rarely true; 5 Very often or always true). Example item: "When I have distressing thoughts or images I am able just to notice them without reacting". The items were reversed when needed to indicate a high level of overall mindfulness (baseline $\alpha = 0.88$).

Program feasibility and acceptance. At postintervention, managers allocated to the mindfulness intervention provided information on their completion of the program, and how often they had been practicing mindfulness during the intervention period (1 daily; 2 a couple of times per week; 3 a couple of times per month; 4 not at all). At the 6-month follow-up, they indicated how often they had been practicing mindfulness since the program ended (1 daily; 2 a couple of times per week; 3 a couple of times per month; 4 not at all).

Effects of the reorganization on managerial position was measured at the 6-month follow-up, where all respondents provided information on whether their managerial position had changed during the past six months (1 no; 2 yes, my position now includes increased

responsibility; 3 yes, my position now includes decreased responsibility; 4 yes, I no longer hold a managerial position), and whether the reorganization had resulted in reduction of staff for which the managers were responsible (1 yes; 2 no). There was, however, no information as to whether there had been an increase of staff for which the managers were responsible.

Data analyses

We adopted an intention-to-treat approach and conducted linear mixed model (LMM) analyses to assess differences between the intervention and reference groups at postintervention and at 6-month follow-up. The LMM minimizes information loss due to missing data by using all available data points (Hesser, 2015). As method of estimation, maximum likelihood was used. The parameters of main interest were the fixed effects interaction terms between group and time, as to describe whether managers in the two groups would show differences in change in the outcome variables over time. The "Variance Components" was chosen as covariance structure by fitting models with competing covariance structures and choosing the best fitting model. A model was run with the outcome variables: job demands, job resources, psychological detachment, work-nonwork boundary control, work-life balance, and mindfulness, one at a time, with time; group; group × time interaction.

In order to accommodate for nonlinear change over time, the difference in change over time was studied between two distinct time periods, i.e. change between baseline and postintervention; and change between postintervention and 6-month follow-up. Hence, a piecewise growth model with two time-pieces was constructed: the first time period represented changes from baseline to postintervention (time-piece 1); and the second time period represented changes from postintervention to the 6-month follow-up (time-piece 2). Moreover, in order to investigate the difference in change over time between the groups, the interaction terms for all time-pieces, i.e. group × time-piece 1; and group × time-piece 2, were included.

We explored whether there were any differences in change over time as a function of continued mindfulness practice during the follow-up period by performing additional subgroup analyses among the managers allocated to the mindfulness program. In this analysis, the same piecewise growth model as above was run. Continued mindfulness practice was tested as a continuous variable.

Results

Correlations between the outcome variables at baseline and postintervention, respectively, are shown in Table 2.

Means and standard errors (SE) of scores on the outcome variables for the two groups at baseline, postintervention and 6-month follow-up are presented in Table 3.

The first model which included all time points showed a significant change over time in psychological detachment ($F = 26.86$, $p < 0.000$), work-life balance ($F = 9.66$, $p < 0.000$), and mindfulness ($F = 9.83$, $p < 0.000$). Significant interaction effects between group × time emerged for job demands ($F = 11.50$, $p < 0.000$), psychological detachment ($F = 4.74$, $p < 0.012$), work-life balance ($F = 4.92$, $p < 0.010$), and mindfulness ($F = 5.85$, $p < 0.005$).

The test of group differences pre-to postintervention, and postintervention to 6-month follow-up, was conducted with the piece-wise growth model.

For job demands, there was a significant group × time interaction ($F = 5.59$, $p < 0.012$) from baseline to postintervention showing a larger decrease in job demands in the intervention group than in the reference group. From postintervention to the 6-month follow-up there was no significant change in job demands scores ($F = 0.26$, $p < 0.615$), and no

Baseline Variable	1	2	3	4	5	6
1. *JD*	1					
2. *JR*	−0.37*	1				
3. *PD*	−0.27	0.28	1			
4. *BC*	−0.40*	0.45**	0.46**	1		
5. *WLB*	−0.55**	0.33*	0.50**	0.56**	1	
6. *MF*	−46**	0.45**	0.14	0.32*	0.34*	1
Postintervention Variable	**1**	**2**	**3**	**4**	**5**	**6**
1. *JD*	1					
2. *JR*	−0.33*	1				
3. *PD*	−0.03	0.20	1			
4. *BC*	−0.41*	0.24	0.12	1		
5. *WLB*	−0.25	0.35*	0.56**	0.30	1	
6. *MF*	−33*	0.37*	0.60**	0.15	0.33*	1

Note(s): *JD* Job demands; *JR* Job resources; *PD* Psychological detachment; *BC* Boundary control; *WLB* Work-life balance; *MF* Mindfulness
*$p < 0.05$, **$p < 0.01$

Table 2. Bivariate correlations at baseline and postintervention, respectively ($N = 40$)

Variable	Interv. $n = 20$ ref. $n = 20$ Baseline mean (SE)		Interv. $n = 20$ ref. $n = 19$ Postintervention mean (SE)		Interv. $n = 18$ ref. $n = 18$ 6-months follow-up mean (SE)	
JD	3.27 (0.14)	2.84 (0.14)	2.89 (0.13)	2.98 (0.13)	3.05 (0.15)	2.93 (0.15)
JR	2.42 (0.13)	2.85 (0.13)	2.54 (0.12)	2.74 (0.12)	2.39 (0.14)	2.59 (0.14)
PD	2.21 (0.23)	2.40 (0.23)	3.22 (0.22)	2.84 (0.22)	3.16 (0.20)	2.91 (0.20)
BC	3.06 (0.21)	3.94 (0.22)	3.71 (0.18)	3.87 (0.19)	3.55 (0.16)	4.06 (0.17)
WLB	2.92 (0.21)	3.53 (0.21)	3.75 (0.18)	3.65 (0.18)	3.51 (0.17)	3.67 (0.17)
MF	3.18 (0.11)	3.49 (0.11)	3.70 (0.12)	3.51 (0.12)	3.69 (0.11)	3.50 (0.11)

Note(s): *JD* Job demands; *JR* Job resources; *PD* Psychological detachment; *BC* Boundary control; *WLB* Work-life balance; *MF* Mindfulness

Table 3. Means and standard errors of outcome measures at the three points-in-time for the intervention (Interv.) and reference (Ref.) group, respectively

significant group × time interaction ($F = 0.82$, $p < 0.457$). This indicated that the decrease in job demands in the intervention group was sustained at the 6-month follow-up.

For job resources, there was a significant group × time interaction ($F = 3.48$, $p < 0.047$) from baseline to postintervention showing a smaller decrease in job resources in the intervention group than in the reference group. From postintervention to the 6-month follow-up there was no significant change in job resources scores ($F = 1.47$, $p < 0.238$), and no significant group × time interaction ($F = 0.73$, $p < 0.492$). Hence, the smaller decrease in job resources in the intervention group remained at the 6-month follow-up.

For psychological detachment, there was a significant group × time interaction ($F = 5.62$, $p < 0.006$) showing a larger increase in psychological detachment in the intervention group than in the reference group. From postintervention to the 6-month follow-up, there was no significant change in psychological detachment scores ($F = 0.01$, $p < 0.909$), and no significant group × time interaction ($F = 0.23$, $p < 0.798$). As such, the increase in psychological detachment in the intervention group was sustained at the 6-month follow-up.

For work-nonwork boundary control, there was a significant group × time interaction ($F = 3.96$, $p < 0.027$) showing a larger increase in boundary control in the intervention group than in the reference group. From postintervention to the 6-month follow-up, there was no significant change in boundary control scores ($F = 0.10$, $p < 0.757$), and no significant group × time interaction ($F = 3.26$, $p < 0.069$). Thus, the increase in boundary control in the intervention group remained at the 6-month follow-up.

For work-life balance, there was a significant group × time interaction ($F = 6.54$, $p < 0.003$) showing a larger increase in work-life balance in the intervention group than in the reference group. From postintervention to the 6-month follow-up there was no significant change in work-life balance scores ($F = 0.87$, $p < 0.353$), and no significant group × time interaction ($F = 0.48$, $p < 0.619$). Hence, the improved work-life balance in the intervention group remained at the 6-month follow-up.

Finally, for mindfulness there was a significant group × time interaction ($F = 3.58$, $p < 0.049$) showing a larger increase in mindfulness in the intervention group than in the reference group. From postintervention to the 6-month follow-up there was no significant change in mindfulness scores ($F = 0.02$, $p < 0.889$), and no significant group × time interaction ($F = 1.51$, $p < 0.256$). As such, the increase in mindfulness in the intervention group was sustained at the 6-month follow-up.

Regarding continued mindfulness practice, there was from baseline to postintervention a significant dosage effect of the reported amount of practice on job demands ($F = 5.56$, $p < 0.013$) such that more frequent mindfulness practice led to a larger decrease in job demands.

From postintervention to the 6-month follow-up there was no significant dosage effect of the reported amount of practice on any of the outcome variables.

At the 6-month follow-up there were eighteen participants in each group. Thus, two managers in each group dropped out between postintervention and the 6-month follow-up, as they had left the organization during that time period. Hence, attrition rate (10%) was smaller than attrition rates usually found in studies on mindfulness interventions (mean 15%, Vøllestad *et al.*, 2012).

Discussion

We evaluated short- and long-term effects of a mindfulness-based intervention among managers in a company setting going through a reorganization. In line with the majority of our hypotheses, participation in the intervention showed a larger decrease in job demands and, not the expected increase, but at least a smaller decrease in job resources, as well as increased psychological detachment, work-nonwork boundary control, and work-life balance as compared to the reference group. These effects were sustained over time indicating that participation in the intervention led to long-term improvement in all the outcomes. The finding of increased levels of mindfulness and that this increase was sustained over time, is in line with previous studies where participants in MBSR-programs were more mindful at the end of the treatment and that gains were even higher at the last follow-up (Khoury *et al.*, 2015).

In the present study, the intervention group reported significantly lower baseline scores on job demands, resources, and work-nonwork boundary control than the reference group. However, they "catched up" with the reference group over time. This could be interpreted as that they experienced more work-related stress than the reference group already before the intervention took place, and furthermore, that they benefited substantially from the intervention. This interpretation is supported by studies showing that among various target populations, those who benefited the most from mindfulness practice were those with higher initial levels of stress (Khoury *et al.*, 2015; Virgili, 2015).

The increase in psychological detachment in the present study is especially interesting, as it has been described as a crucial factor for recovery from work, that prevents prolonged physiological activation (Brosschot *et al.*, 2006) and negative load reactions from one working day spilling over into the next day, thus enabling sufficient rest and recovery (Sonnentag, 2018; Sonnentag *et al.*, 2010) as well as promoting work-life balance (Althammer *et al.*, 2021; Hamilton Skurak *et al.*, 2018). One potential explanation for our finding that mindfulness practice can increase psychological detachment may be that psychological detachment is also closely related to psychological flexibility. This concept includes components of mindfulness and acceptance of one's experiences, that has been shown to be a mechanism of change in intervention studies (Ciarrochi *et al.*, 2010). This line of reasoning is supported by the parallel increase in mindfulness in the present study which points towards a more fundamental deep-level change, that has been found to be crucial in earlier research (Singh *et al.*, 2016).

Taken together, our findings support that participation in the intervention strengthened managers' capacity to cope with challenging working conditions and increased their work-life sustainability in a time of organizational change and disruption. As such, in line with the JD-R model (Demerouti *et al.*, 2001), mindfulness can be regarded as a key personal resource, where previous studies have shown that mindfulness practice can enhance self-efficacy in managing negative emotions related to high job demands (Liu *et al.*, 2021), reduce work stress (Grover *et al.*, 2017) and improve emotional intelligence (Cotler *et al.*, 2017) and proactive behavior (Bakker and de Vries, 2021), which can aid in recognizing and regulating one's fatigue in an effective way (Bakker and de Vries, 2021). The findings of the present study are highly important as studies on the impact of mindfulness practice on workplace-specific outcomes are scarce (Lomas *et al.*, 2017).

Hence, the results of the current study provide additional specific knowledge about how a mindfulness-based intervention impacts in a beneficial way on job characteristics and psychological measures among managers (Rupprecht *et al.*, 2019), that have not been covered by e.g. recent reviews of mindfulness-based interventions in the workplace, where focus has mainly been on wellbeing and stress (Donaldson-Feilder *et al.*, 2019; Vonderlin *et al.*, 2020; Johnson *et al.*, 2020). Also, in earlier intervention studies, follow-up times most often have been shorter, and there has been considerable heterogeneity regarding settings, populations, content and delivery of interventions, and study designs, that limit generalizability.

Strengths, limitations and future directions

The present intervention study included healthy participants and was carried out within the work context of their day-to-day activities. As such, the study has high external validity as the findings are applicable to similar organizational contexts. Moreover, validated measures were used and the PI and all researchers/co-authors were blinded regarding the intervention/control conditions. Furthermore, this study responds to calls for mindfulness interventions with facilitators with long training and personal experience, the inclusion of measures of mindfulness *per se* as well as longer follow-up periods (Gu *et al.*, 2015; Jamieson and Tuckey, 2015).

Limitations include that recruitment of participants was made by the HR-department at the participating company and selection was therefore not supervised by the research team. In addition, complete randomization was not obtained as, without the research teams knowledge, three managers allocated to the intervention group changed place with three managers allocated to the reference group before the baseline measurements. This could potentially explain that there were significant differences at the baseline measurements between the groups, since it might be the case that those managers who already had high initial stress were those who changed from the reference group to the intervention group. Furthermore, the participants attended an information meeting prior to the start of the intervention and also knew which group they had been allocated to before they filled out the

baseline assessments. As such, it cannot be ruled out that this information influenced the participants in a certain direction, as participant expectations have been put forth as explanations for the effectiveness of MBSR (Egberth and Sedlmeier, 2012). Given this, the results must be interpreted with caution. There was, moreover, no manipulation check in the baseline measurements, so no information was gathered about whether the managers felt stressed or in need of a mindfulness intervention. Furthermore, there was no information on whether the managers in the two groups were working together and/or able to talk during the intervention period, which may have impacted on the results. Also, from our study, it is not possible to draw conclusions about which components within the intervention carried the beneficial effects, since the program was studied as a whole – a so-called "black box". This is indeed a shortcoming of most of the existing trials of Mindfulness-Mased Programs (Stein and Witkiewitz, 2020; Van Dam *et al.*, 2018), even if some recent attempts have also been made to dismantle more specifically what the active components of these programs are, and have provided some initial evidence for the specific effects of mindfulness practice, when compared for example to psychoeducation (Stein and Witkiewitz, 2020).

Other limitations concern that the participants: (1) belonged to the same organization; (2) were highly educated; (3) were Swedish, all of which limit the generalizability of the findings to other populations. Moreover, the accuracy, reliability, and generalizability of the findings are limited due to the small sample size and low power. Finally, as the present study was based on self-reported measures, there is a risk that the results may be due to social desirability or priming effects.

Future research would benefit from including more methodologically rigorous studies to investigate the effectiveness of mindfulness practice as well as expectation effects in relation to intervention effectiveness. For instance, in addition to an inactive wait list group, it would be of value to have an active control group, in order to tease out the mindfulness intervention *per se* as the agent of change, beyond the effects of a supportive group atmosphere, expert instruction, and of engaging in activities that are believed to provide benefit (Van Dam *et al.*, 2018). Also, assessing transferred, second order effects of the intervention towards employees, customers etc, beyond targeted managers would be of interest (Grape Viding *et al.*, 2017; Montano *et al.*, 2017).

Practical implications

This study presents important findings on the role of mindfulness practice in enhancing positive antecedents for buffering overall work-life sustainability among managers in contemporary work organizations. Based on our findings, and in line with Johnson *et al.* (2020) and Aviles and Dent (2015), recommendations can be made for organizations to incorporate mindfulness-related practices as part of managers' professional development training, in particular during reorganizations, in order to more efficiently meet the challenges of change. Moreover, mindfulness could be introduced within organizations' overall health and wellbeing initiatives, directed to both managers and employees, e.g. in onboarding programs (Hanson *et al.*, 2020) and workshops. In addition, managers themselves could apply mindfulness practices in their everyday work, for instance between meetings, by adopting tools such as mindfulness meditation, focused attention, body scan, and mindful breath. They could also practice mindful moments during the working day in order to regather their thoughts and be present in the moment, as well as to be conscious of their choices in each moment and, when in difficult situations, they could pause without immediately reacting and/or taking action. Moreover, during meetings or in other kinds of interactions with others, managers could practice mindful listening and be sensitive to non-verbal cues as well as try to understand others before evaluating them. Also, including other levels of the organization, such as the board, and other stakeholders, in analyses of potential drivers and resistance

towards increased organizational mindfulness and improved occupational health is crucial (Lornudd *et al.*, 2020, 2021; Purser, 2018).

Given that mindfulness practice can improve various work-life outcomes among managers, our findings provide a rationale for further research on potential ripple-effects of leadership-based mindfulness interventions at the workplace level in terms of whether it impacts on key criteria related to sustainable organizational development such as interpersonal relationships, collaboration, innovation, sickness absence, and turn-over. In this respect, it is vital to emphasize that individual mindfulness is a necessary prerequisite, but not alone sufficient for organizational mindfulness to emerge, since the latter is also a function of the social procedures in an organization (Kelemen *et al.*, 2020). As mindfulness in organizations touch both individual-level and organizational-level processes, these can then iterate with one another in a cycle, and induce transformational changes not limited to the organization and its competitive context, but potentially also for broader social dynamics, including towards sustainable development (Bayle-Cordier *et al.*, 2021; Wamsler *et al.*, 2021). Therefore, we advocate the need for future research that focuses on the interplay between individual mindfulness and collective processes, relations and ways of organizing, that has recently been highlighted (Bayle-Cordier *et al.*, 2021; Reb *et al.*, 2020; Montano *et al.*, 2017; Wamsler *et al.*, 2021).

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