

Population-based approaches to mental health promotion and prevention:

Investigating a mindfulness-based intervention in workplace contexts

PhD dissertation

Emilie Hasager Bonde

Health

Aarhus University

2023

Population-based approaches to mental health promotion and prevention:

Investigating a mindfulness-based intervention in workplace contexts

PhD dissertation

Emilie Hasager Bonde

Health

Aarhus University

2023

Population-based approaches to mental health promotion and prevention:

Investigating a mindfulness-based intervention in workplace contexts

PhD dissertation

Emilie Hasager Bonde

Health

Aarhus University

Department of Clinical Medicine

Danish Center for Mindfulness

PhD student

Emilie Hasager Bonde, Department of Clinical Medicine, Danish Center for Mindfulness, Aarhus University, Aarhus, Denmark

Supervisors

Lise Juul, Associate Professor, PhD, MPH (main supervisor), Department of Clinical Medicine, Danish Center for Mindfulness, Aarhus University, Aarhus, Denmark

Eva Gemzøe Mikkelsen, Associate Professor, PhD, Work and Organizational Psychologist, Department of Psychology, University of Southern Denmark, Odense, Denmark

Lone Overby Fjorback, Associate Professor, Director, PhD, MD, Department of Clinical Medicine, Danish Center for Mindfulness, Aarhus University, Aarhus, Denmark

Assessment committee

Anette Fischer Pedersen, Associate Professor & Senior Researcher, PhD, MSc in Psychology, Department of Clinical Medicine, Aarhus University, Aarhus, Denmark & The Research Unit for General Practice, Department of Public Health, Aarhus University, Aarhus, Denmark

Niko Kohls, Professor, PhD, Dr. Habil. Med., Dipl. Psych., Department of Social Work & Health, Faculty for Applied Natural Sciences and Health, Coburg University, Coburg, Germany

Connie Timmermann, Associate Professor, PhD, MSc in Nursing, Centre for Research in Patient Communication, Odense University Hospital, Department of Clinical Research, Odense, Denmark

Financial support

The Danish Ministry of Health (Case number: 1800332)

TrygFonden (ID: 151692)

The Velliv Association (19-0506)

TABLE OF CONTENT

Acknowledgements.....	iv
Included original studies.....	vi
Abbreviations.....	vii
Preface.....	viii
Outline of this dissertation.....	ix
Chapter 1: Introduction	1
Mental health.....	2
Approaches to mental health promotion and prevention	2
Recommendations for mental health promotion and prevention in workplace contexts	4
What is mindfulness?	5
Mental health training using mindfulness	6
The influence of mindfulness on mental health.....	7
The influence of mindfulness on relations.....	7
Mindfulness-based stress reduction	8
Mindfulness in workplace contexts.....	9
Summary and research gaps.....	11
Overall aim and research objectives	12
Chapter 2: Methodology	14
Developing and evaluating complex interventions	15
SELFCARE	15
Study 1	18
Implementation of modified Mindfulness-based stress reduction in private Companies	20
Study 2	24
Study 3	26
Study 4	27
Ethical considerations.....	29
Chapter 3: Results.....	30
Study 1	31
Study 2.....	32
Study 3.....	34

Study 4.....	36
Chapter 4: Discussion of main results.....	39
Feasibility	40
Impact on intermediate outcomes	41
Impact on distal outcomes	44
Mental health outcomes.....	44
Organizational outcomes.....	45
Chapter 5: Discussion of methodology.....	48
SELFCARE	49
Implementation of modified Mindfulness-based stress reduction in private companies	50
Contextual factors.....	51
Implementation.....	51
Proposed mediators of impact.....	52
Evaluation of tendencies of change.....	53
Chapter 6: conclusions and implications for future research	56
English summary	59
Danish summary.....	62
References.....	65
Study 1	77
Study 2.....	93
Study 3.....	109
Study 4.....	123
Appendix	179
Appendix 1: Curriculum for the 10-week workplace-adapted MBSR program.....	180
Appendix 2: Pre-intervention interview guides utilized in Study 2 and Study 3.....	186
Appendix 3: Post-intervention interview guides utilized in Study 2 and Study 3.....	196

ACKNOWLEDGEMENTS

This PhD was conducted at the Danish Center for Mindfulness, Department of Clinical Medicine, Aarhus University, and commenced in 2020. However, the journey of doing this PhD started long before I made the decision to enroll as a PhD student. In reality, part of me feels like this PhD has lived in me for as long as I remember. Let me take you back to when I was a budding teenager. Living with my mom and older sister, I remember coming home one day after having had one of my friends cry on my shoulder. This was not an uncommon situation for me. In fact, this happened quite often. Still, on that particular day, I felt frustrated. Frustrated about all the heartache and the sadness, and my inability to help. But it was not only that. I was frustrated that my friends came to me. Me, yet again. Having to cope with my friends' most inner feelings, as well as my own had simply taken a toll on me. I expressed my frustration to my mom. Calm as ever, she told me that I had a special gift of making people around me feel comfortable and safe, and that one day I would learn to appreciate that gift. As I grew older, I did indeed learn to appreciate the intimate trust my friends and family offered me when sharing their personal feelings with me, fueling my strong internal motivation for helping others. However, I struggled with not placing others' hardship within myself. Fast forward to spring 2018, where I participated in a seminar at the Master's program in Public Health at Aarhus University. At the seminar, I was introduced to how mindfulness may support people being in life as it is with all the pleasant and unpleasant experiences that are an intrinsic part of life, and how this could affect the mental health. It immediately resonated.

The leader of this seminar was Lise Juul, who would later become my main supervisor. It was you, Lise, who took me under your wing and introduced me to research. Who supported me all the way from doing my internship at the Danish Center for Mindfulness, through my Master's thesis, and onto supervising my PhD. You have guided me, inspired me, taken your time, and been there through every step of this journey. For that, I am truly grateful. I also met Lone Overby Fjorback at the seminar. Lone, you continue to inspire me and others with your presence, your clear mind, and warm heart, and desire to help others. I first met Eva Gemzøe Mikkelsen during my process of applying for a PhD. Eva, you have generously shared your knowledge, listened when needed, and invited me into your group during my research stay. A kind thanks to all of my supervisors. I feel truly blessed having had the chance to learn and be inspired by three such brilliant researchers and women. Also, my colleagues at

the Danish Center for Mindfulness continue to astound me. The heartfelt care for each other, cheering, and support has enriched my life every day. Thank you to all, whom I have worked with.

A special thanks to all of the collaborators of the research projects informing this dissertation. To all the schools allowing their teachers to engage in an extensive teacher-training program, and to the teacher who chose to do so. To the private companies, who wanted to provide evidence-based mental health promotion and prevention to their employees and managers. To all company employees and managers who participated in the project. To the talented MBSR teachers who delivered numerous MBSR courses in both research projects; thank you for your thoroughness and generosity. I would also like to thank TrygFonden and the Danish Ministry of Health for financing the SELFCARE trial, and The Velliv Association for financing the “Implementation of modified Mindfulness-based stress reduction in private Companies” project, thereby making this PhD possible.

Doing a PhD has for me not just been my work. It has become part of me. I have *been* a PhD student in all aspects of my life. I would like to thank my friends for standing by me. For listening, sparring, laughing, and caring. Thank you for sharing this experience with me, for listening to my frustrations as well as my joys, and for hugs and encouragement. Lastly, my family. Thank you for always cheering me on, for your endless support, and for believing in me. Thank you for helping me find my way, when I felt lost, and for lending me your time to talk about my project. I am filled with imminence gratitude of having exactly you in my corner, rooting me on. Finally, my husband, Peter. Thank you for your patience, your love, and support. For always being by my side, holding me in hard times, celebrating with me in good times, and for being the steady mountain in my horizon. And to our children, Siri and Elias. Thank you for filling my life with love and joy every day. You are the true inspiration of my life.

Emilie Hasager Bonde, Aarhus, June 2023

INCLUDED ORIGINAL STUDIES

Study 1: Bonde E.H., Fjorback, L.O., Frydenberg, M., Juul, L. The effectiveness of mindfulness-based stress reduction for school teachers: a cluster-randomized controlled trial. *European Journal of Public Health*. 2022; 32(2): 246-253.

Study 2: Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L. Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention. *Frontiers in Psychology*. 2022;13.

Study 3: Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L. The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis. *Frontiers in Psychology*. 2022;14.

Study 4: Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L. An organizational-level mindfulness-based intervention in private workplace settings – is it feasible and what are the mental health and organizational impacts? Submitted to *Mindfulness*.

Moreover, while employed as a PhD student, I co-authored a scientific paper utilizing the same data as Study 1. This paper will however not be subjective to examination:

Juul, L., Bonde, E.H., Fjorback, L.O. Altered self-reported resting state mediates the effects of Mindfulness-based stress reduction on mental health. A longitudinal path model analysis within a community-based randomized trial with 6-months follow-up. *Frontiers in Psychology*. 2023; 14.

ABBREVIATIONS

ARSQ	Amsterdam Resting State Questionnaire
BRS	Brief Resilience Scale
CI	Confidence Interval
DCM	Danish Center for Mindfulness
EQ - Decentering	Experiences Questionnaire - Decentering
FFMQ	Five Facet Mindfulness Questionnaire
ITT	Intention To Treat
MBCT	Mindfulness-based Cognitive Therapy
MBI	Mindfulness-based intervention
MBI: TAC	Mindfulness-based Interventions: Teaching Assessment Criteria
MBSR	Mindfulness- based Stress Reduction
MRC	Medical Research Council
NICE	National Institute for Health and Care Excellence
PSS	Perceived Stress Scale
REDCap	Research Electronic Data Capture
RCT	Randomized Controlled Trial
SCL-5	Hopkins Symptom Checklist-5
SD	Standard Deviation
SELFCARE	Stress-free Everyday LiFe for Children and Adolescents Research
SF-12	Short Form-12
S-NAQ	Short Negative Acts Questionnaire
SWEMWBS	Short Warwick-Edinburgh Mental Wellbeing Scale
WHO	World Health Organization
WHO-5	WHO-5 Wellbeing Scale

PREFACE

Based on the continuous decrease of populations' mental health worldwide, there is a call for broad implementation of evidence-based mental health promoting and preventive interventions [1, 2]. It has long been suggested that such interventions ought to be implemented in everyday life settings, such as workplaces [3]. Population-based approaches [4] to the implementation of mental health promoting and preventive interventions may be a possible way of accommodating the need for broad implementation of such interventions. These approaches entail delivering interventions across the mental health continuum, irrespectively of individuals' mental health state [4]. Recently, agencies such as the World Health Organization (WHO), and National Institute for Health and Care Excellence (NICE) have issued recommendations on mental health promotion at work, including recommendations of offering mindfulness-based interventions (MBIs) to all employees and managers in workplace contexts [5, 6].

Previous research has shown MBIs to strengthen protective mental health skills, such as enhanced attentional and emotional regulation [7]. Moreover, these interventions have been found effective in improving positive mental health outcomes, such as well-being [8], as well as reducing negative mental health outcomes, e.g., perceived stress, and symptoms of depression and anxiety [9, 10]. Since the early 2000's, there has been a dramatic increase in the use of MBIs in workplace contexts [11-13], with prominent companies such as Google and IKEA offering mindfulness to employees and managers [13-15]. However, this widespread implementation may have been running ahead of the evidence [15, 16]. While MBIs in both non-workplace and workplace contexts have been found effective in improving the mental health [8-10, 17-19], less is known of the potential organizational effects of such interventions, as well as the effects among specific professions and for people employed in the private sector [12, 15, 18, 20]. Hence, there is a need for further research into these relatively less explored areas within this budding research field. Therefore, the overall aim of this dissertation was to explore the feasibility and potential impacts of delivering an MBI using population-based approaches in workplace context.

OUTLINE OF THIS DISSERTATION

To establish the basis on which this PhD project commenced, Chapter 1 introduces the research field including descriptions of both mental health, population-based approaches, and mindfulness. Moreover, Chapter 1 finishes with an introduction to the current state of the evidence of mindfulness in workplace contexts. Chapter 2 provides an overview of the scientific methods utilized in each of the four original studies of this dissertation, including study design, study population, as well as data collection and analysis. In Chapter 3, the main results of the four included studies are presented. Chapter 4 includes a review and discussion of the results from the four included studies focusing on feasibility of the interventions, as well as impact on intermediate and distal outcomes. In Chapter 5, the methodology of the included studies are discussed. Finally, the dissertation concludes with Chapter 6 including main conclusions and implications for future research.

Prior to this dissertation, an extensive amount of research has been conducted within the research field. Literature utilized in this dissertation was collected primarily through systematic literature searches in the scientific databases PsycINFO and PubMed. These searches included broad terms such as “mindfulness” and “work”, as well as more narrow terms, such as “Mindfulness-based stress reduction” or “social capital”. When feasible, MeSH terms were used. These systematic searches were supplemented by quicker, more specific searches, as well as literature searches restricted to a limited time period to identify the newest studies in the field. Moreover, “snowballing” was used to identify literature through citations in already identified relevant papers. Furthermore, keywords from known research were used in chain searches to identify more recent papers within the same field. Additionally, broad searches were conducted on websites of international organizations, such as the WHO. Literature searches informing this dissertation were carried out throughout the PhD period. Besides identifying literature through searches, relevant papers and knowledge were gathered via attendance in a journal club on complex interventions research, networking, and participation in national and international conferences on both mindfulness and public health.

All the best,

Emilie Hasager Bonde

CHAPTER 1: INTRODUCTION

In this chapter, the case for mental health promotion and prevention in workplace contexts is built. Moreover, an introduction to mindfulness and mindfulness in workplace contexts is provided. Lastly, a summary of knowledge gaps and aims for this dissertation is presented.

MENTAL HEALTH

The mental health of the World's population has been eroding throughout the past decades with severe personal, societal, and economic consequences [2]. Thus, the prevalence of people living with mental health conditions, such as depression and anxiety, have been steadily rising during the past 20 years [2]. Due to the Covid-19 pandemic, several risk factors for poor mental health were exacerbated, leading to a dramatic increase in the prevalence of people living with mental health conditions [2, 21]. In Denmark, the proportion of people with a low SF-12 mental health score rose from 13.2% to 17.4% from 2017 to 2021 [22]. Moreover, the percentage of Danes reporting a high stress level measured by Cohen's Perceived Stress Scale (PSS) increased from 25.1% in 2017 to 29.1% in 2021 [22]. Hence, there is indeed a call for action to ameliorate this development. However, mental health is not merely defined by the absence of mental health conditions or mental disorders [1, 2]. As such, the WHO defines 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*" [1]. This conceptualization includes four domains that influence our ability to; function, connect, cope, and thrive [2]. Thus, when experiencing good mental health, individuals may better connect to others, function in the daily life, cope with (adverse) events, and thrive [2]. Several factors serve as protective for individuals' mental health status. Such factors include, e.g., social and emotional skills, good physical health, social support, and positive relations [2]. Thus, providing interventions that aim at enhancing such protective mental health factors is warranted.

APPROACHES TO MENTAL HEALTH PROMOTION AND PREVENTION

According to the WHO, mental health is not a question of either or, that is, mentally healthy or mentally unhealthy. Instead, individuals' mental health status is placed along a continuum ranging from grave mental health states characterized by suffering to ideal mental health [2]. The late epidemiologist Geoffrey Rose also operated with the notion that individuals' health exists on such a continuum [4]. Based on this view, Rose proposed that two distinctive groups of preventive approaches may be utilized when implementing health promoting and preventive interventions; high-risk approaches and population-based approaches [4]. When using a high-risk approach, interventions are targeted at selected groups in high risk of any given adverse health state, such as depression, whereas population-based approaches target entire populations irrespectively of their health status, such as entire schools or workplaces [4]. Applying these approaches to mental health interventions, high-risk

approaches may yield greater impacts measured on mental health outcomes, such as self-reported symptoms of depression and anxiety, due to a large room for improvement at intervention commencement. On the other hand, population-based approaches may demonstrate smaller impacts on the same mental health outcomes, due to a generally smaller room for improvement, and thus, dilution of mental health impacts caused by individuals with a good mental health at intervention start [4]. However, the aim of population-based approaches is to evoke a shift along the mental health continuum, resulting in an overall improvement of the mental health of the entire population (Figure 1). Such a shift may promote mental health in the entire population as well as prevent individuals at moderate or low risk of adverse mental health from progressing into being at high risk. Hence, individuals are both *prevented* from transitioning to lower levels of mental health, as well as *promoted* towards higher levels of mental health.

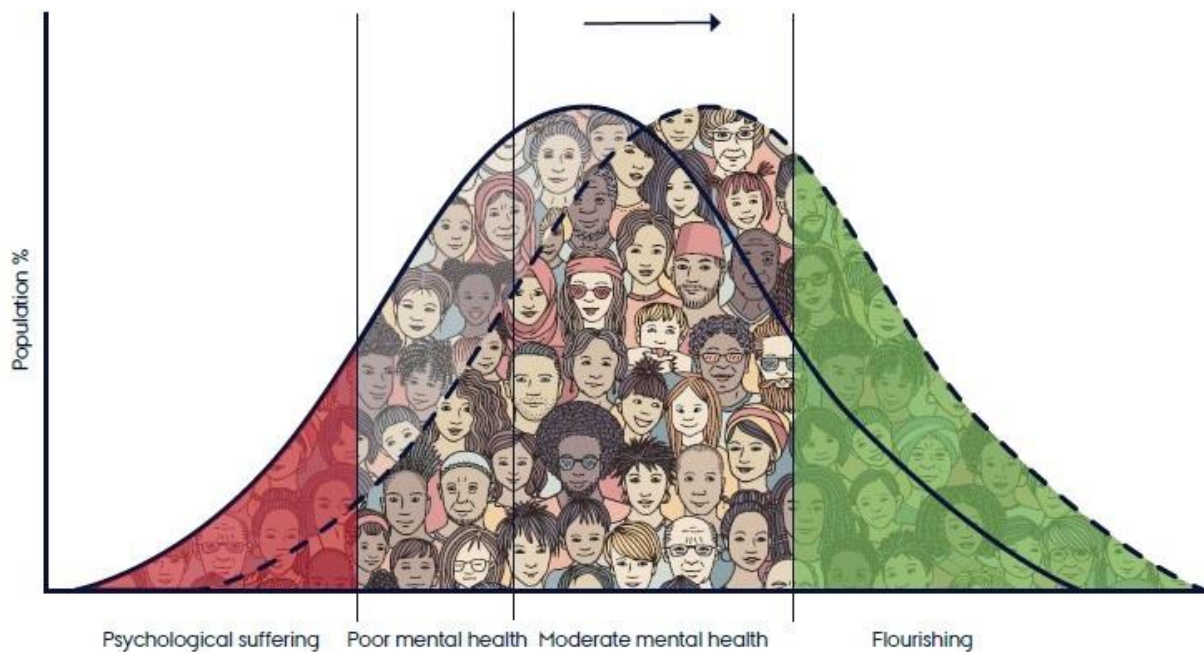


Figure 1: Mental health promotion and prevention using a population-based approach

A key feature of population-based approaches is that by deploying such approaches, no selected groups are singled out. Instead, all individuals within a population receives a given intervention [4]. Thus, the potential risk of stigmatizing particular high-risk populations, such as individuals with mental health conditions, is ameliorated [4]. According to a recent Lancet commission (2022), there is a call

for interventions that reduces the stigma experienced by people with mental health conditions, so to reduce the added mental health impact of stigma on people experiencing these conditions [23]. Therefore, utilizing population-based approaches to deliver mental health promoting and preventive interventions may both influence individuals' mental health directly just as high-risk approaches could. Additionally, population-based approaches further have the possibility of contributing to less stigmatization of individuals with mental health conditions when compared to high-risk approaches.

When deploying population-based approaches to mental health promotion and prevention, interventions may be delivered to entire populations that share a common (physical or virtual) setting, such as workplaces. In this situation, all members of the given setting would be offered participation in the intervention. However, interventions may also be delivered to entire populations that *does not* share a common physical or virtual setting, but share other similarities, such as the same profession. When this format is utilized, members of the target population are all offered participation irrespectively of their physical or virtual setting. An example of this format could be all Danish school teachers being invited to participate in a mental health promoting and preventive intervention.

In the latest framework for developing and evaluating complex interventions, the Medical Research Council (MRC) notes, that interventions may be delivered and evaluated at varying levels, such as at individual and organizational levels [24]. Delivering interventions at an organizational level to entire populations that share a physical or virtual setting allows one to evaluate if and how the intervention may affect changes in systems within the organization, such as relationships within a workplace [24]. Thus, mental health promoting and preventive interventions may be delivered to entire populations representing mental health states across the mental health continuum. Furthermore, population-based approaches may allow for evaluations of how such interventions could potentially affect both the mental health of individuals as well as evoke system changes within organizations, such as workplaces.

RECOMMENDATIONS FOR MENTAL HEALTH PROMOTION AND PREVENTION IN WORKPLACE CONTEXTS

As proposed in the Perth Charter (2012), mental health promotion should be implemented across age groups and in settings where people live their life, such as in schools, hospitals and workplaces [3]. Accordingly, WHO recently published recommendations for mental health at work, offering guidelines on implementing mental health promoting and preventive interventions at both the individual and organizational level [6]. Moreover, the report highlights the use of both universal, selective, and

indicated mental health promoting and preventative interventions [6]. This complements the most recent guidelines on mental well-being at work set forth by NICE [5]. In these guidelines, NICE recommends that mental health workplace-interventions follow a tiered approach, including three tiers: an organizational tier, an individual tier, and a targeted tier [5]. Thus, organizational interventions aim at facilitating changes to entire workplace systems, such as improving the psychosocial work environment, while individual interventions target all individuals in the workplace, but without the aim of affecting workplace systems. Lastly, targeted approaches are in line with high-risk approaches, and are aimed at selected employees or managers at high risk of poor mental health [4, 5]. Individuals' mental health and their work environment exist in a mutual enhancing relationship. Thus, intervening at the organizational level to facilitate system change to, e.g., improve the psychosocial work environment, may positively affect individuals mental health, while implementing interventions aimed at improving individuals' mental health may result in them working more productively [25].

Moreover, the authors of a recent Lancet commission (2022) explicitly recommend that employers adhere to the WHO guidelines on Mental Health at Work (2022) [6, 23]. Hence, influential international organizations and collaborators are advocating that mental health promotion should be implemented in workplace contexts, and, furthermore, provide concrete guidelines on how this may be carried out. Based on the current evidence base, the WHO and NICE both recommend utilizing, e.g., MBIs as universal individual-level interventions in workplace contexts, so that all employees and managers have accesses to these programs [5, 6].

WHAT IS MINDFULNESS?

The ability to be mindful is an innate part of being human [26], and is a capacity ready at hand for us in every situation, at all times. However, along the way from being born with this innate ability to growing into adulthood, most of us forget (to nurture) this ability [27]. Mindfulness originates from the pali word "sati", which translates to the English word "mind", referring both to the heart and mind [27]. Hence, mindfulness relates to both the psychological mind and the body. Stemming from Buddhist tradition, mindfulness has been described as "*a direct path to the "cessation of suffering"*", and as mental skills that may be developed through particular meditation practices [7].

Varying conceptual definitions of mindfulness have been proposed [28]. One contemporary definition of mindfulness is that set forth by Jon Kabat-Zinn, describing mindfulness as "*... the awareness arising through paying attention on purpose in the present moment, non-judgmentally, in the service of self-*

understanding, wisdom, and compassion" [29]. Thus, mindfulness is being aware in the present moment with a kind and curious attitude towards one self, one's own experiences, and to others. Moreover, Kabat-Zinn has described mindfulness as a way to investigate present-moment experiences so to enhance well-being [30]. Hence, mindfulness may act both as an endpoint in itself – that is; non-judgmental present-moment awareness – or as a means to an end, that is skills that may influence well-being positively [28].

MENTAL HEALTH TRAINING USING MINDFULNESS

Neuroscientists have proposed that mental health is essentially a trainable skill in it-self [31, 32]. Thus, the mental shape can be trained just like the physical shape. Practicing mindfulness has previously been described as a specific kind of training to reduce human suffering [33]. Accordingly, previous research has found four essential elements of well-being; awareness, connection, insight, and purpose, all of which are trainable skills [34]. The first element, awareness, relates to individuals' attention to both internal and external states, and is a necessary precursor for the remaining three elements of well-being [34]. The second element, connection, relates to the feeling of caring for and connection to others, which promotes prosocial behavior and caring relations [34]. The third element, insight, concerns subjective insights into how emotions, perceptions, and thoughts shape one's experience and "*sense of self*" [34]. The ability to reflect on one's actions, thoughts, and feelings, and on how one relates to both self and others is an integral part of human cognition. Moreover, this ability is positively linked to the psychological health [35]. On the other hand, automated, overly critical self-reflection is linked to mental illness [35]. Therefore, insights generated through present-moment awareness of, e.g. thoughts and feelings – as opposed to automated self-reflection - may positively influence the mental health. The fourth element, purpose, refers to a feeling of lucidity of what one perceives as meaningful and personal values, and the ability to translate this into daily life actions [34]. Together, heightened abilities in these four elements would result in a high level of well-being.

Previous neuroscientific research has found mindfulness training to affect neural systems that are instrumental in the above-mentioned trainable elements of well-being [7, 36-38]. Thus, mindfulness training has been shown to affect individuals' ability to regulate attention, emotions, and behavior [7, 17, 39]. As before mentioned, awareness is fundamental to the remaining three essential well-being elements [34]. In order to regulate and manage attention and emotions, individuals must first build the capacity to be consciously aware of one's thoughts, feelings, and perceptions [34, 40]. This capacity is

called meta-awareness [34]. Meta-awareness enables individuals to notice thoughts and feelings when they arise, and thus, may assist people in utilizing the space between stimuli and response to act more reflected and skillful [34, 41]. Thus, meta-awareness is a pre-requisite for self-regulation and behavioral change both in relation to one self and to others [7, 34]. Therefore, meta-awareness may support the development of protective mental health skills, such as social and emotional skills, as well as social support and positive relations.

THE INFLUENCE OF MINDFULNESS ON MENTAL HEALTH

Over the years, an extensive amount of evidence has accumulated on the effects of MBIs on adverse mental health outcomes such as perceived stress level, and self-reported symptoms of depression and anxiety [9, 10]. Moreover, in a study using real-time data, Killingsworth and Gilbert (2010) investigated if the degree to which individuals were mentally present in what they were doing, influenced their reported level of happiness in that moment [42]. Key findings from this study are firstly that the human mind is on a mental time travel approximately 47% of our waking hours. Secondly, that people are most happy when mentally aware in what they are doing regardless of the nature of the activity [42]. Thus, being aware in the present moment affects people's experienced level of happiness. This is in line with the notion put forth by Brown & Ryan (2003), that mindfulness is of immense importance for individuals' psychological well-being [43]. This is further supported by a recent systematic review and meta-analysis by van Agteren et al. (2021) [8]. In their review, the authors found MBIs to be among the most effective interventions in improving mental well-being when compared to other psychological interventions [8]. Hence, mindfulness has been shown to both decrease negative mental health aspects, such as perceived stress and symptoms of depression and anxiety, as well as increase positive aspects of mental health, such as well-being and happiness.

THE INFLUENCE OF MINDFULNESS ON RELATIONS

In addition to impacting individuals' mental health, mindfulness may affect how one engages in interpersonal relations. Thus, not being aware of one's internal state may cause individuals to react automatically instead of responding constructively in social situations [26, 41]. Hence, cultivating meta-awareness through mindfulness practice may enable individuals to be more attentive when engaging in conversation, resulting in, e.g., listening more actively to the other person. Accordingly, prior research has found that trait mindfulness is associated with individuals being more attentive to socioemotional cues, such as facial expressions [44, 45]. Moreover, mindfulness practice has been

found to nurture intergroup prosocial behavior via enhanced empathy and reduced tendency to engage in “them” versus “us”-thinking [46]. Moreover, higher trait mindfulness has been found associated with enhanced social functioning in interpersonal situations, resulting in lowered activation of the bodily stress response during challenging social interactions [47]. Hence, cultivating present-moment awareness using mindfulness practices may positively influence how individuals attend to one another, as well as promote prosocial behavior, such as inclusiveness.

Thus, based on the beneficial impacts of mindfulness on both mental health and relations as demonstrated in prior research, there is an incentive to implement interventions that support individuals in cultivating mindfulness.

MINDFULNESS-BASED STRESS REDUCTION

The program “Mindfulness-based stress reduction” (MBSR) was developed by Jon Kabat-Zinn in 1979 with the main purpose of supporting participants in developing their own mindfulness practice [26]. The MBSR program is a curriculum-based 8-week program delivered in a group-format by a trained MBSR teacher, and consists of weekly 2.5 hours sessions and a 7-hour silent retreat day [26, 48]. The MBSR curriculum includes distinctive, yet, related themes every week. The program includes experience-based learning of, e.g., one’s own behavioral patterns, perception, and communication, through guided mindfulness meditation practices, such as body scan and sitting meditation [26, 48, 49]. Moreover, participants are invited to practice mindfulness at home for approximately 60 minutes a day, six days a week.

MBSR was originally developed for chronic pain patients [26]. However, since its development, research has been conducted on the effects of MBSR in a variety of both clinical and non-clinical study populations as well as across study settings [9, 10]. De Vibe et al. (2017) conducted a systematic review and meta-analysis including 101 randomized controlled trials (RCTs) evaluating the effects of MBSR [9]. In this review, the authors found that compared to inactive control groups, MBSR demonstrated moderately large effects on both mental and physical health, as well as on quality of life and social function [9]. Moreover, when MBSR groups were compared to active control groups, MBSR still demonstrated statistically significant, yet smaller, effect sizes [9]. Thus, based on solid evidence, MBSR is a well-documented effective intervention to improve mental health.

MINDFULNESS IN WORKPLACE CONTEXTS

Since the development of MBSR, adapted versions of the program have been developed, including workplace-adapted MBIs [41]. In a review of systematic reviews of RCTs, Hilton et al. (2019) present an evidence map of the research on MBIs with a specific focus on work contexts [18]. The evidence map illustrates that the majority of research within the field of mindfulness in workplace contexts has been conducted among healthcare providers and educators [18]. However, the evidence of the effects of MBIs among school teachers are deemed unclear [18]. Closely related, in a systematic review by Janssen et al. (2018), the authors found that MBIs had predominantly been evaluated in public workplace settings, with the majority of study participants being healthcare providers and school teachers [19]. In conclusion, the authors question the representativeness of these study participants for the general working population [19]. Still, the research field of mindfulness in workplace contexts is constantly developing, and evidence of the impact in private workplace settings is emerging. Thus, recent studies suggest that MBIs in private workplace contexts may positively affect both mental health and organizational outcomes [50, 51]. However, more research in private workplace settings is warranted. Moreover, the process of synthesizing the evidence for MBIs in workplace contexts has been complicated by the vast diversity of the interventions being delivered [12, 15, 19]. As such, MBIs delivered in workplace contexts may differ in relation to; 1. mindfulness being a core intervention element or merely a subsidiary element, 2. length and structure of the intervention, 3. mode of delivery, e.g. in-person or live online, 4. delivery location, e.g. at the worksite (or if live online: during working hours) or outside of work, 5. target population, such as specific professions, 6. the health promoting and preventive strategy utilized (high-risk or population-based), and 7. outcome measures [19].

In 2015, Good et al. published an integrative review of mindfulness in workplace contexts, including a framework illustrating key uncertainties in the literature at the time [17]. Based on previous research and mindfulness theory, the authors explicate that mindfulness influences personal competencies such as enhanced attention, emotion regulation, and behavior [17], and that these personal competencies may impact organizational outcomes, such as performance, and workplace relationships [17]. Thus, Good et al. (2015) propose that MBIs delivered in workplace contexts may positively impact both individuals' mental health and potentially also affect organizational outcomes, such as the psychosocial work environment, through relational changes [17]. Complimentary, González-Palau and Medrano (2022) suggest that reduced levels of work stress as seen from a neuropsychological view point may influence positively on organizations [52]. Accordingly, and in line with non-workplace

research, MBIs delivered in workplace contexts have overall been shown effective in improving well-being, as well as in reducing perceived stress, and symptoms of depression and anxiety [15, 18, 20, 51, 53, 54]. Yet, the research field is still young with the majority of evidence built on research conducted among healthcare providers [18, 20]. Thus, there is a need for expanding research beyond healthcare settings, so to investigate the potential mental health impacts of MBIs delivered to various professions, as well as in distinct workplace contexts.

Where previous research in non-workplace contexts has found mindfulness practice to positively affect protective mental health skills, such as emotion regulation, the majority of present research of mindfulness in workplace contexts has focused on more distal outcomes of mental health, such as well-being and perceived stress. Thus, knowledge of how such potential enhancements of mental health skills may impact employees and managers both at work and during leisure time is more uncertain. However, in a qualitative study by Rupprecht et al. (2019), the authors investigated how mindfulness training affected managers' in their daily work and abilities to lead [55]. In their study, the authors found that managers developed personal skills relating to self-regulation, attention, and self-awareness, resulting in concrete work-related changes, such as more single tasking and enhanced ability to practice self-care [55]. This indicates that MBIs delivered in workplace contexts may facilitate development of similar protective mental health skills as has been demonstrated by MBIs in non-workplace settings.

As proposed in previous research, the beneficial effects of mindfulness in workplace settings may facilitate improvements in organizational outcomes [17, 56]. As such, studies of MBIs in workplace contexts has demonstrated effects in a variety of such outcomes. These organizational outcomes may be divided into individual and relational work-related outcomes. Within individual work-related outcomes, previous research has found evidence of enhanced motivation, productivity, job satisfaction, personal performance and work engagement, and reduced symptoms of burnout [15, 20, 51]. Regarding relational work-related outcomes, MBIs in workplace contexts have shown to enhance, e.g., leadership capabilities, group performance, and organizational climate, as well as reduce hostile behavior and incivility at work [20, 51, 55, 57-59]. Yet, the organizational impacts of MBIs in workplace contexts is still a budding field, characterized by several uncertainties [15, 16]. Thus, organizational effects may be highly dependent on the contexts in which the intervention is delivered, as well as if the intervention is delivered to selected groups or entire workplace populations. Moreover, even when deploying population-based approaches, where MBIs are offered to entire populations, such

interventions may be delivered to populations who share other characteristics than a common physical or virtual setting, such as a common profession [15]. Therefore, generating organizational changes, such as improved workplace relationships, may require multiple employees and managers from the same physical or virtual setting to receive mindfulness training and not merely selected individuals or individuals who does not share a common physical or virtual setting [16].

Still, mindfulness is not to be interpreted as a panacea for generating positive organizational outcomes [16, 60]. Accordingly, scholars have suggested that mindfulness may result in adverse workplace effects [61]. Hence, mindfulness training might possibly result in unfavorable workplace events due to an enhanced awareness of, e.g., poor work environments, which may potentially result in higher levels of turnover [61]. However, recent studies have found mindfulness to positively influence turnover intentions, thus resulting in less turnover [60, 62]. Moreover, a critical stance to the potential organizational impacts of MBIs in workplace settings has been the fact that the majority of research within the field has been conducted on individuals within organizations and not on the interpersonal level [16]. In 2019, Rupprecht et al. made the argument that too little attention was given to "*team mindfulness*" as opposed to individual mindfulness when intervening in organizational contexts [16]. However, in a recent study by Liu et al. (2022), the authors found evidence supporting the hypothesis that individual trait mindfulness may facilitate team mindfulness in an additive relationship [63]. Hence, team mindfulness may be enhanced via several team members with high individual trait mindfulness. Thus, there is a need for a deeper understanding of the potential organizational impacts of MBIs delivered in workplace contexts.

SUMMARY AND RESEARCH GAPS

International agencies recommend implementing MBIs universally in workplace contexts [5, 6]. Thus, deploying population-based approaches to the implementation of such interventions are in line with international recommendations. The current evidence base of mindfulness in workplace contexts is still in a budding stage. As such, previous research has documented positive mental health effects, such as improved well-being and reduced perceived stress [12, 15, 18, 20, 51]. However, research has predominantly been conducted among healthcare providers [12, 18, 20], with only limited focus on how MBIs in workplace contexts may potentially influence protective mental health skills. Thus, there is a need for investigating MBIs delivered to other professions and in private workplace settings [12], as well as explorations of how MBIs in workplace contexts may impact protective mental health skills.

Moreover, evidence of organizational effects is emerging, demonstrating favorable impacts on both individual and relational workplace-outcomes [12, 15, 17, 32, 55, 57-59, 61]. However, more research is needed to understand if and how MBIs may affect organizational outcomes influencing the psychosocial work environment.

OVERALL AIM AND RESEARCH OBJECTIVES

This dissemination focused on gaps in the current research concerning the potential impacts of delivering an MBI using population-based approaches in diverse workplace contexts. To accommodate uncertainties regarding impacts in various study populations and the usage of different population-based approaches, this dissertation was informed by two research projects; “Stress-free Everyday LiFe for Children and Adolescents REsearch” (SELFCARE), and “Implementation of modified Mindfulness-based stress reduction in private Companies”. Thus, this dissertation includes an investigation of delivering MBSR to Danish lower secondary school teachers participating in a teacher-training program, as well as an evaluation of the feasibility and impact of an organizational-level MBI including a workplace-adapted MBSR program. Based on previous research, three hypotheses were formulated (Table 1), which were explored in the following study specific aims.

Study 1: The aim of the study was to evaluate the effectiveness of delivering MBSR to Danish lower secondary school teachers who participated in a teacher-training program measured on perceived stress level.

Study 2: The aim of the study was to gain an understanding of how mental health skills of employees and managers may be impacted by an organizational-level MBI including a workplace-adapted MBSR program.

Study 3: The aim of the study was to investigate if and how an organizational-level MBI including a workplace-adapted MBSR program may influence the workplace social capital and psychological safety, as reported by employees and managers.

Study 4: The main aim of the study was to investigate the feasibility of an organizational-level MBI including a workplace-adapted MBSR program in Danish private workplace settings. A secondary aim was to evaluate tendencies of change in self-reported mental health and organizational outcomes from baseline to 3 and 12 months follow-up.

Table 1: Hypotheses in this dissertation

Hypothesis	Research project	Study
Participation in an MBI conveyed by the workplace may influence positively on intermediate outcomes that protect the mental health, such as enhanced social and emotional skills	SELFCARE and Implementation of modified Mindfulness-based stress reduction in private Companies	Study 1 Study 2 Study 4
Participation in an MBI conveyed by the workplace may positively affect distal mental health outcomes	SELFCARE and Implementation of modified Mindfulness-based stress reduction in private Companies	Study 1 Study 4
If found feasible, an organizational-level MBI delivered to employees and managers who share a common workplace setting may positively impact relations, and thus support enhanced psychosocial work environments	Implementation of modified Mindfulness-based stress reduction in private Companies	Study 3 Study 4

Abbreviations: MBI: Mindfulness-based intervention, SELFCARE: Stress-free Everyday LiFe for Children and Adolescents REsearch

CHAPTER 2: METHODOLOGY

This chapter commences with an introduction to the development and evaluation of complex interventions. Subsequently, a description of the methods used in the research project SELFCARE, and Study 1, is provided, followed by a presentation of methods utilized in the research project “Implementation of modified Mindfulness-based stress reduction in private Companies” and Studies 2-4. Finally, the chapter concludes with a description of ethical considerations of the four included studies.

DEVELOPING AND EVALUATING COMPLEX INTERVENTIONS

The complexity of an intervention is impacted by several factors. Hence, interventions that, e.g., include more than a few components, target several types of behavior, as well as require specific competencies of those delivering the intervention may be categorized as “complex interventions” [24, 64]. The MBSR program includes multiple components, including meditation, yoga, home practice, and lectures [26, 48], targets behaviors towards oneself and others [26, 48], as well as requires specific and pre-specified teacher qualifications [26, 41, 48]. Moreover, the MBSR program is delivered in a group format, including dyads, with a special focus on a safe learning environment [26, 48]. Thus, MBSR constitutes a complex intervention. In 2021, the MRC proposed an updated version of their 2008-framework for developing and evaluating complex interventions, which was again developed from the 2000-framework [24, 65, 66]. In this framework, the need for intervention research to move beyond the question of “does it work?” to “how, for whom, and under which circumstances does it work?” is highlighted [24]. Therefore, there is a need for understanding health interventions and the outcomes thereof in a broader context. To accommodate this broader understanding, qualitative or multi-method studies are encouraged [24].

The framework for developing and evaluating complex interventions includes four phases; Identification or development of an intervention, Feasibility, Evaluation, and Implementation [24]. The phase in which a research project places itself is highly dependent upon the current state of the evidence, that is: what is not yet known? [24]. In relation to MBIs in workplace settings, previous research has demonstrated ambiguous results relating to the effects of MBIs for school teachers and educators [18], whereas research on MBIs in private workplace settings is even more nascent [12, 19]. Hence, the research question regarding the effectiveness of MBSR for school teachers is situated in the “Evaluation”-phase, whereas the research questions regarding the feasibility of an organizational-level MBI including a workplace-adapted MBSR program must be investigated in the “Feasibility”-phase.

SELFCARE

Setting

In 2017, the Danish Parliament granted the Danish Center for Mindfulness (DCM) funding to train Danish school teachers in teaching mindfulness in schools. To investigate the potential effects of this initiative, the trial “SELFCARE” was set up. The main aim of SELFCARE was to evaluate the effectiveness of a school teacher-delivered MBI adapted for children and adolescents (“.b”) delivered

in schools measured on mental health outcomes of the school children [67]. As part of the trial, 191 school teachers representing 110 Danish public and private schools engaged in a teacher-training program including three training elements (Table 2). However, it was hypothesized that participation in an MBSR course as part of the teacher-training program could positively affect the mental health of the school teachers (Figure 2). Thus, Study 1 was set up as a nested trial within SELFCARE.

Table 2: The three elements of the teacher-training program in SELFCARE

1 st quartile	2 nd quartile	3 th quartile	4 th quartile
Participation in an 8-week MBSR course Home practice		Four-day seminar on teaching the mindfulness-based program, “.b” in schools	3*2 days seminars on relational competence
Establishment of own mindfulness practice			

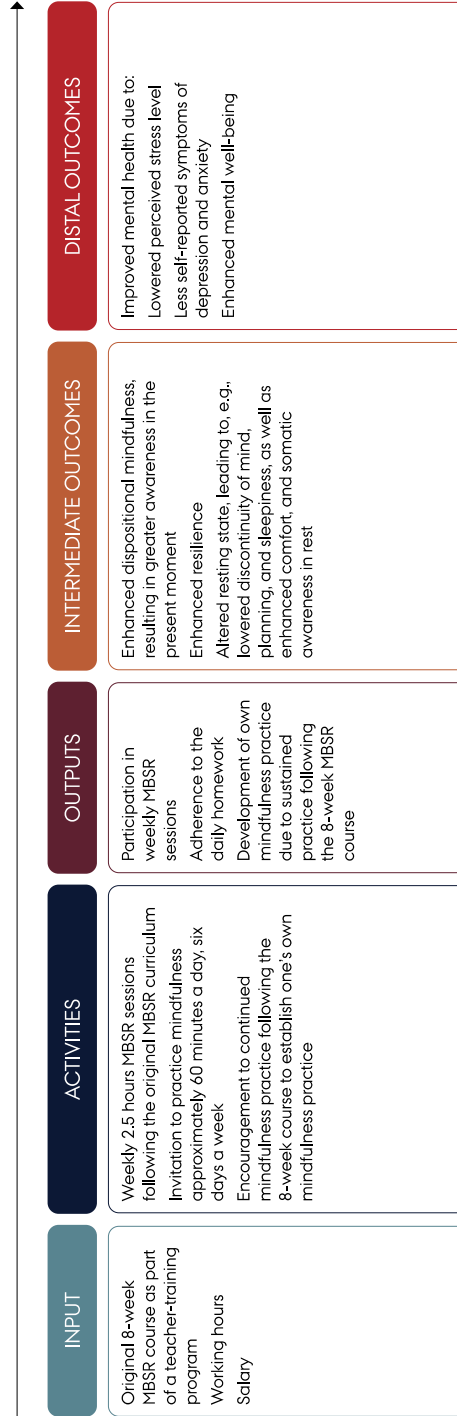


Figure 2: Logic model of the nested trial within SELF CARE (Study 1)

Study 1

Design

Study 1 was designed as a nested trial within the two-arm parallel cluster-randomized controlled trial, SELFCARE, where schools represented clusters. Study 1 was carried out as an effectiveness trial to test the effectiveness of MBSR among school teachers in a real-life setting. The main aim of Study 1 was to evaluate the effectiveness of delivering MBSR as part of a teacher-training program on school teachers' perceived stress level. Thus, according to the MRC framework for developing and evaluating complex interventions, Study 1 is placed in the "Evaluating" phase [24].

Study population

Study 1 utilized a population-based approach, where the population consisted of individuals that shared a profession, but did not (necessarily) share a common physical or virtual workplace. The study population in SELFCARE consisted of 191 lower secondary school teachers who chose to participate in a continuing education enabling them to teach the mindfulness-based program, "b" in schools [67]. A broad recruitment strategy was used to include schools. As such, participants were recruited using local information meetings, social media posts, invitational letters, and advertisements on DCM's webpage. The included school teachers represented Danish public and private schools from all five geographical regions of Denmark [67]. For schools to enroll one or more teachers in the teacher-training program, the school had to have ≥ 100 pupils. Moreover, the headmaster/headmistress was required to provide consent for teachers spending working hours participating in the teacher-training program [67]. Hence, the intervention was conveyed by the teachers' employer. Therefore, Study 1 is an example of a population-based approach to mental health promotion in a workplace context in which an MBI is facilitated *by* the workplace but is not situated *in* the workplace.

Data collection and procedure

Upon information of the use of data, school teachers provided consent by completing the baseline questionnaire, following local legislation [68]. The online data collection tool, Research Electronic Data Capture (REDCap) was used to build and distribute electronic questionnaires via email. REDCap is a secure web-based platform for building questionnaires and managing data collection [69]. Data was collected at baseline, 3, and 12 months follow-up. Block-randomization randomizing schools to start teacher training in 2019 (intervention group) or 2020 (control group) was conducted according to the

five geographical regions of Denmark. An independent statistician performed the randomization based on region specific lists with anonymized school ids with a 1:1 allocation ratio. Randomization was stratified by number of teachers included (1 or 2-3), school size (more or less than 500 pupils), and type of school (public or private).

Intervention and control group

Teachers representing schools randomized to the intervention group began teacher training in 2019. As part of their teacher training, school teachers participated in an 8-week MBSR course (Table 2) [30, 48]. For a description of the MBSR program, please refer to Chapter 1, section “Mindfulness-based stress reduction”. Delivery of the MBSR courses were conducted in-person in each of the five geographical regions by a trained MBSR teacher. Throughout the intervention, MBSR teachers received supervision from the highly qualified and experienced MBSR teacher-trainer, Lone Overby Fjorback. Due to the focus of Study 1, the remaining two parts of the teacher-training program were not included in the nested trial. School teachers from schools randomized to the control group were placed on a one-year waiting list, and began teacher training during 2020.

Outcomes

The primary outcome measure of Study 1 was between-group differences in perceived stress level from baseline to 6 months follow-up. Perceived stress level was measured using Cohen's Perceived Stress Scale (PSS) [70]. Secondary distal outcomes of mental health were self-reported symptoms of depression and anxiety measured by the Hopkins Symptom Checklist-5 (SCL-5) [71], and well-being measured by the WHO-5 Wellbeing Scale (WHO-5) [72]. Moreover, secondary intermediate outcomes were resilience measured using the Brief Resilience Scale (BRS) [73], dispositional mindfulness measured by the Five Facet Mindfulness Questionnaire (FFMQ-15) [74, 75], and thoughts and feelings in rest measured by the Amsterdam Resting State Questionnaire (ARSQ) [76]. For a detailed description of the outcome measures, please refer to Study 1 [77].

Analysis

Based on a power calculation prior to trial commencement, a total study population of 172 teachers were required to detect a mean between-group difference in PSS score of -2.5 points (SD 5.8) [75] with a power of 80%. Data were analyzed using a mixed-effects linear regression model with systematic effects of time, randomization, interaction between time and randomization, age, sex,

school type, school size, and geographical region. Moreover, bootstrapping was performed to adjust for cluster effects. Data was analyzed following the intention-to-treat principle (ITT). Thus, all data were analyzed according to allocated randomization group. Additionally, Cohen's *d* was calculated with the following cut points: large effects: 0.8, medium effects: 0.5, and small effects: 0.2 [78]. Moreover, loss to follow-up analyses were performed. Furthermore, model-based predictions were used to conduct sensitivity analyses by adding or subtracting $0.2 \times SD$ to the point estimate in both the intervention and control group [67]. In all analyses, statistical significance was set at $P=0.05$. All analyses were performed in STATA 16.

IMPLEMENTATION OF MODIFIED MINDFULNESS-BASED STRESS REDUCTION IN PRIVATE COMPANIES

Design

The research project "Implementation of modified Mindfulness-based stress reduction in private companies" (Study 2, Study 3, and Study 4) was a quasi-experimental multi-method feasibility trial with no control group. The primary aim of the research project was to evaluate the feasibility of an organizational-level MBI including a workplace-adapted MBSR program in small and medium-sized private companies. The secondary aims of the project was to gain an understanding of how the intervention might affect mental health skills and relations in the workplace, conceptualized using the theoretical constructs "workplace social capital" and "psychological safety". Additionally, the project aimed at estimating quantifiable changes in mental health and organizational outcomes from baseline to 3 and 12 months follow-up (Figure 3). Thus, the nature of this research project places Study 2, 3, and 4 in the "Feasibility" phase of the MRC framework for developing and evaluating complex interventions [24].

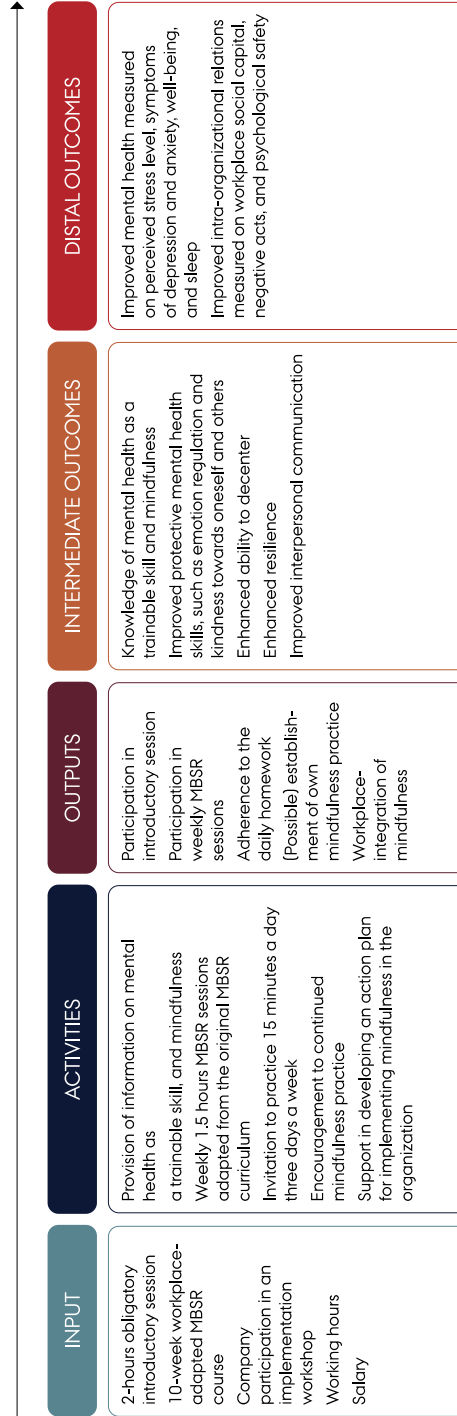


Figure 3: Logic model of the research project "Implementation of modified Mindfulness-based stress reduction in private companies"

Evaluating feasibility

Following the primary aim of the research project “Implementation of modified Mindfulness-based stress reduction in private companies”, the evaluation included parts of a process evaluation as described by Moore et al. (2015) [79]. According to Moore et al. (2015), key elements of a process evaluation include contextual factors, implementation, and mechanisms of impact [79]. Contextual factors refer to factors within the context – for the purpose of this dissertation, the workplace – that might influence how an intervention may work, as well as the implementation, mechanisms, and outcomes [79]. When evaluating the implementation of an intervention, Moore et al. (2015) encourage researchers to collect data on, e.g., intervention reach, and dose [79]. In this dissertation, implementation evaluation will revolve around these two elements. Data on mechanisms of impact may concern data on, e.g., how participants interact with the intervention as well as proposed mediators [79]. For the purpose of this dissertation, mechanisms will be investigated both qualitatively and quantitatively focusing on mediators of potential impact on distal mental health and organizational outcomes. The research project “Implementation of modified Mindfulness-based stress reduction in private companies” mainly explored the implementation element, secondarily mechanisms of impacts, focusing on mediators, and to a limited extent the contextual factors influencing the feasibility of the intervention.

Study population

The research project “Implementation of modified Mindfulness-based stress reduction in private companies” utilized a population-based approach where the population consisted of entire workplaces, with individuals sharing a common physical or virtual workplace. The project’s study population included four small and medium-sized private companies (10-249 employed) that were either entirely based in Denmark or with Danish divisions. The four companies represented four different business areas within media, restaurants, production, and IT, and employed a total of 368 employees and managers at the time of the project. Companies were recruited from January 2020 to October 2020 using a broad recruitment strategy including direct contact to company representatives, social media posts, as well as advertisement on the DCM webpage and in digital newsletters from industry specific business organizations. When a company expressed interest in enrolling in the project, a meeting was held between company representatives, the principal investigator, Lise Juul, and a trained MBSR teacher. In this meeting, company representatives were informed of the requirements for participating in the project. The requirements included; 1. As the intervention was an organizational-

level intervention, it was required that all employees and managers would be offered participation, and not merely selected individuals, 2. Employees and managers were allowed to spend working hours participating in a mandatory two-hour information session, 3. Top-management were to allow employees and managers to spend working hours participating in a 10-week live online workplace-adapted MBSR course, if they chose to sign up. If it was not possible for employees or managers to participate during working hours, the company was required to provide salary for the leisure time these employees and managers spend participating. Thus, efforts were made to ensure that the population-based approach was enforced, and that the intervention would truly be an organizational-level intervention.

Intervention

The intervention consisted of three intervention components; an obligatory introductory session on mental health and mindfulness, voluntary participation in a 10-week live online workplace-adapted MBSR course (for curriculum, see Appendix 1), and the possibility of an implementation workshop for selected managers and employee representatives (please refer to Table 1, Study 2) [80]. Firstly, all employees and managers were invited by a company representative to attend an obligatory two-hour introductory session. These sessions included knowledge of mental health, mindfulness, and that mindfulness may be a way to train one's mental health. Moreover, a mindfulness meditation and brief yoga exercises were included, so to acquaint employees and managers with exercises included in the workplace-adapted MBSR program. Next, all employees and managers had the possibility of signing up for a 10-week workplace-adapted MBSR course delivered live online via Zoom. The adaptation of the original MBSR curriculum was conducted using the framework proposed by Crane et al. (2017) [41]. Hence, essential elements of the MBSR program, such as being informed by contemplative theories, experience-based learning, and teacher requirements, was maintained, while flexible elements, such as the program structure, session length, and delivery mode was adapted to improve context fit [41]. Thus, the workplace-adapted curriculum followed that of the original MBSR program including the same weekly themes, and exercises. For a visualization of differences between the original 8-week MBSR program, and the 10-week workplace-adapted MBSR program, please refer to Table 2, Study 2 [80]. The 10-week workplace-adapted MBSR was delivered live online via Zoom by trained MBSR teachers of which several had experience with teaching mindfulness in organizations. Based on mindfulness theory and findings from previous research, it was hypothesized that even though not all employees and managers participated in a workplace-adapted MBSR course, the

potential impact experienced by MBSR-participating individuals might generate positive ripple effects on non-MBRS participants, and thus, the entire organization. Following the workplace-adapted MBSR course, workplace-selected employees and managers were invited to attend a workshop on further implementation of mindfulness in the organization to help support sustained application of mindfulness in the workplace. Focus of the workshop was to support the company in generating an action plan ready for use.

Study 2

The aim of Study 2 was to explore if and how the organizational-level MBI including a 10-week workplace-adapted MBSR program impacted mental health skills as expressed by employees and managers. Thus, qualitative methods were required to gain insights into such impacts.

Respondents

Respondents were sampled to participate in focus group interviews using purposive sampling [81]. At pre-intervention sampling, managers were asked to recruit respondents that represented employees and managers with a positive, neutral, and negative stance on mindfulness. Post-intervention, MBSR teachers were asked to provide a list of MBSR-participants who represented both highly engaged employees and managers, as well as employees and managers with lower engagement levels. This sampling method was utilized so to ensure that a broad spectrum of attitudes and experiences were represented in the focus groups. Moreover, at post-intervention, focus groups were conducted with both MBSR-participants, MBSR-dropouts, and MBSR-nonparticipants. In total, 76 respondents participated in a pre- or post-intervention focus group, or both.

Data collection

A total of 27 semi-structured focus groups were conducted, consisting of 14 pre-intervention focus groups, and 13 post-intervention focus groups, from March 2020 to May 2021. The pre-intervention semi-structured interview guide was built to fulfill a dual purpose; 1. to gain insights into knowledge of mindfulness among employees and managers, as well as their expressed behavioral patterns during stressful situations, and 2. To uncover characteristics of the psychosocial work environment. Thus, the interview guide consisted of nine themes (Appendix 2), of which four related to the first purpose; knowledge and behavioral patterns. As with the pre-intervention interview guide, the post-intervention

guide's purpose was two-fold. Thus, the interview guide utilized for MBSR-participating employees and managers included eight themes (Appendix 3), of which four related to mental health skills, and possible changes thereof from pre-intervention (for specific theme headings, please refer to Study 2 and Appendix 2 and Appendix 3) [80]. The content of the post-intervention interview guide utilized for focus group interviews with MBSR non-participating employees and managers is provided in Appendix 3. The majority of the focus group interviews (70.4%) were conducted live online via Zoom, due to social distancing recommendations because of the Covid-19 pandemic.

Analysis

Data consisted of verbatim transcriptions of the semi-structured focus group interviews conducted in all four companies, and were analyzed using inductive qualitative content analysis [82, 83]. Following the notion of Graneheim & Lundman (2004), a text may be analyzed according to the manifest or latent content [83]. Manifest content consists of expressed content in the text, whereas the latent content relates to the unspoken meaning of the text [83]. The analysis in Study 2 focused mainly on the manifest content. However, when interpretation of the manifest content was uncertain, notes on, e.g., tone of voice, pauses, or body language was consulted. According to Graneheim & Lundman, the process of interpreting a text happens in cooperation between the interpreter and the text [82, 83]. Hence, the result of a qualitative content analysis will be a product of the manifest and latent content, as well as how the researcher interprets said content. Thus, to ensure validity of the interpretation, the analysis was conducted in a collaboration between Eva Gemzøe Mikkelsen and myself.

The analysis followed an iterative approach in four steps [82-84]. Hence, 1. An overview of the data was gained through verbatim transcription and thorough reading of the transcripts, 2. meaning units were extracted using analytical questions, 3. Meaning units were categorized into descriptive categories, and 4. A transversal analysis was performed across categories to deduce explanatory themes [84]. When performing inductive qualitative analysis, analytical questions are constructed so to guide the analysis according to the research aim [84]. For the purpose of Study 2, three analytical questions were formulated: "1. *How do employees and managers describe their awareness in the present moment?* 2. *What reactions to stress are described by employees and managers?* 3. *How do employees and managers relate to themselves and their felt needs?*" [80]. Whenever a meaning unit from a transcript answered one of these analytical questions, the meaning unit in question was extracted. When all meaning units had been extracted, these were categorized into descriptive categories. Subsequently, a transversal analysis across these descriptive categories revealed themes

offering potential explanations to how this organizational-level MBI may influence employees' and managers' mental health skills.

Study 3

The aim of Study 3 was to investigate if and how the organizational-level MBI including a 10-week live online workplace-adapted MBSR program affected psychosocial work environmental factors, such as workplace social capital and psychological safety as expressed by employees and managers. Hence, Study 3 utilized data from the same semi-structured focus group interviews as Study 2.

Respondents and data collection

Data in Study 3 was obtained simultaneously with data from Study 2. Thus, respondents were the same in the two studies. Hence, for a description of respondent sampling and data collection methods please refer to the above sections "Study 2 – Respondents", and "Study 2 – Data collection".

Analysis

Data consisted of the same verbatim transcriptions as Study 2. For the purpose of Study 3, the analysis was carried out using deductive qualitative content analysis, thus using theoretical frames to guide the interpretation of data [84, 85]. The theoretical framework used in this analysis was built on the concepts "social capital" and "psychological safety". Social capital refers to the networks, norms, and trust within an organization [86], and may be divided into the three subcategories, *bonding*, *bridging*, and *linking* social capital [87]. Workplace bonding social capital refers to the collaboration, norms, and trust within a department/team, whereas bridging social capital concerns social capital between departments/teams. Workplace linking social capital on the other hand, refers to the social capital between employees and management [87]. Thus, the three subcategories constituted the theoretical frame of workplace social capital. Psychological safety concerns how individuals' perceive potential consequences from taken interpersonal risks at work [88]. Where social capital entails the level of general trust [86, 87], the theoretical frame of psychological safety refers to the trust in others having a favorable reaction to mistakes or the likes in specific situations at work [86, 88]. Hence, the two theoretical frames used for the analysis in Study 2 are complementary. Despite being guided by theoretical frames, the analysis was conducted with an open attitude to potentially emerging themes related to the aim of the study. Based on the two theoretical frames, two distinct structured

categorization matrices were formulated (please refer to Tables 2 & 3 in Study 3) [85]. These matrices were used to extract meaning units from interview transcripts, which were then categorized into descriptive categories.

Study 4

The main aim of Study 4 was to evaluate the feasibility of the organizational-level MBI including a 10-week live online workplace-adapted MBSR program. The secondary aim of the study was to investigate the potential tendencies of change in mental health and organizational outcomes from baseline to 3 and 12 months follow-up.

Study population and data collection on self-reported outcome measures

The study population for Study 4 consisted of all employees and managers within the four included companies, who contributed with baseline questionnaire data. Thus, the study population included the entire population independent of MBSR-participation status. Prior to intervention commencement in each company, all employees and managers received an email containing a link to an electronic questionnaire. The entire eligible study population thus consisted of a total of 368 employees and managers. When having answered a baseline questionnaire, follow-up questionnaires were automatically sent to those who contributed with baseline data. Employees and managers who did not answer a baseline questionnaire did not receive follow-up questionnaires.

Feasibility outcomes

Using the framework by Moore et al. (2015), data on reach and dose was collected. In this study, reach referred to the participation rates in the three intervention components. Hence, data on attendance in both the obligatory introductory sessions, 10-week workplace-adapted MBSR sign-up, and company participation in an implementation workshop was collected. To estimate dose, data collection was restricted to the 10-week workplace-adapted MBSR program. Thus, data on session attendance was collected on all employees and managers who signed up for a workplace-adapted MBSR course.

Self-reported mental health and organizational outcomes

To evaluate tendencies of change from baseline to 3 and 12 months follow-up, questionnaires were distributed to all employees. These questionnaires were built and distributed using the secure online

platform, REDCap [69]. The questionnaires included self-report questionnaires on both mental health outcomes, and relational organizational outcomes. Mental health outcomes included perceived stress (PSS) [70], self-reported symptoms of depression and anxiety (SCL-5) [71], well-being measured by the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) [89-91], as well as measures on disturbed sleep (DSI) and awakening problems (AWI) [92, 93]. Moreover, included intermediate mental health outcomes were measures of resilience (BRS) [73] and decentering (EQ – Decentering) [94]. Relational organizational outcomes were collected using the following self-reported measures: 25-item Danish Social Capital Questionnaire to measure workplace social capital [95, 96], the Short Negative Acts Questionnaire (S-NAQ) were used to measure the occurrence of negative acts, such as feeling ignored or excluded [97], and a 7-item measure of psychological safety [98, 99]. For an in-depth description of each outcome measure, please refer to the Methods section in Study 4.

Analysis

Data to evaluate feasibility included reach and dose. To assess reach, proportions of participation in each of the three intervention elements were calculated. Estimation of intervention dose was restricted to the workplace-adapted MBSR program. Thus, received dose was estimated using medians of attended sessions. Dose was calculated for the total number of employees and managers who signed up for a workplace-adapted MBSR course ($n = 169$), as well as for those who completed a course ($n = 140$), and those who dropped out ($n = 29$).

For continuous, normally distributed data, analyses of tendencies of change in both mental health and organizational outcomes were conducted using a mixed-effects linear regression model with systematic effects of sex, age, time, education, cohabitation status, company, job type, and random effect of course number. Data on negative acts were not normally distributed, and was dichotomized using the threshold value of an S-NAQ-score ≥ 12 , where a score above 12 points represented occasional experience of negative acts in the workplace. Tendencies of change in this dichotomized outcome was analyzed using a mixed-effects logistic regression model with systematic effects of sex, age, time, education, cohabitation status, company, and job type. Moreover, loss to follow-up analyses were conducted using *t-tests* and *chi-squared* tests. Additionally, sensitivity analyses were conducted using model-based predictions to estimate the potential impact of missing data. In all analyses, statistical significance was set at $P = 0.05$, and data was analyzed using STATA 17.

ETHICAL CONSIDERATIONS

The SELFCARE trial was approved by the Danish Data Protection Agency (2016-051-000001/1145). In March 2019, Study 1 was registered at ClinicalTrials.gov (NCT03886363). Likewise, the research project “Implementation of modified Mindfulness-based stress reduction in private companies” was approved by the Danish Data Protection Agency. The research project was registered retrospectively in the ISRCTN Registry (ISRCTN93567471) in February 2022. In both research projects informing this dissertation, all study participants received written information on the aim of the research, and the use of data. Moreover, both questionnaire data and transcripts of focus group interviews were anonymized.

In Study 2 and 3, qualitative focus group interviews were conducted with both employees and managers from each of the four included companies. In relation to these interviews, several considerations were made. Thus, prior to the focus group commencing, all respondents received detailed oral information of the research project, the use of data, and the possibility to withdraw at any time during the research period. Furthermore, respondents were encouraged to ask if any doubt presented itself regarding both the research project, data, and the interview. Upon this thorough outline, all respondents provided consent.

Also relating to the two qualitative studies presented in this dissertation, all 27 focus group interviews were conducted by Eva Gemzøe Mikkelsen and myself. As a PhD student, I was involved in several parts of the project entailing both intervention development, adaptation of the MBSR program, company contact and intervention coordination, interviewer, as well as technical assistant in a number of MBSR courses across companies. Thus, focus group respondents might have crossed paths with me on several occasions. Therefore, Eva Gemzøe Mikkelsen was the lead interviewer, and during the introduction to the post-intervention interviews, it was explicitly stated, that both of the interviewers were interested in the respondents' honest opinions, whether these were negative, neutral, or positive regarding the intervention, and its potential impact. However, due to the close involvement in various parts of the research project, I functioned as an internal evaluator. According to Moore et al. (2015), this may be preferred in the Feasibility phase of evaluating complex interventions [79], yet might also potentially introduce bias in the interpretation of data [79]. To accommodate this risk, presuppositions were noted, and qualitative analyses conducted in a close collaboration between Eva Gemzøe Mikkelsen and me.

CHAPTER 3: RESULTS

This chapter comprises a summary of the main results of the original studies included in this dissertation. Supplementary analyses, such as loss to follow-up and sensitivity analyses, are available from Supplementary material of the relevant papers.

STUDY 1

The main aim of Study 1 was to evaluate the effectiveness of MBSR as part of a teacher-training program on reducing perceived stress among lower secondary school teachers participating in a continuing education. Secondly, the study evaluated the effectiveness measured on other mental health outcomes, as well as proposed mediators of change.

Baseline characteristics

Of the included 191 lower secondary school teachers, 97 were randomized to the intervention group, and 94 to the wait-list control group (Study 1, Figure 1). Overall, the two groups was comparable at baseline, measured on both demographical measures, such as sex, age, and school size, mental health outcomes, as well as proposed mediators. Across the two randomization groups, the study population comprised mainly of females (91.6%), with a mean age of 45.2 (SD: 8.4) years at baseline. Looking at mental health outcomes, the mean PSS score at baseline was 15.8 (SD: 5.7), while the SCL-5 score at baseline was 1.9 (SD: 0.5), and the WHO-5 score was 59.1 (SD: 17.0) (Study 1, Table 1).

Adherence and dose

In total, 78 of the 97 lower secondary school teachers randomized to the intervention arm participated in an MBSR course (Study 1, Figure 1). All of these 78 school teachers participated in five sessions or more out of a total of nine (eight weekly sessions and one 7-hour silent retreat day). On average, teachers participated in 7.6 sessions.

Effectiveness

At 3 months follow-up, the intervention group had decreased their mean PSS score by 1.7 (95% CI: 0.04 to 3.3) points more than the wait-list control group. Additionally, the estimated difference between the two groups increased until 6 months follow-up, resulting in a between-group difference of 2.1 (95% CI: 0.5 to 3.8) points at 6 months follow-up. Effects of MBSR on self-reported symptoms of depression and anxiety, and well-being, however, were not statistically significant. Yet, identified tendencies pointed towards a potentially small positive impact of MBSR on these measures. However, these favorable between-group tendencies diminished towards 6 months follow-up (Study 1, Table 2).

Looking at between-group changes in the proposed mediators, resilience (BRS), dispositional mindfulness (FFMQ), and resting state (ARSQ), MBSR demonstrated statistically significant results in some outcome measures, while others showed only small, yet, MBSR-favorable tendencies. Most

notably, the ARSQ subscale Discontinuity of Mind, measuring mind wandering, demonstrated statistically significant effects in reducing mind wandering during rest at 3 months follow-up (-1.4 (95% CI: -2.2 to -0.6)). This effect was, however, smaller at 6 months follow-up, yet, a statistically significant between-group effect still remained (-0.9 (95% CI: -1.8 to -0.01)) (Study 1, Table 3).

STUDY 2

The aim of Study 2 was to investigate if and how an organizational-level MBI including a workplace-adapted MBSR course may impact protective mental health skill of employees and managers.

Pre-intervention categories

Categorizations of meaning units extracted from the pre-intervention focus groups led to the development of four descriptive categories (Table 3). At pre-intervention focus groups, the majority of respondents were able to identify bodily sensations during stressful situations. However, several respondents were unable to describe such bodily sensations, and some even described themselves as detached from their body during feelings of stress. Moreover, most respondents offered examples of reactive or passive behavior during stressful situations. Yet, some managers described patterns of behavior during stress that were more responsive. The category "*Differences in perception as a stressor*" emerged from several respondents spontaneously mentioning viewing social situations differently as an independent stressful event. Finally, the pre-intervention categories revealed a general lack of self-kindness and attention to one's own needs among employees and managers. Conclusively, employees and managers demonstrated a room for improvement in protective mental health skills, such as emotion regulation and kindness towards oneself, at pre-intervention.

Table 3: Pre- and post-intervention categories identified in Study 2 [80]

Pre-intervention categories	Post-intervention categories
<i>Bodily sensations and awareness in stressful situations</i>	<i>Enhanced ability to be aware in the present moment</i>
<i>Reactive and passive behavior during stressful situations</i>	<i>Increased awareness of how others may view things differently from oneself</i>
<i>Differences in perception as a stressor</i>	<i>Increased kindness to oneself and being able to practice self-care</i>
<i>Self-criticism and low ability to practice self-care</i>	<i>Moving from reactive to responsive behavior in stressful situations</i>
	<i>Mindfulness as an accelerator for ongoing personal development</i>
	<i>Practicing mindfulness – Setting time aside or being mindful in everyday life</i>

Post-intervention categories

During the post-intervention focus groups, two respondents independently stated that they experienced feelings with more magnitude compared to before the intervention. The respondents furthermore reported that this added magnitude contributed to enhanced worrying. This tendency, however, was limited to these two individuals and were not stated by any of the remaining respondents. Moreover, several respondents initially reported not having experienced any changes following the intervention. However, as the focus group interviews progressed, the majority of these employees and managers offered examples of changes in, e.g., behavior during stress.

The categorization of meaning units from post-intervention focus groups resulted in six descriptive categories (Table 3). The first four post-intervention categories shed light on the development in protective mental health skills, whereas the last two categories concern factors that may influence how this workplace-MBI may impact mental health skills among employees and managers.

Generally, employees and managers reported examples of being more aware in the present moment, including noticing when they were not aware. This increased awareness manifested itself in an

enhanced ability to sense how one is feeling, enhanced ability to concentrate, to notice when one is ruminating, as well as an increased awareness of the good things in life, such as one's surroundings.

Strongly related to the emergent pre-intervention category "*Differences in perception as a stressor*", employees and managers across companies reported in the post-intervention focus groups that they had gained a better understanding of how individuals may perceive social situations differently. This improved understanding supported the respondents in being curious as to how others might have perceived a given situation. Moreover, as stated by some respondents, being aware of differences in perception facilitated a more reflected and respectful approach to differences in opinion.

In contrast to pre-intervention focus groups, respondents from the post-intervention focus groups reported treating themselves with more kindness compared to before the intervention. Moreover, this increased level of self-kindness was closely related to employees' and managers' ability to practice self-care, such as taking breaks during the workday, and speaking up when their emotional boundaries were reached.

The reactivity identified in the pre-intervention focus groups had been altered to an improved ability to act responsive during stressful situations. Thus, employees and managers offered examples of this increased responsivity in both personal and working relationships. However, some respondents stated that they were sometime not able to stop their automatic reaction in during a stressful situation.

In sum, protective mental health skills, such as practicing self-care and engaging in responsive behaviors during stress, may be enhanced through this organizational-level MBI including a workplace-adapted MBSR course.

STUDY 3

The aim of Study 3 was to investigate whether and how an organizational-level MBI including a workplace-adapted MBSR course could affect the psychosocial work environment when focusing on the theoretical constructs "workplace social capital" and "psychological safety".

Pre-intervention overview

Social capital

In the pre-intervention focus group interviews, a high degree of bonding social capital was identified. Thus, the social capital within departments/teams were characterized by a workplace culture where

employees supported one another and provided help when needed. However, the between-departmental social capital (bridging) was strained at pre-intervention in the majority of the included companies. Hence, the collaboration between departments were described as difficult, primarily due to a lack of understanding of one another. The social capital between employees and managers (linking) at pre-intervention was generally high in all four companies, primarily demonstrated by a collective trust among employees in that their managers cared about their well-being.

Psychological safety

Pre-intervention, a high level of psychological safety was identified in only one of the four included companies. Thus, employees reported feeling safe talking to one's managers about difficult subjects, as well as providing and receiving feedback. In the remaining three companies, respondents stated that they felt safe making mistakes. However, the same respondents also provided examples of fear related to interpersonal risk-taking, such as expressing disagreement with the management.

Post-intervention categories

As described in Chapter 2, data was analyzed using structured categorization matrices. However, an emergent theme was identified during the analysis. Thus, the analysis resulted in three main categories: 1. Social capital, 2. Psychological safety, and 3. Emergent theme: The role of lockdown on the perceived.

Social capital

At the post-intervention focus group interviews, respondents across companies reported not having noticed any change in the intradepartmental collaboration (bonding social capital). However, despite a little room for improvement pre-intervention, employees from two companies described having experienced a positive change in intradepartmental relationships. Thus, there are indications that this workplace-MBI might positive affect relationships within a department/team. However, one respondent mentioned frictions between MBSR-participating employees and non-MBSR participating employees within a department.

Pre-intervention, the social capital between departments/teams (bridging) was strained. Yet, at post-intervention, improvements in the bridging social capital were identified. Thus, respondents from across the four included companies provided examples of both enhanced interdepartmental collaboration, such as sparring with a colleague from another department, trust, and understanding of

one another. Moreover, an employee described a sense of connectedness within the company as a result of the intervention.

Like with the bonding social capital, only a small room for improvement existed in the linking social capital at pre-intervention. Following the intervention, some employees stated that the intervention had reinforced the feeling that the management cared about their well-being. Moreover, an example of a manager being more able to listen actively was reported. Lastly, several managers reported using present moment awareness when engaging in meetings with their employees as a result of the intervention. Thus, norms on how to engage with employees may be impacted by this workplace-MBI.

Psychological safety

At post-intervention, the psychological safety between colleagues at the same hierarchical level in the organization had improved. Hence, both employees and managers expressed a perceived positive change in asking for help, and sharing if one was having a bad day. However, in one department in one of the companies, this was not the case. Moreover, the psychological safety between hierarchical levels did not appear to be affected by the intervention.

Emergent theme: The role of lockdown on the perceived

During the analysis, a theme emerged relating to the potential impact of implementing the intervention during the Covid-19 pandemic. Hence, relational organizational outcomes, such as workplace social capital and psychological safety, may have been affected by the circumstances presented by the Covid-19 restrictions, such as working from home. Thus, based on statements from non-participating MBSR employees, the potential positive ripple effects on relations resulting from an MBI may not have diffused in the entire organization as hypothesized.

STUDY 4

The primary aim of Study 4 was to evaluate the feasibility of implementing an organizational-level MBI including a workplace-adapted MBSR course, measured on reach and dose. Secondly, the study investigated the potential tendencies of change in mental health outcomes and organizational outcomes following the intervention.

Feasibility

Reach of the three intervention elements, introductory session, 10-week live online workplace-adapted MBSR course, and implementation workshop were calculated. In total, 278 (75.54%) employees and managers participated in an introductory session, while 169 (45.92%) employees and managers signed up for a 10-week MBSR course. Lastly, three out of four companies (75.00%) chose to participate in an implementation workshop (Table 2, Study 4). The received dose of the intervention was restricted to the 10-week MBSR course. In total, the 169 employees and managers who signed up for a course participated in a median of 8.0 (q25; q75: 6.0; 9.0) sessions. However, when dividing these 169 into completers (140), and dropouts (29), the respective median received dose was 9.0 (q25; q75: 8.0; 9.0), and 1.0 (1.0; 3.0) (Table 3, Study 4).

Tendencies of change

Mental health outcomes

Of the 368 eligible employees and managers at baseline, 213 (57.88%) completed a baseline questionnaire. The included employees and managers consisted equally of men and women, with a mean age of 41.74 (SD: 10.61) at baseline. At baseline, the mental health scores generally indicated a moderate to good mental health (Table 1, Study 4).

In the mental health outcomes measuring perceived stress, symptoms of depression and anxiety, well-being, resilience, and sleep problems, little to no changes were found at 3 and 12 months follow-up. However, the intermediate outcome EQ – Decentering measuring individuals ability to decenter from thoughts and feelings, increased borderline statistically significantly at 3 months follow-up (1.15 (95% CI: -0.03 to 2.33)), and statistically significantly at 12 months follow-up (1.46 (95% CI: 0.02 to 2.89)) (Table 4, Study 4).

Organizational outcomes

Organizational outcomes, such as social capital demonstrated that the bridging social capital was the most strained at baseline, while psychological safety was generally rated high. Moreover, at baseline, approximately 25% of employees and managers reported occasionally experiencing negative acts (Table 1, Study 4). At 3 months follow-up, the bridging social capital showed a non-statistically significant increase (1.17 (95% CI: -2.16 to 4.50)), while the social capital between employees and

immediate management decreased (-1.91 (95% CI: -5.22 to 1.40)). Bonding social capital, linking social capital (overall management), and psychological safety showed little to no changes at 3 months follow-up. Yet, at 12 months follow-up, psychological safety as well as all subscales of social capital had decreased from the baseline scores (Table 5, Study 4). However, a statistically significant decrease in the odds of occasionally experiencing negative acts (am S-NAQ score of >12) was identified at 3 months follow-up (0.28 (95% CI: 0.12 to 0.68)). At 12 months follow-up, there was still a tendency of reduced odds of occasionally experiencing negative acts (0.63 (95% CI: 0.25 to 1.60)). Yet, the odds ratio was no longer statistically significant (Table 6, Study 4).

CHAPTER 4: DISCUSSION OF MAIN RESULTS

This chapter includes a discussion of the four included original studies structured in sections on feasibility, and impact on intermediate and distal outcomes. During the discussion, brief summaries of the main findings are presented along with discussions of these in the context of previous research.

The aim of this dissertation was to investigate the feasibility and impact of delivering an MBI as a universal mental health promoting and preventive intervention in workplace contexts using distinct population-based approaches. If found feasible, it was hypothesized that an MBI delivered in a workplace context may positively affect both intermediate outcomes, such as protective mental health skills, as well as distal mental health outcomes, e.g., perceived stress level. Moreover, it was hypothesized that if the intervention was delivered at an organizational level to an entire company, this may positively influence workplace relationships, potentially contributing to healthier work environments.

FEASIBILITY

In Study 4, data on the reach of each of the three intervention elements were obtained. Thus, approximately (\approx) 75% of all employees and managers participated in an introductory session, while \approx 46% signed up for a 10-week workplace-adapted MBSR course, and lastly, 75% of the companies participated in an implementation workshop (Table 2, Study 4). A benchmark for the reach of an organizational-level MBI delivered using a population-based approach was not located. However, as this workplace-MBI was delivered as a universal mental health promoting and preventive intervention to a study population whom at baseline demonstrated a generally good mental health (Table 1, Study 4), the intervention reach was considered acceptable.

In Study 1, data was collected on attendance in an original MBSR program, while in Study 4, data on attendance in a workplace-adapted MBSR program was obtained. To enable comparison of the two studies, attrition rates may be consulted. Hence, the MBSR attrition rate in Study 1 and Study 4, respectively, was \approx 19%, and \approx 17%. In a recent study, Lam et al. (2022) found a weighted mean attrition rate of 19.1% (95% CI: 16% to 22%) for MBIs in general [100]. Thus, the attrition rate identified in both Study 1 and Study 4 are within the normal range of MBI attrition across study populations and settings.

In both Study 1 and Study 4, the received MBSR dose was calculated. In Study 1, school teachers participated in an average of 7.6 sessions out of nine possible. In Study 4, employees and managers participated in a median of 8.0 sessions out of ten, when including both MBSR-completers and dropouts. Previously, cut-points of acceptable dose received in MBIs have been suggested. Thus, participation in 50% of the sessions have previously been found indicative of an acceptable intervention that may need further improvements, whereas participation in 66.6% of the sessions or

more is deemed feasible [101, 102]. Referring to these cut-points, the MBSR programs delivered in both Study 1 and Study 4 are feasible. Moreover, the dosage received in both studies are similar to other studies of MBIs delivered in a workplace context [51, 102]. Thus, the programs and delivery thereof are considered both feasible and acceptable.

IMPACT ON INTERMEDIATE OUTCOMES

Based on previous research and mindfulness theory, it was hypothesized that the MBIs investigated in this dissertation may positively influence intermediate outcomes, such as emotion regulation and behavioral patterns, which might potentially impact more distal outcomes, such as individuals' mental health and the psychosocial work environment (Figure 2 and Figure 3). In Study 1 and Study 4, such intermediate outcome were investigated quantitatively using self-report questionnaire data, while in Study 2, qualitative focus group interview data was utilized to gain a deeper understanding of how this potential impact may come about. Hence, all included quantitative intermediate measures operationalized trainable skills that are suggested to positively influence mental health, while the qualitative methods utilized in Study 2 expanded on the expressed everyday life changes, reported by employees and managers.

In Study 1, positive tendencies were found in the proposed mediators, FFMQ and ARSQ, at both 3 and 6 months follow-up. In a recent study using the same data as Study 1, a reduction in mind wandering and planning, as well as enhanced comfort at rest was found to be statistically significant mediators of the effects in both PSS, SCL-5, and WHO-5 [103]. Hence, acquiring skills that enables one to, e.g., not get distracted by thoughts or automatically engage in planning during rest may facilitate positive mental health outcomes, such as reduced perceived stress levels. In line with these results, previous research has also demonstrated that MBIs for school teachers may support the development of protective mental health skills, such as emotion regulation [104], enhanced stress coping, as well as improved relations [105]. Thus, MBSR delivered as a universal mental health promoting and preventive intervention to school teachers may positively affect proposed mediators representing skills related to improved mental health.

Referring to Study 4, a borderline statistically significant positive pre-post intervention change was evident in employees and managers' ability to decenter (EQ – Decentering). This positive change was sustained and reached statistical significance at 12 months follow-up. Hence, company participation in an organizational-level MBI including a 10-week workplace-adapted MBSR course may positively

influence the ability to; be aware in the present moment, and decenter from thoughts and feelings. Previous research has found low levels of decentering associated with poorer mental health outcomes and difficulties in coping with stress [94, 106, 107]. As such, Fresco et al. (2007) suggest that individual's ability to decenter is important for the maintenance of good mental health [94]. Thus, cultivating a positive development in employees' and managers' ability to decenter may support sustainment in the moderate to good mental health, expressed at baseline. However, in both Study 1 and Study 4, little to no changes were evident in the proposed mediator, resilience (BRS). Still previous research has demonstrated various impacts of MBIs on resilience with some showing positive impacts [15, 108], while others show little to no impact [109, 110]. Moreover, only a small room for improvement in this intermediate outcome were evident at baseline in both studies, which may offer an explanation of why no change was evident in this proposed intermediate outcome.

The findings of Study 2 indicated that the organizational-level MBI including a workplace-adapted MBSR course may influence protective mental health skills positively among employees and managers. Based on a transversal analysis [84] of the descriptive categories, two explanatory themes derived: "*Enhanced awareness as a facilitator of kindness towards oneself and felt needs*" and "*Enhanced awareness as a facilitator of behavior change during stressful situations*" [80]. These two themes offered explanations of how the organizational-level MBI may have influenced the mental health skills of employees and managers. Hence, throughout the descriptive categories, enhanced awareness was seen to facilitate greater attention to one's own felt needs, and ability to act on these, as well as positively influence employees' and managers' behavior patterns during stressful situations. Previous research has found self-criticism to be a risk factor of major depressive disorder [111]. On the contrary, self-compassion has been found associated with lower levels of anxiety and depression [111, 112], as well as greater well-being [113]. Moreover, the changes in how employees and managers relate to differences in perception of a social situation from pre- to post-intervention may indicate a change in how one relates to others and engages in social interactions, which could in turn affect workplace social relations. Previous research has documented positive social relations to be protective of the mental health [39, 114, 115]. Additionally, in a recent RCT by Hülshager et al. (2022), the authors investigated the efficacy of delivering a universal individual MBI using an app format to employees and managers compared to a wait-list control group [116]. The results indicated that mindfulness training may effectively reduce participants' reactivity when experiencing affective events [116]. Hence, these results are in line with the results from Study 2. Moreover, in a recent review, Micklitz et al.

(2021) found that MBIs in workplace contexts may facilitate improved well-being and ability to act skillfully during stressful situations [117]. In accordance with findings of Study 2, the authors furthermore found that these changes were caused by, e.g., enhanced awareness and ability to self-regulate, as well as a feeling of being allowed to practice self-care [117]. Thus, in line with previous research [117-122], the explanatory themes indicated that the organizational-level workplace-MBI may facilitate changes in mental health skills that affect both how employees and managers relate to themselves, as well as how they engage in social interactions.

However, the results of Study 2 also demonstrate that being aware of one's patterns of behavior does not always translate into actual behavior change. This tendency may suggest that there is a need for more practice in order to establish sustainable change of behavior from reactive to responsive during stressful situations. This is also in line with previous research indicating that effects of mindfulness training on, e.g., mental distress, are mediated by how much practice, managers engage in [120]. The vast majority of the respondents in Study 2 did not establish a formal mindfulness practice following the intervention. Therefore, the impacts identified in Study 2 may be smaller than what might have been the case, had the participating employees and managers established a formal practice. Still, these smaller impacts are in accordance with what might be expected when utilizing a population-based approach, where individuals with good mental health may dilute impacts.

Thus, based on the findings of Study 1, 2, and 4, delivering an MBI in a workplace context using a population-based approach may yield positive impacts on protective mental health outcomes, such as reduced mind wandering, as well as enhanced ability to decenter, practice self-care, and consciously respond during stressful situations. The improvement of these protective mental health skills may be viewed in light of Dahl et al.'s (2020) framework for training human flourishing [34]. As proposed by the authors, the four pillars of mental health; *awareness, connection, insight, and purpose*, are essentially all trainable skills that have been found to positively affect individual's well-being [34]. In Study 2, increased awareness in the present moment was seen to facilitate both self-care and behavior change. Thus, positive changes were identified in: employees and managers ability to be aware in the present moment (awareness), how they relate to own felt needs (insight), as well as how they engage in social situations (connection to others). This is also in line with the findings in Study 1 and Study 4, where changes in dispositional mindfulness and decentering could represent a positive development in both the *awareness* and *insight* pillar. According to the framework by Dahl et al.

(2020), improvements in these pillars are suggested to positively influence more distal mental health outcomes, such as well-being.

IMPACT ON DISTAL OUTCOMES

In Study 1 and 4, quantitative outcome measures were utilized. In Study 1, distal outcome measures consisted entirely of self-reported mental health outcomes, whereas Study 4 included both mental health and organizational distal outcome measures. In Study 3, qualitative methods were used to investigate the impact of an organizational-level MBI including a workplace-adapted 10-week MBSR course as expressed by employees and managers.

Mental health outcomes

In both Study 1 and Study 4, participants constituted a population with a good to moderate mental health at baseline. Hence, only a small room for mental health improvement was evident in both study populations. In Study 1, MBSR as part of a teacher-training program was found effective in reducing perceived stress levels among lower secondary school teachers. Thus, MBSR utilized as a mental health promoting and preventive intervention may facilitate mental health improvements among school teachers participating in a continuing education, when measured specifically on perceived stress. Taken the small room for improvement in perceived stress level at baseline into account, it is noteworthy that the trial yielded small yet statistically significant effects. Such small effects generated in studies using a population-based approach may however contribute to larger societal implications [4], such as reduced number of sick leaves due to stress. In a meta-analysis of the effects of MBIs on educators, Zarate and colleagues (2019) found positive moderate effects on stress measures [123]. Moreover, a recent scoping review also found MBIs to facilitate lower self-reported stress levels among teachers [124]. Hence, in spite of a small room for improvement in perceived stress at baseline the main results are in line with findings from previous research. However, little to no between-group effects were seen on well-being or symptoms of depression and anxiety in Study 1, whereas previously published research predominantly has shown positive effects of MBIs for teachers on measures of well-being, depression, and anxiety [105, 123, 125-127]. At baseline, the included school teachers had a mean WHO-5 score of 59.1 (SD: 17.0) points (Table 1, Study 1). In a recent study by Moeller et al. (2023), the authors found a mean WHO-5 score in the Danish population of 63.9 (SD: 22.0), with a normal range of 40 points or more [128]. Hence, the well-being of the included school teachers at baseline was slightly less than the mean of the general Danish population. Thus, the trial might have

been expected to yield larger effects than what was the case. Still, the included school teachers' WHO-5 scores were within the normal range of 40 points or more, and thus, no large room for improvement was evident. The baseline mean SCL-5 score, however, did indeed indicate a small room for improvement regarding self-reported symptoms of depression and anxiety among the included teachers (1.9 (SD: 0.5)). In a Danish study using a community sample among individuals with stress-related problems, baseline mean SCL-5 scores were between 2.8 (SD: 0.6), and 3.0 (SD: 0.8). Hence, the small room for improvement in self-reported symptoms of depression and anxiety is in accordance with the expected when delivering MBSR as a mental health promoting and preventive intervention using a population-based approach. These limited rooms for improvements mostly in negative mental health outcomes (symptoms of depression and anxiety), but also in positive mental health outcomes (well-being) may explain the limited effects on these measures in Study 1.

In Study 4, little to no changes were seen in distal mental health outcomes when comparing baseline measurement to post-intervention measurements (Table 4, Study 4). The vast majority of published research of MBIs in workplace context has identified positive impacts on self-reported mental health outcomes [12, 15, 19]. Like in Study 1, the absence of impact on mental health outcomes in Study 4 may be due to the small room for improvement in mental health at baseline (Table 1, Study 4). Thus, employees and managers contributing with data in Study 4 displayed an even smaller room for improvement in the mental health outcomes PSS and SCL-5 at baseline than the school teachers included in Study 1. However, as will be discussed in Chapter 5, the pre-post design without a control group made Study 4 susceptible to changes in time. As the study was conducted in the midst of the Covid-19 pandemic, an abundance of changes both at work and outside of work may have influenced the mental health of employees and managers within the participating companies. As such, the authors of a large representative Danish study found a statistically significant decrease in well-being measured by the SWEMWBS from pre-pandemic 2019 to mid-pandemic autumn 2020 [129]. Moreover, the percentage of Danes reporting a high perceived stress level also increased from 2017 to 2021 [22]. Therefore, the tendencies indicating no change in mental health outcomes may potentially reflect a protective mental health impact of the intervention.

Organizational outcomes

The research project "Implementation of modified Mindfulness-based stress reduction in private Companies" informing both Study 3 and 4 aimed both at promoting employee and manager mental health, as well as evoking system change in interpersonal relations in the workplace using an

organizational-level MBI. On the contrary, the intervention delivered in Study 1 was not based in an organization. Rather the intervention was delivered to self-selecting teachers across 110 different Danish schools. Thus, no relational organizational impact was expected.

In Study 4, impact on the organizational outcomes, social capital, negative acts, and psychological safety, was investigated using quantitative outcomes measures, while Study 3 was based on qualitative methodology to gain a deeper understanding of how an organizational-level MBI may impact workplace relations. In Study 4, baseline characteristics revealed that the social capital between departments/teams (bridging) demonstrated the largest room for improvement regarding workplace social capital. Accordingly, the results of Study 4 indicated a tendency to a small positive change in the bridging social capital at 3 months follow-up (Table 5, Study 4). This change was in line with results from Study 3 where the greatest impact on workplace social capital was found in especially the interdepartmental collaboration [130]. Moreover, the results of Study 3 indicated a modest improvement in social capital between employees from the same department/team (bonding), as well as between employees and managers (linking). Specifically, employees reported that the implementation of the organizational-level MBI had emphasized the experience that the management cared about employee well-being. This is in line with findings from a recent qualitative study about establishing the institutional frames to facilitate mindfulness and self-care at work among health care providers [131]. In their study, Valipour et al. (2023) found that work environments that reflect the organization's intention to support employee well-being contribute to an enhanced feeling of being cared for among employees [131]. Hence, evoking such system change in the psychosocial work environment may contribute positively to the social capital between employees and management. However, the results of Study 4 indicated a small negative tendency of change in the social capital between employees and immediate management (linking) at 3 months follow-up. This divergence between results from Study 3 and 4 may be due to differences in operationalization of the construct "social capital" utilized in the quantitative questionnaire, and the qualitative deductive content analysis. Moreover, the qualitative content analysis did not divide linking social capital into "immediate management" and "overall management" as was done in the quantitative analysis in Study 4. Additionally, differences in respondent characteristics informing both the quantitative and qualitative data may have influenced the results.

Aside from the negative tendency of change in linking social capital between employees and immediate management uncovered in Study 4, the remaining outcome measures of social capital

and psychological safety indicated small positive or no tendencies of change at 3 months follow-up (Table 5, Study 4). Furthermore, the results of Study 4 indicated a decrease in the frequency of experiencing negative acts in the workplace (Table 6, Study 4). These positive tendencies in improved interpersonal relations are in line with previous research. Thus, previous research has found mindfulness training to facilitate prosocial behavior between groups [46, 132], as a result of, e.g., reduced “us” versus “them”-thinking [46]. Moreover, higher levels of trait mindfulness have been found to positively influence incivility at work [57]. However, these small yet positive organizational impacts were not sustained at 12 months follow-up, as identified in Study 4 (Table 5 and Table 6, Study 4). On the contrary, several organizational outcome measures demonstrated reduced levels in both social capital and psychological safety at 12 months follow-up when compared to baseline measurement. As will be discussed in further detail in Chapter 5, this may be due to the Study’s susceptibility to changes in time caused by the trial design. The emergent theme uncovered in Study 3 supports this notion, suggesting that organizational impact may have had difficulty diffusing into the entire organization due to restrictions caused by the Covid-19 pandemic [130]. Thus, the potential positive relational impacts caused by some employees and managers who participated in a workplace-adapted MBSR course may be smaller than expected due to the Covid-19 restrictions, including remote work. Hence, based on the studies informing this dissertation, the organizational-level MBI including a workplace-adapted 10-week MBSR program may have the potential to yield positive impacts on workplace relations immediately following the intervention. However, the long-term impacts of the intervention are uncertain.

The results of the original studies included in this dissertation indicated that it is indeed feasible to deliver MBIs as mental health promoting and preventive interventions in workplace contexts using population-based approaches. This was the case both when the MBI was conveyed by the employer to self-selected employees, and when the MBI was delivered at an organizational level to entire companies. When delivered at the organizational level, such interventions may support healthier work environments owing to improved interpersonal relations. Moreover, the results demonstrated that such workplace-MBIs may have the capacity to promote distal mental health outcomes, such as perceived stress among self-selecting school teachers. However, the largest impact of such interventions may be on intermediate outcomes, representing protective mental health skills. This may be due to the population-based approach, where potentially large changes among employees and managers with poorer mental health may be diluted by no or very small changes among those with a good mental health.

CHAPTER 5: DISCUSSION OF METHODOLOGY

This chapter includes a discussion of the methodologies used to inform this dissertation. Moreover, the design of the two overarching research projects “SELFCARE” and “Implementation of modified Mindfulness-based stress reduction in private Companies” are discussed.

A collective strength of the two research projects informing this dissertation is that both projects utilized a population-based approach to investigate an MBI in a real-life setting. Thus, both projects shed light on the potential impacts of such interventions when delivered in the context in which they are intended to be implemented in. Moreover, by deploying a population-based approach, both projects ameliorated the potential risk of stigmatization when delivering mental health promoting and preventive interventions targeted selected groups, such as individuals at high risk of depression [4, 23]. However, the results of the four studies must be understood in relation to methodological strengths and limitations in both the design of the two research projects, as well as the scientific methods used in the respective four studies.

SELFCARE

Study 1 was conducted as a nested trial within the cluster-randomized controlled SELFCARE trial [67]. The robust study design including a well-powered study population enabled the investigation of the effectiveness of the original MBSR program as part of a teacher-training program for reducing perceived stress levels among lower secondary school teachers. Moreover, the study population included school teachers from all five geographical regions of Denmark, indicating a representative national sample. However, even though the study utilized a population-based approach where all Danish lower secondary school teachers working at school with a 100 or more pupils were eligible for inclusion, participating school teachers represented teachers who wished to qualify to deliver an MBI in schools [67]. Hence, the study population may consist of a motivated group of teachers with a pre-existing interest in mindfulness. Thus, the generalizability of the results might be restricted to lower secondary school teachers interested in mindfulness. Moreover, the study utilized a wait-list control as the control condition. Therefore, the control condition was to continue usual practice, and hence, no conclusions can be made on MBSR-specific effects. Accordingly, previous research has indeed found, e.g., physical activity interventions effective in reducing symptoms of depression, anxiety, and distress [133]. Moreover, Hoge et al. (2021) found that MBIs did not surpass active control conditions measured on emotional-related constructs related to mental health [134]. Still, in their review containing 101 RCTs of the effects of MBSR, de Vibe et al. (2017) found small, yet, statistically significant effects of MBSR on mental health outcomes when compared to active control conditions [9]. Hence, this review including a large body of evidence points to the fact that MBSR does in fact have significant stress-reducing effects as demonstrated in Study 1.

As Study 1 was conducted as a nested trial, long term follow-up of the effectiveness of MBSR past 6 months was not feasible, due to the two remaining elements of the teacher-training program being introduced after 6 months follow-up [67]. Moreover, the evaluation of the intervention was restricted to intermediate and distal mental health related outcomes, and thus, did not include work-related measures. In Study 1, MBSR was delivered as a universal individual mental health promoting and preventive intervention to teachers that did not (necessarily) share a common workplace. Therefore, no relational organizational effects were expected. However, the trial might have benefitted from including register-based data on, e.g. differences in the number of sick days between the intervention and control group, or self-reported measures of, e.g. job satisfaction and turnover intentions, as utilized as individual work-related outcomes in previous research [12, 15, 60, 62]. Moreover, in Study 1, the investigation of potential mediators of change focused on quantitative outcome measures of resilience, dispositional mindfulness, and thoughts and feelings in rest. As put forth by the MRC, investigation of complex interventions such as MBSR may benefit from complementary qualitative data on the study participants' experiences of participating in the intervention [24]. However, the aim of Study 1 was to evaluate the effectiveness of MBSR as part of a teacher-training program for lower secondary school teachers. Thus, the trial design and data fit the purpose of the Study.

IMPLEMENTATION OF MODIFIED MINDFULNESS-BASED STRESS REDUCTION IN PRIVATE COMPANIES

In the research project "Implementation of modified Mindfulness-based stress reduction in private Companies" both self-reported measures of proposed mediators of change, such as decentering and resilience, as well as a qualitative exploration was utilized. Deploying a multi-method design when evaluating an MBI may enable a fuller understanding of the potential changes evoked by such an intervention. Moreover, in previous research it has been suggested that the usage of both quantitative and qualitative methods is highly relevant and called for when investigating spiritual experiences – or perhaps – when evaluating any construct affecting human beings [135]. Thus, the utilization of the multi-method design poses a strength to this dissertation as it has the potential to qualify a deeper understanding of how using an adapted version of MBSR as a mental health promoting and preventive intervention in workplace contexts may affect both protective mental health skills and more distal mental health and organizational outcomes.

The main aim of the research project was to evaluate the feasibility of an organizational-level MBI in private workplace settings with the purpose of both affecting mental health related outcomes as well

as improve psychosocial work environments through relational change. The research project was thus conducted as a feasibility trial that touched upon three parts of a process evaluation; contextual factors, implementation, and mechanisms of impact with a specific focus on mediators of change [79]. Moreover, the research project included a secondary evaluation of tendencies of change.

Contextual factors

According to Moore et al. (2015), contextual factors constitute factors that may influence (or be influenced by) how the intervention is implemented, as well as if and how proposed mechanisms of change are activated [79]. Investigation of the contextual factors influencing the intervention was in this dissertation restricted to the emergent theme in Study 2, indicating that Covid-19 restrictions may have affected the diffusion of intervention impact in the organization. Thus, the investigation of contextual factors is indeed limited. Still, data on barriers and facilitators regarding implementation and impact of the intervention was collected during the semi-structured focus group conducted in the research project. However, the findings resulting from data on barriers and facilitators will be included in a future study.

Implementation

In Study 4, data on reach and dose was collected so to inform an evaluation of the implementation of the intervention in the included companies. Moreover, the adjustments made during the process of adapting the original MBSR curriculum to a private workplace context was carefully discussed and noted. Additionally, the adaptation process followed the framework of adapting MBIs to specific contexts while maintaining the essential elements of such an intervention [41]. Thus, the 10-week workplace-adapted MBSR program included the essential and active elements of an MBI, such as practices of awareness and acceptance, as well as mindfulness meditation exercises [41, 136]. However, qualitative data on how company representatives experienced the local implementation would have further qualified the evaluation of the implementation process [79]. Hence, data on potential obstructing and facilitating implementation factors as experienced by company representatives might have provided valuable knowledge for future effectiveness studies. Moreover, the organizational-level MBI including a 10-week workplace-adapted MBSR course was delivered using a live online format. Prior research has found online or hybrid formats to be as effective as face-to-face delivery in non-workplace contexts [137]. Moreover, previous research has found positive effects of either online or app-based delivery formats when delivering MBIs in workplace contexts [108, 138], as well as in non-workplace contexts [139-141]. Hence, it was suggested that the live

online delivery format would be both feasible and have the potential to facilitate the hypothesized impacts. Furthermore, the evaluation of intervention implementation might have benefitted from data on the fidelity of the intervention delivery. For such purpose, quantitative scores from the Mindfulness-based Interventions: Teaching Assessment Criteria (MBI: TAC) might have been utilized [142]. However, in both the SELFCARE trial and the “Implementation of modified Mindfulness-based stress reduction in private companies” project, the trained MBSR teachers delivering the intervention were supervised throughout the delivery of the MBSR programs following the key features in the MBI: TAC [142]. Yet, the scoring system developed for the MBI: TAC was not deployed during supervisions. Hence, no score was calculated of the individual MBSR teacher’s competence in delivering the intervention. Still, following the six domains of the MBI: TAC with included key features, MBSR-program fidelity was ensured in both research projects informing this dissertation. However, field observations might have been conducted in all three intervention components; introductory session, 10-week MBSR course, and implementation workshops, to document intervention fidelity in all three components. However, I participated in all intervention components delivered to the companies, and the content and delivery of these were discussed in the research group throughout the intervention. Hence, intervention fidelity was continuously monitored.

Proposed mediators of impact

As described by Moore et al. (2015), investigating mechanisms of impacts is an intrinsic part of a process evaluation, which may be explored using both quantitative and qualitative data on proposed mediators of change [79]. As in Study 1, Study 4 included data on proposed mediators of change, i.e. decentering and resilience. However, none of the studies included a structural equation model of the degree to which potential changes in distal outcomes may be explained by changes in intermediate outcomes. Thus, the potential impact of these proposed mediators on distal mental health outcomes have not been analyzed in this dissertation. Moreover, Study 1 and Study 4 included quantitative measures of *proposed* mediators that – based on previous research - may constitute protective mental health skills. Such proposed mediators may all be indicative of changes in individuals’ mental shape. As suggested in previous research, one’s mental shape may be trained using mindfulness, just as one’s physical shape may be trained by physical exercises [31-33]. However, no collected measure of change in individuals’ mental shape, similar to that of one’s physical shape, was located. However, the qualitative investigation of the intervention’s impact on mental health skills as expressed by employees and managers reported in Study 2 qualified the understanding of how this intervention may positively

affect intermediate intervention outcomes that would not have been uncovered, had the evaluation been purely quantitative. Hence, these qualitative data supported a deeper understanding of the underlying mechanisms. However, the data used in Study 2 was collected using semi-structured focus group interviews. Therefore, the collected data may not offer in-depth insights into the lived experiences of employees and managers, as would have been the case had data been collected using individual interviews [143]. Thus, social dynamics of the focus groups may have affected the identified impacts. However, previous research using data from individual interviews has yielded results similar to those of Study 2 [118, 119], indicating validity of the results of Study 2. Moreover, the results of Study 3 may be seen in light of the findings of Study 2, showing lowered reactivity in stressful situations, which may positively affect interpersonal relations in the workplace. Additionally, the positive impact on organizational outcomes identified in Study 3 may contribute to a more nuanced understanding of the organizational findings in Study 4. Thus, utilizing both quantitative and qualitative methods allowed for complementary relations between the methodologies, which contributed to a fuller understanding of the potential mechanisms of change of this workplace-MBI [144].

Evaluation of tendencies of change

The quantitative evaluation of tendencies of change in mental health and organizational outcomes was secondary in the research project "Implementation of modified Mindfulness-based stress reduction in private Companies". As the trial did not aim to estimate between-group effects of the intervention, the project utilized a quasi-experimental design without a control group. A reason for the choice of study design was also that one of the main hypotheses behind using the organizational-level implementation was that the intervention could evoke system change, possibly resulting in healthier work environments. Therefore, it would be in disaccordance with the hypothesis to randomize individuals within a company to either an intervention or control arm. Should the trial, however, have had the possibility of investigating between-group effects, participating companies would have had to be cluster-randomized, which would have required a large number of companies to ensure a successful randomization. Alternatively, a non-randomized trial using matched controls might have been an alternative to the extensive cluster-randomized design. Still, ensuring comparability between the intervention company and its matched control might have been difficult, as companies should be comparable in terms of motivation, baseline mental health and psychosocial work environment. However, it is encouraged that such studies are conducted in the future.

However, utilizing the quasi-experimental design without a control group meant that the trial was highly susceptible to changes in time. As the research project was carried out in the midst of the Covid-19 pandemic, substantial variations in time occurred during the trial period (Figure 1, Study 4). Hence, the tendencies of change identified in Study 4 may have been influenced by contextual factors that varied at the three data collection points, such as remote work, enhanced mental health worrying, and isolation. Therefore, distal outcomes of Study 4 ought to be interpreted with due caution. However, changes in intermediate outcomes that are closer to the intervention, such as EQ-Decentering, may be less susceptible to contextual factors, such as lockdowns. This particular outcome may thus be more reliable for interpretation in Study 4. Due to the study design, the importance of including qualitative data to inform of some of the underlying mechanisms behind the quantitative findings was highlighted. Hence, had the research project solely included a quantitative evaluation, the intervention may have been deemed feasible yet to some extent incapable of evoking changes in mental health and organizational outcomes.

Moreover, the trial design in Study 4 varies from that in Study 1. Thus, in Study 1, between-group effects were calculated for teachers in the intervention group compared to those in the wait-list control group. On the other hand, in Study 4, tendencies of change from baseline to 3 and 12 months follow-up were measured among employees and managers contributing with questionnaire data irrespectively of MBSR-participation status. The choice of analyzing changes in all employees and managers irrespectively of whether they participated in a 10-week workplace-adapted MBSR course was aligned with the trial purpose of affecting entire organizations, and thereby contributing to an overall positive change in the entire company. However, it would have been interesting to perform supplemental subgroup analyses of tendencies of change among MBSR-participating employees and managers compared to non-MBSR participants. Yet, there was a fair amount of missing data at 3 months follow-up in Study 4, as well as a low response rate at 12 months follow-up when compared to previous research [145, 146]. Moreover, those employees and managers who did not complete an MBSR course, but contributed with questionnaire data at 3 months follow-up, was found to be a highly selected group with a pre-existing good mental health (Table O3, Supplementary material, Study 4). Hence, MBSR-participating employees and managers who contributed with questionnaire data were not comparable to non-MBSR participants who contributed with questionnaire data. Therefore, it was not sensible to perform subgroup analyses. However, the large amount of missing data not only prohibited the conduction of subgroup analyses. It is also a cause for concern of the general interpretation of the results of Study 4. Currently, there are no official guidelines on the acceptable

amount of missing data. However, previous research has suggested that when more than 10% of data is missing, estimates may be biased [147]. Thus, keeping the percentages of $\approx 35\%$ missing data at 3 months follow-up and $\approx 60\%$ at 12 months follow-up in mind, this begs the question: might the results of Study 4 be biased? To investigate this question, sensitivity analyses were performed. These demonstrated that estimates of changes in both mental health and organizational outcomes were indeed affected by the model-based predictions of missing data at both 3 months and 12 months follow-up (Tables O4-O5, Supplemental material, Study 4). For the odds ratio of occasionally experiencing negative acts, this was especially the case 12 months follow-up (Figure O2, Supplemental material, Study 4). Thus, sensitivity analyses revealed that the estimated odds ratio might be biased towards demonstrating a smaller impact at follow-up when compared to baseline, due to individuals with missing data seemingly having lower predicted logodds of occasionally experiencing negative acts at 12 months follow-up compared to those, who contributed with data (Figure O2, Supplemental material, Study 4). Thus, the estimates of changes in distal mental health and organizational outcomes may have been impacted by the missing data at both follow-up time points. Therefore, the results of tendencies of change in distal mental health and organizational outcomes ought to be interpreted with due caution, especially those at 12 months follow-up. However, in the sensitivity analyses, the estimate of change in the intermediate mental health outcome, decentering, demonstrated favorable results even in the model-based prediction of missing data experiencing $0.2 \times SD$ less than the adjusted point estimate of EQ-decentering. Thus, the direction of the association with this intermediate outcome measure may be more certain than the distal outcomes, especially at 12 months follow-up.

A recent review of organizational-level interventions to improve both the psychosocial work environment and health of workers was published in Spring 2023 [148]. Interestingly, the authors excluded MBIs from the review based on the notion that such interventions aim solely at evoking individual change in, e.g. coping strategies [148]. However, as demonstrated in this dissertation, workplace-MBIs delivered at an organizational level may in fact have the potential to positively influence organizational outcomes, such as negative acts and social capital between departments/teams at post-intervention. Thus, the results of this dissertation may hopefully contribute to a shift in perceptions of MBIs as purely aimed at impacting individuals as separated from the context in which they engage in.

CHAPTER 6: CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

In this chapter, the main conclusions of each of the four included studies are presented followed by a collected conclusion of this dissertation. Moreover, the chapter includes concluding remarks on implications for future research.

In **Study 1**, MBSR as part of a teacher-training program was found effective in reducing perceived stress among lower secondary school teachers participating in a continuing education qualifying them to teach mindfulness in schools. However, little to no effects were identified in well-being, or symptoms of depression and anxiety. Still, results indicated that the intervention group experienced decreased levels of mind wandering, which has previously been found associated with self-reported happiness. Moreover, small, yet, MBSR-favorable tendencies were found in proposed mediators, such as dispositional mindfulness, and comfort at rest.

The qualitative results of **Study 2** indicated that an organizational-level MBI including a 10-week workplace-adapted MBSR program may enhance mental health skills among employees and managers in private companies. Based on the identified explanatory themes, the improvements in mental health skills may have been facilitated by enhanced awareness resulting in both increased self-care, and ability to respond appropriately during stressful situations.

In **Study 3**, the organizational-level MBI including a 10-week workplace-adapted MBSR program was found to have the capacity to influence interpersonal organizational constructs of workplace social capital and psychological safety. Thus, following the intervention, the largest impact was seen on social capital between departments/teams, whereas only small positive impacts were identified in the social capital within departments/teams, and between employees and managers. Moreover, positive changes were seen in the psychological safety among employees and managers at the same level of employment.

In **Study 4**, the organizational-level MBI including a 10-week workplace-adapted MBSR program was found feasible based on reach and dose of the intervention. However, little to no changes were seen in distal mental health outcomes, such as perceived stress and well-being. Yet, larger tendencies were identified in the intermediate outcome measure, EQ-Decentering, representing a mental health skill. Changes in organizational outcomes demonstrated the largest positive changes in social capital between departments/teams, and the odds of experiencing occasional negative acts at 3 months follow-up. However, at 12 months follow-up, all organizational measures, except for the odds ratio of experiencing negative acts, had decreased when compared to baseline. Due to the trial design, the results of Study 4 are highly susceptible to changes in time, and tendencies in outcomes that may be affected by contextual factors, such as the Covid-19 pandemic, should be interpreted with due caution.

In sum, the results of the studies included in this dissertation demonstrate the feasibility of delivering MBIs as mental health promoting and preventive interventions in workplace contexts using distinct population-based approaches. The results indicate that when such interventions are delivered to populations with a small room for improvement in mental health outcomes, the interventions may mostly affect intermediate outcomes, such as enhanced awareness, self-care, and comfort at rest, as well as reduced mind wandering at rest, and reactivity in stressful situations. Based on previous research, these intermediate outcomes may represent protective mental health skills. Moreover, when delivered to a group of self-selecting school teachers, MBSR may facilitate reduced perceived stress levels. However, when delivered at an organizational-level, such impacts on distal mental health outcomes among employees and managers were not identified. Still, an organizational-level MBI may support the psychosocial work environment through improved interpersonal relationship between departments/teams, and reduced odds of occasionally experiencing negative acts in the workplace.

In the two research projects informing this dissertation, there was generally a small room for improvement in mental health outcomes at baseline. This was in line with what was expected when utilizing population-based approaches to deliver MBIs to an entire population irrespectively of mental health status. However, when delivering MBIs as mental health promoting and preventive interventions to entire populations, special attention to intermediate outcome measures of protective mental health skills may be warranted. Thus, based on the findings of this dissertation, it is encouraged that future research utilize measures of intermediate outcomes that may constitute protective mental health skills so to avoid the risk of interventions potentially being wrongfully deemed ineffective by solely looking at distal mental health impacts. Closely related, there is a need for more research into the mechanisms of impact of MBIs delivered in workplace contexts so to identify the ways in which such interventions may evoke changes in both mental health and organizational outcomes. Moreover, as has been proposed in previous research, one's mental shape may be trained, just as one's physical shape. However, quantitative measures of changes in individuals' mental shape are lacking. Thus, development of such measures is encouraged. Furthermore, future research should investigate potential barriers and facilitators for implementing MBIs in workplace contexts, as well as contextual factors that may influence how such interventions works. Lastly, more research is required to shed light on the potential organizational impacts of organizational-level MBIs aimed at supporting the development of healthier psychosocial work environments through improved interpersonal relations.

ENGLISH SUMMARY

The mental health of the World's population has been continuously declining over the past decades. Accordingly, international organizations are advocating for the implementation of mental health promoting and preventive interventions into everyday life settings, such as workplaces. By utilizing population-based approaches, mental health promoting and preventive interventions may be delivered to entire populations irrespectively of their mental health state. Mindfulness-based interventions (MBIs) delivered in workplace contexts have been found effective in enhancing the mental health. Moreover, it has been suggested that such interventions may positively influence organizational outcomes, such as interpersonal relations. However, the research field of mindfulness in workplace contexts is still in a nascent stage, and characterized by uncertainties of the potential impacts on specific professions, such as teachers and private sector workers, as well as relational organizational impacts of MBIs delivered in workplace contexts. Therefore, the overall aim of this dissertation was to investigate the feasibility and potential impact of MBIs delivered in workplace contexts using two distinct population-based approaches. To fulfill this aim, four studies were conducted using data from two independent research projects.

In Study 1, a population-based approach was deployed by offering the intervention to school teachers who did not share a common workplace. Instead, the possibility to participate was conveyed by the employer. Results indicated that participating in an 8-week Mindfulness-based stress reduction (MBSR) course as part of a continuing education is effective in reducing perceived stress among lower secondary school teachers. Moreover, findings suggest that the intervention may facilitate positive effects in protective mental health skills, such as reduced mind wandering.

Study 2, 3, and 4 utilized data from a research project investigating the feasibility of an organizational-level MBI including a workplace-adapted MBSR program in private workplace settings. Hence, a population-based approach including invitation of all employees and managers in a company to participate in an intervention with the aim of impacting both the mental health and relational organizational outcomes. Using qualitative focus group data, results of Study 2 indicated that the intervention may positively impact protective mental health skills, such as enhanced awareness, self-kindness, and ability to respond appropriately in stressful situations. Study 3 included a qualitative exploration of the potential impact of the intervention on the two organizational constructs *workplace social capital* and *psychological safety*. Deductive qualitative content analysis of focus group data yielded findings that suggest that the intervention may have the capacity to positively influence

primarily the social capital between departments/teams, as well as psychological safety between people at the same level of employment.

Study 4 aimed primarily at investigating the feasibility of the intervention, and secondarily the tendencies of change from baseline to 3 and 12 months follow-up on mental health and organizational outcomes. Based on data on reach and dose, the intervention was found feasible. Tendencies of change revealed little to no changes in distal mental health outcomes, such as perceived stress, at follow-up. Still, a positive change was seen in the proposed mediator, decentering, at both 3 months and 12 months follow-up. Tendencies in organizational outcomes varied. However, a positive tendency was identified in social capital between departments/teams as well as the odds of occasionally experiencing negative acts at 3 months follow-up. However, the due to the study design, the results are highly susceptible to changes in time.

In conclusion, this dissertation contributes with insights into the feasibility and impact of delivering MBIs in workplace contexts using population-based approaches. The results indicate that such interventions are feasible, and that they may facilitate positive changes in protective mental health skills, and to a smaller extent to more distal mental health outcomes, such as perceived stress. Moreover, when an MBI is delivered at an organizational level, the intervention may contribute to improved intra-organizational relations. However, the long-term impacts are less clear. Based on this dissertation, it is recommended that future research apply scientific methods so to gain insights into the impacts of MBIs delivered as mental health promoting and preventive interventions on protective mental health skills. Shedding light on these intermediate outcomes may further the understanding of how such interventions could potentially protect individual's future mental health. Moreover, the research field would benefit from more studies investigating MBIs as organizational-level interventions, and not merely as individual interventions.

DANISH SUMMARY

De seneste årtier har befolkningens mentale sundhed været stødt faldende på tværs af landegrænser. Som følge heraf anbefaler en række internationale organisationer at implementere mental sundhedsfremmende og forebyggende interventioner i de kontekster, hvor vi mennesker lever vores liv, såsom på arbejdspladser. Sådanne interventioner kan leveres ved hjælp af populationsbaserede strategier, hvorved interventionen bliver tilbudt alle, uagtet hvordan deres mentale sundhedstilstand er. Tidligere forskning har fundet, at mindfulnessbaserede interventioner (MBI'er), der bliver leveret i en arbejdspladskontekst, kan have en positiv påvirkning på både mentale sundhedsmål samt relationer internt i organisationer. Til trods for at der de seneste år gradvist er kommet mere forskning af mindfulness leveret i arbejdspladskontekster, befinder forskningsfeltet sig stadig i et spirende stadie. Feltet der derfor karakteriseret af usikkerheder om, f.eks. hvordan sådanne interventioner påvirker bestemte professioner, såsom lærere og ansatte i private virksomheder, samt hvordan relationer internt på arbejdspladser influeres af MBI'er. Det overordnede formål med denne afhandling var derfor at undersøge, hvorvidt det er muligt levere sådanne interventioner i danske arbejdspladskontekster med populationsbaserede strategier, samt om og hvordan sådanne interventioner kan påvirke både mentale sundhedsmål og relationer på arbejdspladser. For at opfylde dette mål blev der anvendt data fra to selvstændige forskningsprojekter, hvori der var brugt to forskellige populationsbaserede strategier.

I Studie 1 blev en populationsbaseret strategi anvendt til at levere en MBI til en population af skolelærere, som ikke var ansat på den samme arbejdsplads. Muligheden for at deltage i interventionen blev formidlet af arbejdsgiveren, men fandt sted uden for lærerens fysiske arbejdsplads. Resultaterne af Studie 1 indikerer, at deltagelse i et 8-ugers Mindfulnessbaseret stressreduktionskursus (MBSR) som en del af en efteruddannelse var effektiv til at reducere oplevet stressniveau 6 måneder efter start. Derudover viste resultaterne, at interventionen var effektiv til fremme mentale sundhedsfærdigheder, såsom nedsat tankemylder i hvile.

Studie 2, 3 og 4 anvendte data fra et forskningsprojekt, hvori der indgik en undersøgelse af gennemførligheden af en MBI leveret på organisationsniveau, hvori medarbejdere og ledere havde muligheden for at deltage på et 10-ugers arbejdspladstilpasset MBSR-kursus. I dette forskningsprojekt blev en populationsbaseret strategi anvendt til at tilbyde alle medarbejdere og ledere i en virksomhed at deltage i en mental sundhedsfremmende og forebyggende intervention, som også havde til formål at styrke relationer internt på arbejdspladsen. Kvalitative fund i Studie 2 indikerer, at interventionen kan påvirke mentale sundhedsfærdigheder, såsom øget opmærksomhed, venlighed mod sig selv samt

øget evne til at respondere hensigtsmæssigt i stressfyldte situationer. Studie 3 inkluderede en kvalitativ undersøgelse af, hvorvidt interventionen kunne påvirke virksomhedens sociale kapital og psykologiske sikkerhed. Deduktiv kvalitativ indholdsanalyse af fokusgruppedata viste, at interventionen kan facilitere positive ændringer i primært den sociale kapital mellem afdelinger/teams, samt den psykologiske sikkerhed mellem personer, der er ansat på samme organisatoriske niveau.

Det primære formål i Studie 4 var at afdække muligheden for at gennemføre interventionen. Derudover var det sekundære formål at undersøge de potentielle ændringer i mentale sundheds- og organisationsmål efter 3 og 12 måneders opfølgning. Baseret på data om rækkevidde (reach) og dosis (dose) blev interventionen fundet mulig at gennemføre i danske private virksomheder. Ændringerne fra interventionsstart til 3 og 12 måneders opfølgning viste kun små eller ingen ændringer i mentale sundhedsmål, såsom oplevet stressniveau. Til trods herfor viste resultaterne en tendens til en positiv påvirkning af en mental sundhedsfærdighed, decentrering, ved både 3 og 12 måneders opfølgning. Ændringerne i organisatoriske mål varierede. Imidlertid indikerede resultaterne, at der kan være en positiv påvirkning af den sociale kapital mellem afdelinger/teams samt risikoen for sommetider at opleve negative handlinger ved 3 måneders opfølgning sammenlignet med interventionsstart. Studiedesignet gør dog, at resultaterne kan være påvirket af ændringer i tiden, som er uafhængige af interventionen. Derfor bør resultater, der kan påvirkes af andet end interventionen, fortolkes med forsigtighed.

Denne afhandling bidrager med indsigter i gennemførligheden af at anvende populationsbaserede tilgange til at levere MBI'er i arbejdspladskontekster, samt hvordan det kan påvirke mentale sundhedsfærdigheder, samt mere distale mentale sundheds- og organisationsmål. Resultaterne indikerer, at sådanne interventioner kan fremme mentale sundhedsfærdigheder og i mindre grad distale mentale sundhedsmål, såsom oplevet stressniveau. Ydermere indikerer resultaterne, at når sådanne interventioner leveres på et organisationsniveau, kan dette påvirke interpersonelle relationer i virksomheden positivt. Dog er det mere uvist, hvordan sådanne interventioner påvirker sådanne mål på længere sigt. Resultaterne i denne afhandling indikerer, at fremtidig forskning bør undersøge, hvordan MBI'er, der leveres som mentalt sundhedsfremmende og forebyggende interventioner, kan påvirke mentale sundhedsfærdigheder. Undersøgelser af sådanne intermedicære mål vil potentielt kunne bidrage til en forståelse af, hvordan interventionerne potentielt kan beskytte individers mentale sundhed. Ydermere vil det gavne forskningsfeltet, at der gennemføres flere studier af MBI'er som organisatoriske interventioner og ikke udelukkende som individuelle interventioner.

REFERENCES

1. WHO, *Comprehensive mental health action plan 2013–2030*. 2021, World Health Organization: Geneva.
2. WHO, *World mental health report: transforming mental health for all*. 2022, World Health Organization: Geneva.
3. Foundation, C.B. and M.H. WA, *Perth Charter for the Promotion of Mental Health and Wellbeing*, in *Seventh World Conference on the Promotion of Mental Health and the Prevention of Mental and Behavioural Disorders*. 2012: Perth, Western Australia.
4. Rose, G., K. Khaw, and M. Marmot, *Rose's Strategy on Preventive Medicine*. 2008, New York: Oxford University Press.
5. NICE, *Mental wellbeing at work*. 2022. p. 1-49.
6. WHO, *WHO guidelines on mental health at work*. 2022, World Health Organization: Geneva.
7. Vago, D. and S. David, *Self-awareness, self-regulation, and self-transcendence (S-ART): a framework for understanding the neurobiological mechanisms of mindfulness*. *Frontiers in Human Neuroscience*, 2012. **6**.
8. van Agteren, J., et al., *A systematic review and meta-analysis of psychological interventions to improve mental wellbeing*. *Nat Hum Behav*, 2021. **5**(5): p. 631-652.
9. De Vibe, M., Bjørndal, A., Fattah, S., Dyrdal, G.M., Halland, E. & Tanner-Smith, E.E., *Mindfulness-based stress reduction (MBSR) for improving health, quality of life and social functioning in adults: a systematic review and meta-analysis*. 2017, The Campbell Collaboration: Norge.
10. Khoury, B., et al., *Mindfulness-based stress reduction for healthy individuals: A meta-analysis*. *J Psychosom Res*, 2015. **78**(6): p. 519-28.
11. Gelles, D., *Mindful work: How meditation is changing business from the inside out*. *Mindful work: How meditation is changing business from the inside out*. 2015, Boston, MA: Houghton Mifflin Harcourt. 296-296.
12. Lomas, T., et al., *The impact of mindfulness on well-being and performance in the workplace: An inclusive systematic review of the empirical literature*. *European Journal of Work and Organizational Psychology*, 2017. **26**(4): p. 492-513.

13. Schaufenbuel, K. *Why Google, Target, and General Mills are Investing in Mindfulness*. 2015 [11 May 2023]; Available from: https://mindleader.org/wp-content/uploads/2017/08/HARVARD-BUSINESS-REVIEW_Why-Google-is-investing-in-Mindfulness.pdf.
14. Hougaard, R. *How IKEA Is Navigating Global Crisis With Mindfulness And Humanity*. 2020 [11 May 2023]; Available from: <https://www.forbes.com/sites/rasmushougaard/2020/09/08/how-ikea-is-navigating-global-crises-with-mindfulness-and-humanity/>.
15. Vonderlin, R., et al., *Mindfulness-Based Programs in the Workplace: a Meta-Analysis of Randomized Controlled Trials*. *Mindfulness*, 2020. **11**(7): p. 1579-1598.
16. Rupprecht, S., et al., *Running too far ahead? Towards a broader understanding of mindfulness in organisations*. *Current Opinion in Psychology*, 2019. **28**: p. 32-36.
17. Good, D., et al., *Contemplating Mindfulness at Work: An Integrative Review*. *Journal of Management*, 2015. **42**(1): p. 114-142.
18. Hilton, L.G., et al., *Mindfulness meditation for workplace wellness: An evidence map*. *Work*, 2019. **63**(2): p. 205-218.
19. Janssen, M., et al., *Effects of Mindfulness-Based Stress Reduction on employees' mental health: A systematic review*. *PLoS One*, 2018. **13**(1): p. e0191332.
20. Panditharathne, P.N.K.W. and Z. Chen *An Integrative Review on the Research Progress of Mindfulness and Its Implications at the Workplace*. *Sustainability*, 2021. **13**, DOI: 10.3390/su132413852.
21. OECD and E. Union, *Health at a Glance: Europe 2022*. 2022.
22. Jensen, H.A.R., Davidsen, M., Møller, S.R., Román, J.E.I., Kragelund, K., Christensen, A.I, Ekholm, O., *Danskernes sundhed - Den Nationale Sundhedsprofil 2021 [The Danes' Health - The National Health Profile 2021]* 2022, Sundhedsstyrelsen [Danish Health Authority]: Copenhagen.
23. Thornicroft, G., et al., *The Lancet Commission on ending stigma and discrimination in mental health*. *The Lancet*, 2022. **400**(10361): p. 1438-1480.
24. Skivington, K., et al., *A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance*. *BMJ*, 2021. **374**: p. n2061.
25. WHO and ILO, *Mental Health at work: policy brief*. 2022, World Health Organization & International Labour Organization.
26. Kabat-Zinn, J., *Full Catastrophe Living: How to cope with stress, pain and illness using mindfulness meditation*. 2013, Revised edition: New York: Bantam Books.

27. Fjorback, L.O., *Må jeg hjælpe dig? : fri af depression [May I help you? : Free from depression]*. 1st ed. 2015, Copenhagen: Gads Forlag.
28. Phan-Le, N.T., L. Brennan, and L. Parker, *The search for scientific meaning in mindfulness research: Insights from a scoping review*. PLOS ONE, 2022. **17**(5): p. e0264924.
29. Kabat-Zinn, J., *Meditation is not what you think*. 2018, New York: Hachette Book Group.
30. Kabat-Zinn, J. and H. T.N., *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*. 2009, New York: Delta.
31. Davidson, R.J., *Mindfulness and More: Toward a Science of Human Flourishing*. Psychosom Med, 2021. **83**(6): p. 665-668.
32. Goleman, D. and R. Davidson, *The Science of Meditation: How to Change Your Brain, Mind and Body*. 2017: Penguin Books Limited.
33. Gill, L., et al., *Mindfulness induction and cognition: A systematic review and meta-analysis*. Consciousness and Cognition, 2020. **84**: p. 102991.
34. Dahl, C.J., C.D. Wilson-Mendenhall, and R.J. Davidson, *The plasticity of well-being: A training-based framework for the cultivation of human flourishing*. Proc Natl Acad Sci U S A, 2020. **117**(51): p. 32197-32206.
35. Philippi, C.L. and M. Koenigs, *The neuropsychology of self-reflection in psychiatric illness*. Journal of Psychiatric Research, 2014. **54**: p. 55-63.
36. Davidson, R.J., et al., *Alterations in brain and immune function produced by mindfulness meditation*. Psychosom Med, 2003. **65**(4): p. 564-70.
37. Davidson, R.J. and B.S. McEwen, *Social influences on neuroplasticity: stress and interventions to promote well-being*. Nature neuroscience, 2012. **15**(5): p. 689-695.
38. Tang, Y.-Y., B.K. Hölzel, and M.I. Posner, *The neuroscience of mindfulness meditation*. Nature Reviews Neuroscience, 2015. **16**(4): p. 213-225.
39. Roffey, S., *Chapter 5: Relationships*, in *Creating the World We Want to Live in: How Positive Psychology Can Build a Brighter Future*, B. Greenville-Cleave, Guðmundsdóttir, D., Huppert, F., King, V., Roffey, D., Roffey, S., de Vries, M., Editor. 2021, Routledge. p. 91-107.
40. Dahl, C.J., A. Lutz, and R.J. Davidson, *Reconstructing and deconstructing the self: cognitive mechanisms in meditation practice*. Trends Cogn Sci, 2015. **19**(9): p. 515-23.
41. Crane, R.S., et al., *What defines mindfulness-based programs? The warp and the weft*. Psychol Med, 2017. **47**(6): p. 990-999.

42. Killingsworth, M.A. and D.T. Gilbert, *A Wandering Mind Is an Unhappy Mind*. Science, 2010. **330**(6006): p. 932.
43. Brown, K.W. and R.M. Ryan, *The benefits of being present: mindfulness and its role in psychological well-being*. J Pers Soc Psychol, 2003. **84**(4): p. 822-48.
44. Creswell, J.D., et al., *Neural Correlates of Dispositional Mindfulness During Affect Labeling*. Psychosomatic Medicine, 2007. **69**(6).
45. Quaglia, J.T., R.J. Goodman, and K.W. Brown, *Trait Mindfulness Predicts Efficient Top-Down Attention to and Discrimination of Facial Expressions*. J Pers, 2016. **84**(3): p. 393-404.
46. Berry, D.R. and K.W. Brown, *Reducing separateness with presence: How mindfulness catalyzes intergroup prosociality*, in *Mindfulness in social psychology*, J.C. Karresmans and E.K. Papies, Editors. 2017, Routledge/Taylor & Francis Group: New York, NY, US. p. 153-166.
47. Brown, K.W., N. Weinstein, and J.D. Creswell, *Trait mindfulness modulates neuroendocrine and affective responses to social evaluative threat*. Psychoneuroendocrinology, 2012. **37**(12): p. 2037-2041.
48. Santorelli, S. *Mindfulness-Based Stress Reduction (MBSR): Standards of Practice*. 2014 [cited 2020 apr 24]; Available from: https://mindfulness.au.dk/fileadmin/mindfulness.au.dk/Artikler/Santorelli_mbsr_standards_of_practice_2014.pdf.
49. Dimidjian, S. and Z.V. Segal, *Prospects for a clinical science of mindfulness-based intervention*. Am Psychol, 2015. **70**(7): p. 593-620.
50. de Bruin, E.I., et al., *The Unilever study: Positive effects on stress and risk for dropout from work after the finding peace in a frantic world training*. Mindfulness, 2020. **11**: p. 350-361.
51. Kersemaekers, W., et al., *A workplace mindfulness intervention may be associated with improved psychological well-being and productivity. A preliminary field study in a company setting*. Frontiers in Psychology, 2018. **9**: p. 11.
52. González-Palau, F. and L.A. Medrano, *A Mini-Review of Work Stress and Mindfulness: A Neuropsychological Point of View*. Frontiers in Psychology, 2022. **13**.
53. Huang, S.L., et al., *The Potential for Mindfulness-Based Intervention in Workplace Mental Health Promotion: Results of a Randomized Controlled Trial*. PLoS One, 2015. **10**(9): p. e0138089.
54. Waddell, A., et al., *How effective are interventions in optimizing workplace mental health and well-being? A scoping review of reviews and evidence map*. Scand J Work Environ Health, 2023. **49**(4): p. 235-248.

55. Rupprecht, S., et al., *Mindful Leader Development: How Leaders Experience the Effects of Mindfulness Training on Leader Capabilities*. *Front. Psychol.*, 2019. **10**.
56. Bunjak, A., M. Černe, and E.L. Schölly, *Exploring the past, present, and future of the mindfulness field: A multitechnique bibliometric review*. *Frontiers in Psychology*, 2022. **13**.
57. Hülshager, U.R., S. van Gils, and A. Walkowiak, *The regulating role of mindfulness in enacted workplace incivility: An experience sampling study*. *Journal of Applied Psychology*, 2021. **106**: p. 1250-1265.
58. Krishnakumar, S. and M.D. Robinson, *Maintaining an even keel: An affect-mediated model of mindfulness and hostile work behavior*. *Emotion*, 2015. **15**(5): p. 579-589.
59. Cleirigh, D.O. and J. Greaney, *Mindfulness and Group Performance: An Exploratory Investigation into the Effects of Brief Mindfulness Intervention on Group Task Performance*. *Mindfulness*, 2015. **6**(3): p. 601-609.
60. Olafsen, A.H., et al., *Mindfulness buffers the adverse impact of need frustration on employee outcomes: A self-determination theory perspective*. *Journal of Theoretical Social Psychology*, 2021. **5**(3): p. 283-296.
61. Walsh, Z., E. Ng, and R.E. Purser, *The promise and perils of corporate mindfulness*, in *Leadership Matters. Finding Voice, Connection and Meaning in the 21st Century*, D. Knights and C. Mabey, Editors. 2017, N.Y.: Routledge: New York. p. 47-63.
62. Wihler, A., et al., *It's so boring—Or is it? Examining the role of mindfulness for work performance and attitudes in monotonous jobs*. *Journal of Occupational and Organizational Psychology*, 2022. **95**: p. 131-154.
63. Liu, X., et al., *How and when team average individual mindfulness facilitates team mindfulness: The roles of team relational stress and team individual mindfulness diversity*. *Journal of Organizational Behavior*, 2022. **43**(3): p. 430-447.
64. Richards, D.A., *The complex interventions framework*, in *Complex Interventions in Health: An overview of research methods*, D.A. Richards and I.R. Hallberg, Editors. 2015, Routledge: Abingdon, Oxon, and New York, NY. p. 1-15.
65. Campbell, M., et al., *Framework for design and evaluation of complex interventions to improve health*. *Bmj*, 2000. **321**(7262): p. 694-6.
66. Craig, P., et al., *Developing and evaluating complex interventions: the new Medical Research Council guidance*. *BMJ*, 2008. **337**: p. a1655.

67. Juul, L., et al., *Stress-free Everyday LiFe for Children and Adolescents REsearch (SELFCARE): a protocol for a cluster randomised trial testing a school teacher training programme to teach mindfulness ("b")*. BMC Psychol, 2021. **9**(1): p. 31.
68. Agency, T.D.D.P. *Generelt om forskning og statistik (On research and statistics in general)*. 2021 [cited 2021 05.05.2021]; Available from: <https://www.datatilsynet.dk/emner/forskning-og-statistik/generelt-om-forskning-og-statistik>.
69. Harris, P.A., et al., *Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support*. J Biomed Inform, 2009. **42**(2): p. 377-81.
70. Cohen, S., T. Kamarck, and R. Mermelstein, *A global measure of perceived stress*. J Health Soc Behav, 1983. **24**(4): p. 385-96.
71. Tambs, K. and T. Moum, *How well can a few questionnaire items indicate anxiety and depression?* Acta Psychiatr Scand, 1993. **87**(5): p. 364-7.
72. Topp, C.W., et al., *The WHO-5 Well-Being Index: a systematic review of the literature*. Psychother Psychosom, 2015. **84**(3): p. 167-76.
73. Smith, B.W., et al., *The brief resilience scale: assessing the ability to bounce back*. International Journal of Behavioral Medicine, 2008. **15**(3): p. 194-200.
74. Gu, J., et al., *Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after mindfulness-based cognitive therapy for people with recurrent depression*. Psychol Assess, 2016. **28**(7): p. 791-802.
75. Juul, L., et al., *Effectiveness of Mindfulness-Based Stress Reduction in a Self-Selecting and Self-Paying Community Setting*. Mindfulness, 2018. **9**(4): p. 1288-1298.
76. Diaz, B.A., et al., *The Amsterdam Resting-State Questionnaire reveals multiple phenotypes of resting-state cognition*. Front. Hum. Neurosci, 2013. **7**(446).
77. Bonde, E.H., et al., *The effectiveness of mindfulness-based stress reduction for school teachers: a cluster-randomized controlled trial*. European Journal of Public Health, 2022. **32**(2): p. 246-253.
78. Lakens, D., *Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs*. Front. Psychol. , 2013. **4**: p. 863.
79. Moore, G.F., et al., *Process evaluation of complex interventions: Medical Research Council guidance*. BMJ : British Medical Journal, 2015. **350**: p. h1258.

80. Bonde, E.H., et al., *Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention*. *Frontiers in Psychology*, 2022. **13**.
81. Campbell, S., et al., *Purposive sampling: Complex or simple? Research case examples*. *J. Res. Nurs.*, 2020. **25**(8): p. 652-661.
82. Graneheim, U.H., B.M. Lindgren, and B. Lundman, *Methodological challenges in qualitative content analysis: A discussion paper*. *Nurse Educ Today*, 2017. **56**: p. 29-34.
83. Graneheim, U.H. and B. Lundman, *Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness*. *Nurse Educ Today*, 2004. **24**(2): p. 105-12.
84. Lyhne, C. and M. Bjerrum, *Kvalitativ indholdsanalyse - en hands-on introduktion [Qualitative content analysis - a hands on introduction]*. *Klinisk sygepleje [Clinical nursing]*, 2021. **35**(4): p. 304-322.
85. Elo, S. and H. Kyngäs, *The qualitative content analysis process*. *J Adv Nurs*, 2008. **62**(1): p. 107-15.
86. Putnam, R., *Bowling Alone: America's Declining Social Capital*. 1995, *Journal of Democracy*. p. 65-78.
87. Woolcock, M. and D. Narayan, *Social Capital: Implications for Development Theory, Research, and Policy*. *The World Bank Research Observer*, 2000. **15**(2): p. 225-49.
88. Edmondson, A., *Psychological Safety, Trust, and Learning in Organizations: A Group-Level Lens*, in *Trust and distrust in organizations: Dilemmas and approaches.*, RM Kramer and K. Cook, Editors. 2004, Russell Sage Foundation: New York, NY, US. p. 239-272.
89. Koushede, V., et al., *Measuring mental well-being in Denmark: Validation of the original and short version of the Warwick-Edinburgh mental well-being scale (WEMWBS and SWEMWBS) and cross-cultural comparison across four European settings*. *Psychiatry Research*, 2019. **271**: p. 502-509.
90. Ng Fat, L., et al., *Evaluating and establishing national norms for mental wellbeing using the short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS): findings from the Health Survey for England*. *Qual Life Res*, 2017. **26**(5): p. 1129-1144.
91. Stewart-Brown, S., et al., *Internal construct validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): a Rasch analysis using data from the Scottish Health Education Population Survey*. *Health and Quality of Life Outcomes*, 2009. **7**(1): p. 15.

92. Hansen, A.M., et al., *Workplace bullying and sleep difficulties: a 2-year follow-up study*. *Int Arch Occup Environ Health*, 2014. **87**(3): p. 285-94.
93. Rugulies, R., et al., *Deadlines at work and sleep quality. Cross-sectional and longitudinal findings among Danish knowledge workers*. *Am J Ind Med*, 2012. **55**(3): p. 260-9.
94. Fresco, D.M., et al., *Initial Psychometric Properties of the Experiences Questionnaire: Validation of a Self-Report Measure of Decentering*. *Behavior Therapy*, 2007. **38**(3): p. 234-246.
95. Borg, V., N.C. Mateu, and T. Clausen, *Udvikling af en ny metode til undersøgelse af social kapital på arbejdspladsen [Development of a new method for studying social capital in the workplace]*. 2014, Det Nationale Forskningscenter for Arbejdsmiljø (NFA) [National Research Centre for the Working Environment]: Copenhagen.
96. Meng, A., T. Clausen, and V. Borg, *The association between team-level social capital and individual-level work engagement: Differences between subtypes of social capital and the impact of intra-team agreement*. *Scandinavian Journal of Psychology*, 2018. **59**(2): p. 198-205.
97. Conway, P.M., et al., *Optimal Cut-Off Points for the Short-Negative Act Questionnaire and Their Association with Depressive Symptoms and Diagnosis of Depression*. *Annals of Work Exposures and Health*, 2018. **62**(3): p. 281-294.
98. Edmondson, A., *Psychological Safety and Learning Behavior in Work Teams*. *Administrative Science Quarterly*, 1999. **44**(2): p. 350-383.
99. Hastings, E., et al., *Structure or Nurture?: The Effects of Team-Building Activities and Team Composition on Team Outcomes*. *Proceedings of the ACM on Human-Computer Interaction*, 2018. **2**: p. 1-21.
100. Lam, S.U., A. Kirvin-Quamme, and S.B. Goldberg, *Overall and Differential Attrition in Mindfulness-Based Interventions: a Meta-Analysis*. *Mindfulness*, 2022. **13**(11): p. 2676-2690.
101. Kuyken, W., et al., *Mindfulness-based cognitive therapy to prevent relapse in recurrent depression*. *J Consult Clin Psychol*, 2008. **76**(6): p. 966-78.
102. Montero-Marin, J., et al., *Feasibility and Effectiveness of a Workplace-Adapted Mindfulness-Based Programme to Reduce Stress in Workers at a Private Sector Logistics Company: An Exploratory Mixed Methods Study*. *Int J Environ Res Public Health*, 2020. **17**(5).
103. Juul, L., E.H. Bonde, and L.O. Fjorback, *Altered self-reported resting state mediates the effects of Mindfulness-Based Stress Reduction on mental health: a longitudinal path model analysis within a community-based randomized trial with 6-months follow-up*. *Frontiers in Psychology*, 2023. **14**.

104. Jennings, P.A., et al., *Impacts of the CARE for Teachers program on teachers' social and emotional competence and classroom interactions*. Journal of Educational Psychology, 2017. **109**: p. 1010-1028.
105. Hwang, Y.-S., et al., *A systematic review of mindfulness interventions for in-service teachers: A tool to enhance teacher wellbeing and performance*. Teaching and Teacher Education, 2017. **64**: p. 26-42.
106. Fresco, D.M., et al., *Relationship of posttreatment decentering and cognitive reactivity to relapse in major depression*. Journal of Consulting and Clinical Psychology, 2007. **75**: p. 447-455.
107. Wang, Y., E.L. Garland, and N.A.S. Farb, *An experimental test of the mindfulness-to-meaning theory: Casual pathways between decentering, reappraisal, and well-being*. Emotion, 2023.
108. Aikens, K.A., et al., *Mindfulness goes to work: impact of an online workplace intervention*. J Occup Environ Med, 2014. **56**(7): p. 721-31.
109. Juul, L., et al., *The Effects of a Mindfulness Program on Mental Health in Students at an Undergraduate Program for Teacher Education: A Randomized Controlled Trial in Real-Life*. Frontiers in Psychology, 2021. **12**.
110. Juul, L., et al., *A pilot randomised trial comparing a mindfulness-based stress reduction course, a locally-developed stress reduction intervention and a waiting list control group in a real-life municipal health care setting*. BMC Public Health, 2020. **20**(1): p. 409.
111. Ehret, A.M., J. Joormann, and M. Berking, *Examining risk and resilience factors for depression: The role of self-criticism and self-compassion*. Cogn Emot, 2015. **29**(8): p. 1496-504.
112. Muris, P., et al., *Good for the Self: Self-Compassion and Other Self-Related Constructs in Relation to Symptoms of Anxiety and Depression in Non-clinical Youths*. J Child Fam Stud, 2016. **25**: p. 607-617.
113. Barnard, L.K. and J.F. Curry, *Self-Compassion: Conceptualizations, Correlates, & Interventions*. Review of General Psychology, 2011. **15**(4): p. 289-303.
114. Rydstedt, L.W., et al., *Quality of Workplace Social Relationships and Perceived Health*. Psychol. Rep., 2012. **110**(3): p. 781-790.
115. Santini, Z.I., et al., *The association between social relationships and depression: A systematic review*. J. Affect. Disord., 2015. **175**: p. 53-65.
116. Hülsheger, U.R., et al., *Stop the spin: The role of mindfulness practices in reducing affect spin*. J Occup Health Psychol, 2022. **27**(6): p. 529-543.

117. Micklitz, K., G. Wong, and J. Howick, *Mindfulness-based programmes to reduce stress and enhance well-being at work: a realist review*. *BMJ Open*, 2021. **11**(3): p. e043525.
118. Hegney, D., et al., *Experiences of university employees of the impact of a mindful self-care and resiliency program on their well-being*. *High. Educ. Res. Dev.*, 2021. **40**(3): p. 524-537.
119. Orellana-Rios, C.L., et al., *Mindfulness and compassion-oriented practices at work reduce distress and enhance self-care of palliative care teams: a mixed-method evaluation of an "on the job" program*. *BMC Palliat Care*, 2017. **17**(1): p. 3.
120. Vonderlin, R., et al., *Effectiveness of a mindfulness- and skill-based health-promoting leadership intervention on supervisor and employee levels: A quasi-experimental multisite field study*. *J. Occup. Health Psychol.*, 2021. **26**(6): p. 613-628.
121. Zimmer-Gembeck, M.J., S.J. Clear, and S.M. Campbell, *Peer relationships and stress: Indirect associations of dispositional mindfulness with depression, anxiety and loneliness via ways of coping*. *J. Adolesc.*, 2021. **93**: p. 177-189.
122. Jiménez-Picón, N., et al., *The Relationship between Mindfulness and Emotional Intelligence as a Protective Factor for Healthcare Professionals: Systematic Review*. *Int J Environ Res Public Health*, 2021. **18**(10).
123. Zarate, K., D.M. Maggin, and A. Passmore, *Meta-analysis of mindfulness training on teacher well-being*. *Psychol. Sch.*, 2019. **56**(10): p. 1700-1715.
124. Agyapong, B., et al., *Interventions to Reduce Stress and Burnout among Teachers: A Scoping Review*. *Int J Environ Res Public Health*, 2023. **20**(9).
125. Beshai, S., et al., *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): p. 198-208.
126. de Carvalho, J.S., et al., *Effects of a Mindfulness-Based Intervention for Teachers: a Study on Teacher and Student Outcomes*. *Mindfulness*, 2021. **12**(7): p. 1719-1732.
127. Klingbeil, D.A. and T.L. Renshaw, *Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base*. *School Psychology Quarterly*, 2018. **33**(4): p. 501-511.
128. Moeller, S.B., et al., *National norms of mental health for Denmark*. *Nordic Journal of Psychiatry*, 2023: p. 1-7.
129. Thygesen, L.C., et al., *Decreasing mental well-being during the COVID-19 pandemic: A longitudinal study among Danes before and during the pandemic*. *J Psychiatr Res*, 2021. **144**: p. 151-157.

130. Bonde, E.H., et al., *The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis*. *Frontiers in Psychology*, 2023. **14**.
131. Valipoor, S., S.J. Bosch, and L.Y.T. Chiu, *From Stressful to Mindful: Reactions to a Proposed Emergency Department Design for Enhancing Mindfulness and Stress Reduction Among Healthcare Clinical Staff*. *HERD: Health Environments Research & Design Journal*. **0**(0): p. 19375867231172222.
132. Sajjad, A. and W. Shahbaz, *Mindfulness and Social Sustainability: An Integrative Review*. *Social Indicators Research*, 2020. **150**(1): p. 73-94.
133. Ben, S., et al., *Effectiveness of physical activity interventions for improving depression, anxiety and distress: an overview of systematic reviews*. *British Journal of Sports Medicine*, 2023: p. bjsports-2022-106195.
134. Hoge, E.A., et al., *Emotion-related constructs engaged by mindfulness-based interventions: A systematic review and meta-analysis*. *Mindfulness (N Y)*, 2021. **12**(5): p. 1041-1062.
135. Kohls, N., A. Hack, and H. Walach, *Measuring the Unmeasurable by Ticking Boxes and Opening Pandora's Box? Mixed Methods Research as a Useful Tool for Investigating Exceptional and Spiritual Experiences*. *Archive for the Psychology of Religion*, 2008. **30**(1): p. 155-188.
136. Stein, E. and K. Witkiewitz, *Dismantling Mindfulness-Based Programs: A Systematic Review to Identify Active Components of Treatment*. *Mindfulness (N Y)*, 2020. **11**(11): p. 2470-2485.
137. Spijkerman, M.P.J., W.T.M. Pots, and E.T. Bohlmeijer, *Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials*. *Clinical Psychology Review*, 2016. **45**: p. 102-114.
138. Axelsen, J.L., et al., *Mindfulness and music interventions in the workplace: assessment of sustained attention and working memory using a crowdsourcing approach*. *BMC Psychology*, 2022. **10**(1): p. 108.
139. Xu, J., et al., *Virtual mindfulness interventions to promote well-being in adults: A mixed-methods systematic review*. *J Affect Disord*, 2022. **300**: p. 571-585.
140. Zhang, Y., J. Xue, and Y. Huang, *A meta-analysis: Internet mindfulness-based interventions for stress management in the general population*. *Medicine (Baltimore)*, 2020. **99**(28): p. e20493.
141. Yeun, Y.R. and S.D. Kim, *Psychological Effects of Online-Based Mindfulness Programs during the COVID-19 Pandemic: A Systematic Review of Randomized Controlled Trials*. *Int J Environ Res Public Health*, 2022. **19**(3).

142. Crane, R., et al., *Mindfulness-based interventions: Teaching assessment criteria*. 2021, Bangor University: Bangor.
143. Halkier, B., *Kapitel 5: Fokusgrupper [Chapter 5: Focus groups]*, in *Kvalitative metoder - en grundbog [Qualitative methods - a textbook]*, S.T. Brinkmann, L., Editor. 2010, Hans Reitzels Forlag. p. 121-135.
144. Gibson, C.B., *Elaboration, Generalization, Triangulation, and Interpretation: On Enhancing the Value of Mixed Method Research*. *Organizational Research Methods*, 2017. **20**(2): p. 193-223.
145. Anseel, F., et al., *Response Rates in Organizational Science, 1995–2008: A Meta-analytic Review and Guidelines for Survey Researchers*. *Journal of Business and Psychology*, 2010. **25**(3): p. 335-349.
146. Hülshager, U.R., et al., *Benefits of mindfulness at work: the role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction*. *J Appl Psychol*, 2013. **98**(2): p. 310-25.
147. Lee, J.H. and J.C. Huber, Jr., *Evaluation of Multiple Imputation with Large Proportions of Missing Data: How Much Is Too Much?* *Iran J Public Health*, 2021. **50**(7): p. 1372-1380.
148. Aust, B., et al., *How effective are organizational-level interventions in improving the psychosocial work environment, health, and retention of workers? A systematic overview of systematic reviews*. *Scandinavian Journal of Work, Environment & Health*.

STUDY 1

The effectiveness of mindfulness-based stress reduction for school teachers: a cluster-randomized controlled trial

Published in European Journal of Public Health

The effectiveness of mindfulness-based stress reduction for school teachers: a cluster-randomized controlled trial

Emilie H. Bonde ¹, Lone O. Fjorback¹, Morten Frydenberg², Lise Juul¹

¹ Department of Clinical Medicine, Danish Center for Mindfulness, Aarhus University, Aarhus, Denmark

² MFStat, Aarhus, Denmark

Correspondence: Emilie H. Bonde, Department of Clinical Medicine, Danish Center for Mindfulness, Aarhus University, Hack Kampmanns Square 1-3, 4th Floor, 8000 Aarhus, Denmark, e-mail: emilie.bonde@clin.au.dk

Background: Teaching has been found to be one of the most stressful occupations. Hence, current interest in reducing stress and enhancing the well-being of teachers is strong. Mindfulness-based stress reduction (MBSR) is documented to be effective in reducing stress and increasing well-being. This study investigated the effectiveness of delivering MBSR to lower secondary school teachers as a part of a teacher-training programme. **Methods:** This study was a nested trial within the parallel cluster-randomized controlled trial, Stress-free Everyday LiFe for Children and Adolescents REsearch (SELF CARE). Schools were recruited from all five geographical regions in Denmark between May 2018 and May 2019. One to three teachers from each school were allowed to participate. At baseline, 110 schools, representing 191 lower secondary school teachers, were cluster-randomized to intervention or a wait-list control group. The intervention group received MBSR during 2019 and the wait-list control group during 2020. Data were collected at baseline and after 3 and 6 months. The primary outcome was measured by Cohen's Perceived Stress Scale (PSS). Data were analyzed using a mixed-effect linear regression model and bootstrapped for cluster effects. **Results:** At 3 months, the intervention group statistically significantly reduced their PSS score 1.7 [95% confidence interval (CI) 0.04–3.3] points more than did the wait-list control group. At 6 months, the intervention group had statistically significantly reduced their mean PSS score 2.1 (95% CI: 0.5–3.8) points more than the wait-list control group. **Conclusion:** It is possible to reduce perceived stress among lower secondary school teachers by delivering MBSR as part of a teacher-training programme.

Introduction

The mental health of the European population has been eroding during the past two decades.¹ Perceived stress is a contributor to this development. Stress is associated with depression, type-2 diabetes, cardiovascular diseases and premature mortality.^{2–4} Stress is defined as the ongoing activation of the body's stress response without physical or mental restitution.⁵

In general, teachers report experiencing high levels of stress.⁶ Teaching has been found to be among the most stressful occupations measured on psychological well-being, physical health and job satisfaction.⁷

In Denmark, stress among school teachers is a growing problem.⁸ In 2018, every fourth Danish school teacher reported experiencing symptoms of stress.⁸ Since 2012, the proportion of school teachers experiencing symptoms of work-related stress during the past month has risen by 25.6%, measured by perceived difficulties at work and trust in one's own ability to overcome difficulties at work.⁸ Hence, there is a call for investigating stress-reducing interventions for school teachers.

The programme *mindfulness-based stress reduction* (MBSR) supports participants build resources that help them be in the present moment and cope with stress and strains of life. Mindfulness can be defined as '... the awareness arising through paying attention on purpose in the present moment, non-judgmentally, in the service of self-understanding, wisdom, and compassion'.⁹ MBSR is a curriculum-based, 8-week programme delivered in a group format by a trained MBSR teacher.^{10,11}

MBSR has previously been evaluated in various settings and with different study populations.¹² Previous research has found MBSR to assist adults cope with stress and challenges of life. In effect, the authors found MBSR moderately effective in improving the mental health of adults across different target groups.¹² Furthermore, research shows that compared to non-active control groups, mindfulness-based interventions (MBIs) are effective in reducing depression, anxiety and distress and improve well-being in non-clinical settings. However, due to heterogeneity between studies, the effects of MBIs cannot be generalized across every setting.¹³ Moreover, compared to active control groups, the authors found no superiority of MBIs.¹³

Research on mindfulness for educators has demonstrated favourable effects on mental health measures of stress, anxiety, depression, burnout and strain, and for mindfulness, emotional regulation and job performance.^{14,15} An evidence map of MBIs for workplace well-being shows mixed effects of mindfulness for educators.¹⁶ Hence, there is a need for further research on the effects of mindfulness for this profession.

Rose et al. have proposed two strategies to prevent illness in the population: the high-risk strategy and the population-based strategy.¹⁷ The aim of a population-based strategy, e.g. by providing universal interventions, is to improve the health of a wide part of the population. Using this approach, health-promoting initiatives are offered to populations with the largest parts of the populations experiencing moderate risks of adverse health, e.g. moderate stress level.¹⁷ This approach might yield smaller effect sizes than the high-risk strategy where interventions are offered to selected high-risk

groups with more room for improvement. However, these smaller effect sizes may have a higher impact at the society level.¹⁷

In 2017, the Danish Parliament granted the Danish Center for Mindfulness (DCM) funding to educate school teachers in teaching mindfulness to lower secondary school children. As part of their education, the teachers received an 8-week MBSR course. The purpose of the present study was to evaluate the effectiveness of delivering MBSR to Danish lower secondary school teachers participating in a teacher training-programme compared to usual practice; measured on their perceived stress level and mental health 6 months after enrolment.

Methods

Design

A two-arm parallel cluster-randomized controlled trial was conducted using schools as clusters. This study was a nested trial within the research project *Stress-free Everyday LiFe for Children and Adolescents REsearch (SELFCARE)*. The project was approved by the Danish Data Protection Agency (2016-051-000001/1145). The nested trial was registered at ClinicalTrials.gov (NCT03886363) in March 2019.¹⁸

Setting

The trial was conducted across all five geographical regions in Denmark. At present, there are 1326 municipal schools (71%) and 538 (29%) private schools in Denmark.¹⁹ This study, being a nested trial, was conducted within the setting of the main trial described in the protocol.¹⁸

Participants

School teachers from private and municipal schools in all five geographical regions of Denmark were included. To be included, schools were required to have ≥ 100 pupils. Furthermore, the headmaster/mistress had to give consent for teachers to participate in the trial and to allow the teachers to spend working hours participating. Participants were recruited between May 2018 and May 2019 through advertisements on the DCM webpage, social media posts, invitational letters to schools in selected regions and local information meetings. In total, 110 schools enrolled. The individual schools chose which teachers to enrol. A maximum of three teachers was allowed to enrol from each school.

Procedure and randomization

All participants were informed about the trial and use of data. Teachers provided consent by completing the baseline questionnaire, this being standard protocol in Denmark when conducting non-biological research.²⁰ Data were collected using Research Electronic Data Capture (REDCap). REDCap is a secure online platform for managing data collection for research.²¹ REDCap was used to build and distribute questionnaires via e-mail. Schools were randomized to begin teacher-training in 2019 or 2020. Block-randomization was performed in five blocks corresponding to the geographical regions. For each region, the third author received a list with anonymized school ids. The randomization was stratified by school size (more or less than 500 pupils), school type (private or municipal) and number of teachers included in the trial (1 or 2–3). Finally, the anonymous school ids were linked to the schools' actual identity.¹⁸ Randomization was conducted between February 2019 and September 2019. The allocation ratio was 1:1. The data collectors were not blinded to group assignment, as they were able to identify school affiliations in data collected using REDCap. In total, 191 school teachers contributed with baseline data and were included in this trial (figure 1).

Intervention

Intervention group

The intervention group began teacher training in 2019. As part of the teacher-training programme, the participants received an 8-week MBSR course in a group of 8 to 28 school teachers from the same geographical region. MBSR is a curriculum-based course consisting of 8 weekly 2.5-hour sessions and a 7-hour silent retreat day. The participants are invited to practice mindfulness for 60 minutes during the day 6 days a week. The aim of the MBSR course is to support the participants in developing their own mindfulness practice.^{10,11} The course must be delivered by a trained MBSR teacher. The MBSR teachers delivering the courses in this trial were employed by the DCM but were not part of the research group. The second author supervised the MBSR teachers. The remaining elements of the teacher-training programme were delivered after 6 months of follow-up and are outside the scope of the present study.¹⁸

Wait-list control group

The teachers representing schools randomized to the control group were put on the waiting list to receive the teacher-training programme including an MBSR course in 2020.

Outcomes and instruments

The primary outcome was measured by Cohen's Perceived Stress Scale (PSS)²² 6 months from baseline. Primary outcome measure at 6 months of follow-up was chosen to allow for the longest follow-up period strictly relating to MBSR before introducing the remaining teacher-training elements. Secondary outcomes were well-being and symptoms of depression and anxiety as well as proposed mediators such as dispositional mindfulness. Data were collected at baseline, 3 and 6 months from baseline.

Perceived Stress Scale

The 10-item version of PSS measures subjective stress.²² The items investigate how often during the past month respondents have experienced life as unpredictable, uncontrollable and overloaded. Items are scored on a five-point Likert scale (sum scores 0–40) with higher scores indicating higher levels of perceived stress. The scale has shown to be valid and reliable.^{23–25}

The Hopkins Symptom Checklist-5

The five-item version of the Symptom Checklist is a self-report measure of symptoms of depression and anxiety.²⁶ Items are scored on a four-point scale. An average score is calculated with higher scores indicating higher levels of self-reported symptoms of depression and anxiety. This shortened version of the original 25-item SCL correlates at $r = 0.92$. The alpha reliability for the SCL-5 is estimated to be 0.85.²⁷

The WHO-5 Wellbeing Scale

The World Health Organization-Five Well-Being Index (WHO-5) is a five-item self-report measure of well-being.²⁸ The items investigate how often during the past 2 weeks the respondents have experienced specific feelings. Items are scored on a five-point scale. A total score is calculated by adding and multiplying sub scores, providing a score range from 0 to 100. Higher scores indicate higher levels of well-being. WHO-5 is considered to be a valid measure of individuals' well-being.²⁸

Brief Resilience Scale

The Brief Resilience Scale (BRS) is a six-item measure of the respondents' resilience. Items are scored on a five-point scale, and an average score is calculated. Higher scores indicate greater

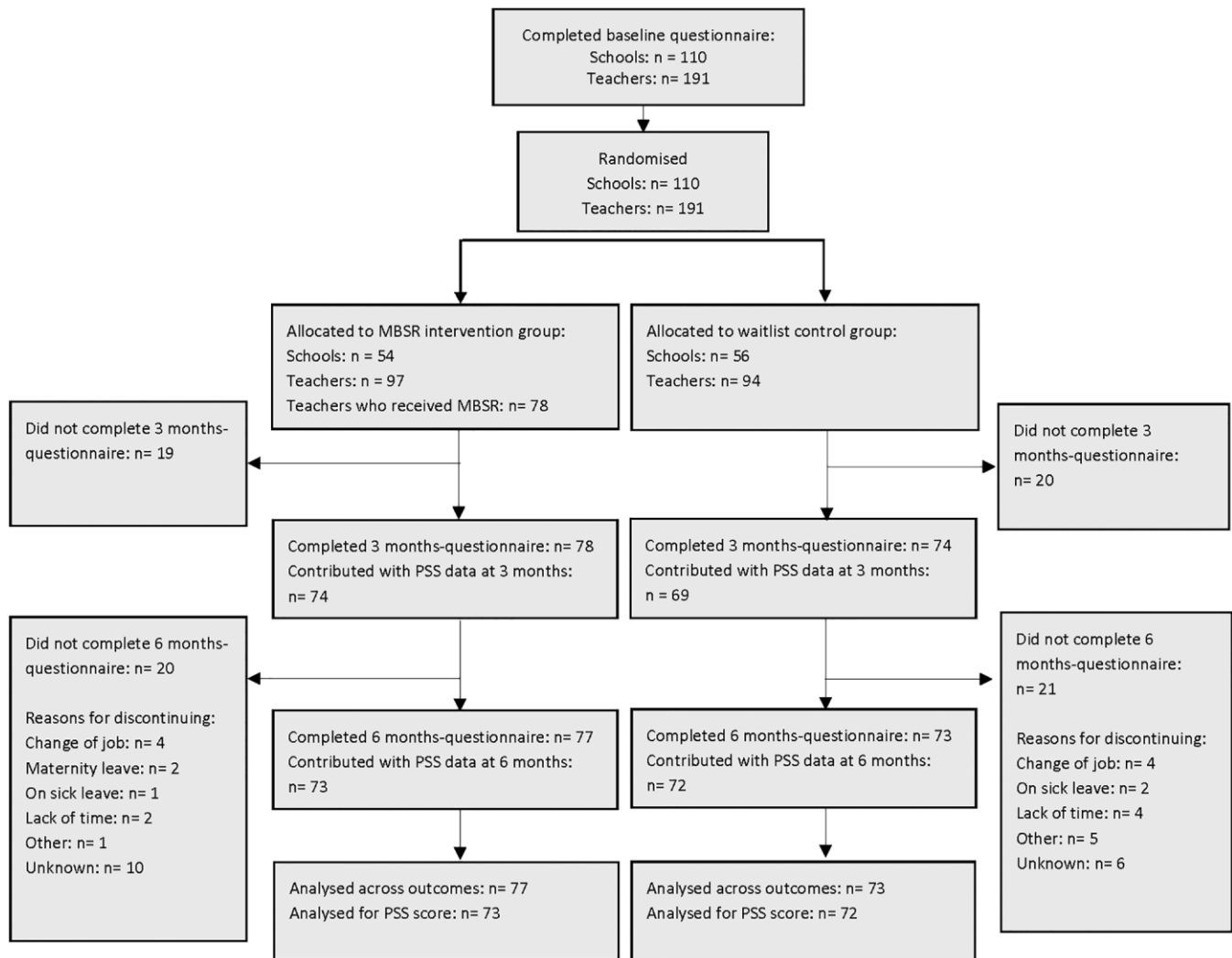


Figure 1 Flow chart of participants

resilience.²⁹ Cut-points of low, normal and high resilience have been proposed; low: 1.00–2.99, normal: 3.00–4.30 and high: 4.31–5.00. BRS has been suggested to be one of the most valid instruments to measure resilience among adults.³⁰

The Five Facet Mindfulness Questionnaire

The Five Facet Mindfulness Questionnaire-15 is a 15-item self-report measure of a respondent's dispositional mindfulness³¹ and includes five facets of mindfulness: Observing, Describing, Acting with awareness, Non-judgement and Non-reactivity. Items are scored on a five-point scale. A total score is calculated by summing the scores of each sub-scale and then summing the sub-scores into one total score with higher scores indicating higher dispositional mindfulness. Gu et al. have suggested that the sub-score for the facet 'observing' be omitted when calculating the total score.³² When omitting this sub-score, the range of the total score is 12 to 60. The FFMQ-15 is a shortened version of the original FFMQ-39 and has been found valid and reliable.³¹

The Amsterdam Resting State Questionnaire

The Amsterdam Resting State Questionnaire (ARSQ) is a self-report measure of thoughts and feelings in rest, containing 21 statements, across 7 dimensions: Discontinuity of Mind, Theory of Mind, Self, Planning, Sleepiness, Comfort and Somatic Awareness. Each item is scored on a five-point Likert scale.³³ Scores for each of the seven

dimensions are calculated as sum scores. Each dimension has a score range from 3 to 15.

Statistical analysis

Before the trial commenced, a power calculation was performed. Based on previous research, the expected mean effect on PSS score was -2.5 score points (SD 5.8).³¹ To detect this effect with a power of 80%, the trial had to include 86 teachers in each group; 172 in total.

Data from the three time points were analyzed in a mixed-effect linear regression model with systematic effect of randomization, time, interaction between randomization and time, sex, age (continuous variable), school type (municipal or private), school size (1–499 or 500+ pupils) and geographical region. As one MBSR course was delivered in each region, the 'region' variable also represents clusters of MBSR courses. We assumed random effect of school and teacher. Standard errors and confidence intervals (CIs) were based on bootstrapping, resampling teachers and giving each resampled teacher a new unique id.

The data were analyzed according to the intention-to-treat principle (ITT), i.e. all available data from participants were analyzed according to the randomization group the participants were originally assigned, regardless of what intervention they received (e.g. whether the participants in the intervention group completed the MBSR course or not).

Cohen's *d* was estimated for all outcomes. The following cut-points for interpretation of the Cohen's *d* were used; small effects: 0.2, medium effects: 0.5 and large effects: 0.8.³⁴ Regarding loss to follow-up, (i) analyses of loss to 6 months follow-up were performed using *t* tests and χ^2 tests (Supplementary tables S1–S3). Two-sided *P* values were applied and statistical significance was set at *P* = 0.05 and (ii) sensitivity analyses were conducted. In these analyses, model-based predictions were performed by adding or subtracting 0.2 SD in either the intervention arm or the control arm (Supplementary tables S4 and S5).¹⁸ Analyses were performed using Stata 16.1 software.

Results

Baseline characteristics

The intervention group consisted of 97 teachers and the wait-list control group of 94 teachers. Participants were mainly female (91.6%) with an average age of 45.2 (SD 8.4) years at baseline. The majority of participants represented municipal schools (67.5%) (table 1). The study population's mean PSS score at baseline was 15.8 (SD 5.7). Generally, the two groups were comparable at baseline across demography and self-reported mental health scores (table 1).

Attendance

Of the 97 school teachers allocated to the intervention group, 78 (82%) participated in an MBSR course (figure 1). None of the 78 participants attended fewer than five MBSR sessions with an average attendance of 7.6 sessions out of 9.

Effectiveness

Table 2 shows the effect of MBSR compared to usual practice after 3 and 6 months among lower secondary school teachers participating in MBSR as part of a teacher-training programme. The intervention group reduced their mean PSS score by 1.7 (95% CI: 0.04–3.3) points more after 3 months than the wait-list control group. Furthermore, the between-group difference increased from 3 to 6 months. As such, the intervention group reduced their mean PSS score by 2.1 (95% CI: 0.5–3.8) points more than the wait-list control group after 6 months. Hence, the effect of MBSR on PSS was statistically significant. Our study did not show statistically significant effect of MBSR on other mental health outcomes. However, tendencies pointed towards favouring the MBSR group. The intervention group reduced symptoms of depression and anxiety at 3 months by 0.2 (95% CI: –0.01 to 0.3) point more than the wait-list control group. At 6 months, the difference in reduction was 0.1 (95% CI: –0.04 to 0.2) point. Moreover, tendencies indicated that the well-being of the school teachers increased more in the intervention group than in the wait-list control group at both 3 months, WHO-5: 4.9 (95% CI: –0.1 to 9.9) points and at 6 months: 3.6 (95% CI: –1.7 to 9.0) points.

Table 3 shows the estimated effect in proposed mediators. Measured by BRS, there was no statistically significant effect on resilience after 3 months: 0.1 (95% CI: –0.1 to 0.4) point and after 6 months: –0.003 (95% CI: –0.2 to 0.2) point. Measured by FFMQ-15, the intervention group reported statistically significantly higher mean dispositional mindfulness than the wait-list control group after 3 months: 1.6 (95% CI: 0.2–2.9) points. However, at 6 months, this difference was no longer statistically significant: 0.9 (95% CI: –0.2 to 2.0) point. Furthermore, the intervention group reported

Table 1 Characteristics of school teachers at baseline

Characteristic	MBSR intervention (n = 97)		Wait-list control (n = 94)		Total (n = 191)	
	Included	Missing, n (%)	Included	Missing, n (%)	Included	Missing, n (%)
Sex, n (%)						
Men	10 (10.3)	0 (0)	6 (6.4)	0 (0)	16 (8.4)	0 (0)
Women	87 (89.7)	0 (0)	88 (93.6)	0 (0)	175 (91.6)	0 (0)
Age, mean (SD), year	46.2 (8.7)	0 (0)	44.2 (8.1)	0 (0)	45.2 (8.4)	0 (0)
Geographical region, n (%)						
Central Denmark Region	26 (26.8)	0 (0)	24 (25.5)	0 (0)	50 (26.2)	0 (0)
The Capital Region of Denmark	29 (29.9)	0 (0)	27 (28.7)	0 (0)	56 (29.3)	0 (0)
Region Zealand	14 (14.4)	0 (0)	14 (14.9)	0 (0)	28 (14.7)	0 (0)
The Region of Southern Denmark	21 (21.7)	0 (0)	21 (22.4)	0 (0)	42 (22.0)	0 (0)
The North Denmark Region	7 (7.2)	0 (0)	8 (8.5)	0 (0)	15 (7.8)	0 (0)
School type (%)						
Private	33 (34.0)	0 (0)	29 (30.9)	0 (0)	62 (32.5)	0 (0)
Municipal	64 (66.0)	0 (0)	65 (69.1)	0 (0)	129 (67.5)	0 (0)
School size (%)						
≤499 pupils	50 (51.6)	0 (0)	50 (53.2)	0 (0)	100 (52.4)	0 (0)
≥500 pupils	47 (48.4)	0 (0)	44 (46.8)	0 (0)	91 (47.6)	0 (0)
Self-reported mental health [mean (SD)]						
PSS	15.4 (5.4)	3 (3.1)	16.2 (6.0)	2 (2.1)	15.8 (5.7)	5 (2.6)
SCL-5	1.9 (0.5)	1 (1.0)	1.9 (0.6)	1 (1.1)	1.9 (0.5)	2 (1.0)
WHO-5	59.7 (16.9)	1 (1.0)	58.6 (17.1)	2 (2.1)	59.1 (17.0)	3 (1.6)
BRS	4.3 (0.9)	2 (2.1)	4.3 (0.8)	2 (2.1)	4.3 (0.9)	4 (2.1)
FFMQ-15	41.8 (5.5)	3 (3.1)	42.0 (5.7)	4 (4.3)	41.9 (5.6)	7 (3.7)
ARSQ						
Discontinuity of Mind	9.0 (2.6)	1 (1.0)	9.0 (2.8)	4 (4.3)	9.0 (2.7)	5 (2.6)
Theory of Mind	8.6 (2.8)	3 (3.1)	9.2 (2.7)	3 (3.2)	8.9 (2.7)	6 (3.1)
Self	9.2 (2.3)	2 (2.1)	9.6 (2.0)	2 (2.1)	9.4 (2.2)	4 (2.1)
Planning	9.0 (2.9)	2 (2.1)	9.7 (2.9)	3 (3.2)	9.4 (2.9)	5 (2.6)
Sleepiness	6.6 (2.6)	4 (4.1)	6.4 (2.3)	3 (3.2)	6.5 (2.5)	7 (3.7)
Comfort	10.7 (1.9)	3 (3.1)	10.6 (2.0)	2 (2.1)	10.7 (2.0)	5 (2.6)
Somatic awareness	10.4 (2.2)	2 (2.1)	10.6 (2.3)	2 (2.1)	10.5 (2.2)	4 (2.1)

ARSQ, Amsterdam Resting-State Questionnaire; BRS, Brief Resilience Scale; FFMQ, Five Facet Mindfulness Questionnaire; MBSR, Mindfulness-based Stress Reduction; n, number; PSS, Cohen's Perceived Stress Scale; SCL-5, The Hopkins Symptom Checklist 5; SD, standard deviation; WHO-5, WHO-5 Well-being Scale.

Table 2 Effectiveness of MBSR for school teachers on perceived stress, symptoms of anxiety and depression and wellbeing at 3- and at 6-month follow-up (mixed model analysis)

Measure	MBSR intervention			Wait-list control			Between-group difference, mean (95% CI) ^a	P value	Cohen's d
	Teachers (n)	Score, mean (SD)	Within-group change from baseline, mean (95% CI) ^a	Teachers (n)	Score, mean (SD)	Within-group change from baseline, mean (95% CI) ^a			
PSS ^b									
Baseline	94	15.4 (5.4)	NA	92	16.2 (6.0)	NA	NA	NA	NA
3 months	74	13.1 (5.3)	-2.2 (-3.6 to -0.8)	69	15.8 (6.3)	-0.5 (-1.6 to 0.6)	-1.7 (-3.3 to -0.04)	0.04	0.30
6 months	73	12.9 (5.0)	-2.3 (-3.5 to -1.1)	72	16.1 (5.9)	-0.2 (-1.2 to 0.8)	-2.1 (-3.8 to -0.5)	0.01	0.37
SCL-5 ^c									
Baseline	96	1.9 (0.5)	NA	93	1.9 (0.6)	NA	NA	NA	NA
3 months	76	1.7 (0.5)	-0.2 (-0.3 to -0.06)	69	1.9 (0.6)	-0.02 (-0.1 to 0.09)	-0.2 (-0.3 to 0.01)	0.07	0.30
6 months	74	1.7 (0.4)	-0.1 (-0.2 to -0.03)	72	1.9 (0.6)	-0.04 (-0.1 to 0.07)	-0.1 (-0.2 to 0.04)	0.16	0.19
WHO-5 ^d									
Baseline	96	59.7 (16.9)	NA	92	58.6 (17.1)	NA	NA	NA	NA
3 months	74	64.1 (15.2)	3.9 (-0.6 to 7.2)	70	57.6 (18.2)	-1.0 (-5.0 to 3.0)	4.9 (-0.1 to 9.9)	0.05	0.29
6 months	74	62.6 (14.6)	2.3 (-1.5 to 6.1)	73	57.1 (17.1)	-1.3 (-4.7 to 2.0)	3.6 (-1.7 to 9.0)	0.18	0.21

a: Adjusted for systematic effect: randomization, sex, age, region, school type, school size and school cluster effect.

b: Measure of perceived stress with higher values indicating higher levels of perceived stress.

c: Measure of self-reported symptoms of depression and anxiety with higher values indicating higher levels of self-reported symptoms of depression and anxiety.

d: Measure of general wellbeing with higher values indicating higher level of wellbeing.

CI, confidence interval; MBSR, Mindfulness-based Stress Reduction; n, number; NA, not applicable; PSS, Cohen's Perceived Stress Scale; SCL-5, The Hopkins Symptoms Checklist-5; SD, standard deviation; WHO-5, The WHO-5 Well-being Scale.

statistically significantly more comfort [0.9 (95% CI: 0.05–1.7)] and statistically significantly more bodily awareness [1.0 (95% CI: 0.1–2.0)] in rest at 6 months than did the wait-list control group. The intervention group also experienced statistically significantly less discontinuity of mind [-0.9 (95% CI: -1.8 to -0.01)] during rest at 6 months than did the wait-list control group.

Most effect estimates corresponded to small or medium standardized effects sizes (tables 2 and 3). However, some results showed effect sizes below 0.2.

Loss to 6-month follow-up showed statistically significant differences in age, geographical region, sleepiness and bodily awareness (Supplementary table S1–S3). The sensitivity analyses showed statistically significant effects on PSS in all four scenarios we analyzed (Supplementary table S4). Sensitivity analyses revealed that when adding $0.2 \times$ SD to the intervention group, effects in well-being became statistically significant at both 3 and 6 months. The same was true when subtracting $0.2 \times$ SD in the wait-list control group (Supplementary table S4). Sensitivity analyses of symptoms of depression and anxiety showed that adding $0.2 \times$ SD to the wait-list control group provided statistically significant effects at 3 months. As did subtracting $0.2 \times$ SD in the intervention group. The sensitivity analyses did not change the conclusions of the remaining outcomes.

Discussion

In this study, MBSR was investigated as a health-promoting and primary preventive intervention delivered as a part of a school teacher-training programme. The study population included lower secondary school teachers, who had an interest in teaching mindfulness in schools. Their stress level was moderate at baseline and therefore with no large room for improvement. Our findings indicate that MBSR has a small significant effect in reducing perceived stress among lower secondary school teachers participating in a teacher-training programme 6 months after enrolment. According to Rose, small effect sizes found in a study that applies a population-based preventive strategy may have great implications on the society level.¹⁷ It may prevent the school teachers with moderate stress levels from developing high stress levels and related

consequences. Previous research has documented an association between a PSS score ≥ 16 and the risk of long-term sickness absence from work.³⁵ No other statistically significant effects were found on mental health outcomes in this study. However, there were tendencies for the intervention group to have higher levels of well-being and lower levels of symptoms of depression and anxiety than the wait-list control group at both 3 and 6 months. Furthermore, the intervention group experienced statistically significantly less discontinuity of mind and more comfort and bodily awareness in rest after 6 months than the wait-list control group.

In line with our results, previous research has shown similar effects of the stress-reducing properties of mindfulness for educators.^{15,36,37} A systematic review of mindfulness-based interventions for teachers shows a small to moderate effect with regard to stress reduction.¹⁵ A non-randomized feasibility trial shows a greater effect of an MBI for teachers on perceived stress than that of the present study.³⁶ However, this non-randomized trial included teachers with a mean PSS score of ≥ 19 in the intervention group. Hence, they constituted a high-risk group. As opposed to our study, the above-mentioned studies find positive effects on symptoms of depression and anxiety and on well-being.^{15,36} The lack of effects on these mental health outcomes in our study may be due to missing follow-up data (Supplementary table S4) or a smaller room for improvement in the present study.

Besides stress-reducing effects, mindfulness has been shown to assist teachers in providing genuine care for their students and creating 'calmer and more focused classroom environments'.³⁸ This illustrates the importance for teachers acquiring these personal and professional competencies.

Strengths and limitations

Firstly, a strength of this study is its cluster-randomized design and the use of robust statistical analysis. Using mixed-effect analysis and bootstrapping, we adjusted for the cluster effects. Secondly, the study population includes schools from all five geographical regions in Denmark and represents both private and municipal schools. Hence, this study is assumed to be representative of the effects one could expect to find upon replication in a Danish setting. Thirdly, the research area of mindfulness for teachers is

Table 3 Effectiveness of MBSR for school teachers on resilience, dispositional mindfulness and thoughts and feelings in rest at 3- and 6-month follow-up (mixed model analysis)

Measure	MBSR intervention			Wait-list control			P value	Cohen's d
	Teachers (n)	Score, mean (SD)	Within-group change from baseline, mean (95% CI) ^a	Teachers (n)	Score, mean (SD)	Within-group change from baseline, mean (95% CI) ^a		
BRS^b								
Baseline	95	4.3 (0.9)	NA	92	4.3 (0.8)	NA	NA	NA
3 months	74	4.5 (0.8)	0.2 (0.02 to 0.4)	68	4.3 (0.9)	0.05 (−0.1 to 0.2)	0.1 (−0.1 to 0.4)	0.22
6 months	73	4.4 (0.9)	0.05 (−0.1 to 0.2)	71	4.3 (0.9)	0.05 (−0.1 to 0.2)	−0.003 (−0.2 to 0.2)	0.98
FFMQ–15^c								
Baseline	94	41.8 (5.5)	NA	90	42.0 (5.7)	NA	NA	NA
3 months	71	43.6 (5.5)	1.4 (0.4 to 2.4)	68	41.7 (5.5)	−0.2 (−1.3 to 0.9)	1.6 (0.2 to 2.9)	0.02
6 months	72	43.3 (4.9)	0.9 (−0.02 to 1.8)	68	41.7 (5.0)	−0.05 (−0.9 to 0.8)	0.9 (−0.2 to 2.0)	0.09
ARSQ^d								
Discontinuity of mind								
Baseline	96	9.0 (2.6)	NA	90	9.0 (2.8)	NA	NA	NA
3 months	76	7.6 (2.6)	−1.4 (−1.9 to −0.9)	69	9.0 (2.8)	−0.01 (−0.6 to 0.5)	−1.4 (−2.2 to −0.6)	<0.01
6 months	73	8.1 (2.6)	−0.9 (−1.6 to −0.2)	73	9.1 (2.4)	0.03 (−0.6 to 0.7)	−0.9 (−1.8 to −0.01)	0.05
Theory of mind								
Baseline	94	8.6 (2.8)	NA	91	9.2 (2.7)	NA	NA	NA
3 months	75	8.3 (2.7)	−0.3 (−0.9 to 0.3)	69	9.3 (2.7)	0.2 (−0.6 to 1.0)	−0.5 (−1.5 to 0.5)	0.31
6 months	73	8.9 (2.5)	0.4 (−0.2 to 1.0)	72	9.8 (2.6)	0.7 (0.2 to 1.1)	−0.3 (−1.1 to 0.5)	0.49
Self								
Baseline	95	9.2 (2.3)	NA	92	9.6 (2.0)	NA	NA	NA
3 months	74	8.9 (2.2)	−0.3 (−0.8 to 0.2)	69	9.5 (2.4)	−0.2 (−0.8 to 0.5)	−0.1 (−0.9 to 0.7)	0.79
6 months	71	9.4 (2.4)	0.2 (−0.4 to 0.8)	72	9.3 (2.2)	−0.4 (−1.1 to 0.2)	0.6 (−0.2 to 1.4)	0.14
Planning								
Baseline	95	9.0 (2.9)	NA	91	9.7 (2.9)	NA	NA	NA
3 months	76	8.1 (2.8)	−0.9 (−1.7 to −0.2)	66	10.3 (2.4)	0.6 (−0.2 to 1.4)	−1.5 (−2.6 to −0.4)	0.01
6 months	72	8.6 (2.7)	−0.3 (−1.0 to 0.4)	71	9.9 (2.8)	0.1 (−0.6 to 0.9)	−0.4 (−1.4 to 0.6)	0.42
Sleepiness								
Baseline	93	6.6 (2.6)	NA	91	6.4 (2.3)	NA	NA	NA
3 months	76	6.1 (2.8)	−0.3 (−1.1 to 0.4)	68	7.1 (2.5)	0.7 (0.03 to 1.4)	−1.0 (−2.0 to −0.02)	0.05
6 months	72	6.2 (2.8)	−0.2 (−0.9 to 0.6)	73	7.2 (2.4)	0.7 (0.1 to 1.3)	−0.9 (−1.9 to 0.3)	0.10
Comfort								
Baseline	94	10.7 (1.9)	NA	92	10.6 (2.0)	NA	NA	NA
3 months	75	10.9 (2.1)	0.2 (−0.2 to 0.6)	70	10.4 (2.1)	−0.3 (−0.7 to 0.1)	0.5 (−0.1 to 1.1)	0.07
6 months	73	11.1 (1.9)	0.4 (−0.1 to 0.9)	73	10.2 (2.3)	−0.5 (−1.1 to 0.2)	0.9 (0.05 to 1.7)	0.04
Somatic awareness								
Baseline	95	10.4 (2.2)	NA	92	10.6 (2.3)	NA	NA	NA
3 months	74	10.9 (2.3)	0.4 (−0.1 to 1.0)	68	10.2 (2.4)	−0.6 (−1.3 to 0.2)	1.0 (−0.1 to 2.0)	0.07
6 months	72	10.5 (2.4)	0.03 (−0.6 to 0.6)	72	9.7 (2.4)	−1.0 (−1.7 to −0.3)	1.0 (0.1 to 2.0)	0.03

a: Adjusted for systematic effect randomization, sex, age, region, school type, school size and school cluster effect.

b: Measure of resilience with higher values indicating higher levels of resilience.

c: Measure of dispositional mindfulness with higher values indicating higher levels of dispositional mindfulness.

d: Measure of thoughts and feelings in rest with higher values indicating more frequent experience of the seven sub-dimensions in rest. CI, confidence interval; ARSQ, Amsterdam Resting-State Questionnaire; BRS, Brief Resilience Scale; FFMQ, Five Facet Mindfulness Questionnaire; MBSR, Mindfulness-based Stress Reduction; *n*, number; NA, not applicable; SD, standard deviation.

characterized by heterogeneity of the MBIs being evaluated.³⁷ Thus, it is a strength of the present study that we employed the MBSR programme for which there is evidence for stress-reducing effect.¹²

The study also has limitations. It was conducted as a nested trial and as part of a teacher-training programme in which additional programme elements were included after 6 months follow-up. Therefore, it was not possible to measure long-term effects of MBSR past 6 months. Still, previous research has mainly used less than 6 months of follow-up.¹³ Further, the study being a nested trial prohibited the use of an active control group, as this might affect the results of the main trial. Since we compared an MBSR-intervention group to a passive wait-list control group, we cannot conclude on any specific effects of MBSR. Moreover, it cannot be ruled out that the participating self-selected school teachers might have had a pre-existing interest in mindfulness. Therefore, they could be more motivated for participation in an MBSR course compared to an average Danish school teacher. If this is the case, results of this study may solely be representative of school teachers with an interest for mindfulness.

Loss to 6-month follow-up analyses showed differences in various parameters. To mitigate the possibility of bias, sensitivity analyses were performed. The results of these did not change the main conclusions of the study. Furthermore, only self-reported measures were utilized. Since this study investigated the *perceived* stress and well-being of participants, self-reported data were deemed appropriate. However, the study could have benefitted from supplementary knowledge of whether the intervention group experienced fewer sick days than the control group.

Conclusions

This study shows that it is possible to reduce the perceived stress level of lower secondary school teachers by offering MBSR as part of a teacher-training programme educating lower secondary school teachers to teach mindfulness in schools. The difference in perceived stress level between the intervention and control groups continued to increase from 3 to 6 months. Teachers in the intervention group reported moderate a mean perceived stress level at baseline. This

indicates that a universal intervention using MBSR as part of a teacher-training programme can reduce stress among lower secondary school teachers. Reducing the mean perceived stress level among school teachers with a moderate stress level may prevent these individuals from developing high stress levels.

Supplementary data

Supplementary data are available at *EURPUB* online.

Acknowledgements

The authors thank all the participating schools and teachers for their participation and time; the MBSR-teachers delivering the intervention; and the research group conducting the SELFCARE project.

Data availability

The data used and analyzed in this study are available from the corresponding author upon reasonable request.

Funding

The Danish Parliament, Ministry of Health (Case number: 1800332) funded the intervention including; development of the teacher training programme, translation and adaptation of the Mindfulness Programme, “b”, which the teachers are trained to teach in schools, and training of 200 Danish lower secondary school teachers. The research was funded by TrygFonden (ID: 151692). Neither The Danish Parliament nor TrygFonden has had any role in the research conducted.

Conflicts of interest: The Danish Center for Mindfulness, Department of Clinical Medicine, Aarhus University, offers MBSR teacher-training and MBSR courses and receive payments for both. The authors declare no conflicts of interest.

Key points

- The mean perceived stress level of school teachers in the intervention group was statistically significantly reduced more than that of the wait-list control group both 3 and 6 months after participating in a Mindfulness-based Stress Reduction (MBSR) course.
- The present study did not show statistically significant effects of MBSR on symptoms of depression and anxiety or well-being. However, tendencies favoured MBSR.
- The intervention group experienced statistically significantly less discontinuity of mind, more comfort and bodily awareness in rest at 6 months follow-up than did the wait-list control group.
- The present study indicates that it is possible to integrate MBSR in continuing education, resulting in reduced perceived stress levels among participating school teachers.

References

- 1 WHO. Fact sheet on sustainable development goals: health targets—Mental Health. 2018, 1–8. Available at: <https://www.euro.who.int/en/health-topics/noncommunicable-diseases/mental-health/publications/2016/fact-sheets-on-sustainable-development-goals-sdgs-health-targets-mental-health-sdg-target-3.4> (29 April 2021, date last accessed).
- 2 Joseph JJ, Golden SH. Cortisol dysregulation: the bidirectional link between stress, depression, and type 2 diabetes mellitus. *Ann N Y Acad Sci* 2017;1391:20–34.
- 3 Prior A, Fenger-Grøn M, Larsen KK, et al. The association between perceived stress and mortality among people with multimorbidity: a prospective population-based cohort study. *Am J Epidemiol* 2016;184:199–210.
- 4 Kashani M, Eliasson A, Vernalis M. Perceived stress correlates with disturbed sleep: a link connecting stress and cardiovascular disease. *Stress* 2012;15:45–51.
- 5 McEwen BS, Lasley E. *The End of Stress as We Know It*. New York: Dana Press. 2002.
- 6 Kyriacou C. Teacher stress: directions for future research. *Educational Review* 2001;53:27–35.
- 7 Johnson S, Cooper C, Cartwright S, et al. The experience of work-related stress across occupations. *Journal of Managerial Psych* 2005;20: 178–87.
- 8 Lichtenberg E. *Flere Oplever Stress—Især Blandt Offentligt Ansatte (More People Are Experiencing Stress—Especially among Public Employees)*. Copenhagen: Arbejderbevægelsens Erhvervsråd (The Economic Council of the Labour Movement), 2018.
- 9 Kabat-Zinn J. *Meditation is Not What You Think*. New York: Hachette Book Group, 2018.
- 10 Mindfulness Center at Brown. MBSR Teacher Training and Development, 2020. Available at: <https://www.brown.edu/public-health/mindfulness/learn-more/mbsr-teacher-training-and-development> (23 April 2021, date last accessed).
- 11 Santorelli S. Mindfulness-Based Stress Reduction (MBSR): Standards of Practice. 2014. Available at: https://mindfulness.au.dk/fileadmin/mindfulness.au.dk/Artikler/Santorelli_mbsr_standards_of_practice_2014.pdf (24 April 2021, date last accessed).
- 12 De Vibe M, Bjørndal A, Fattah S, et al. *Mindfulness-Based Stress Reduction (MBSR) for Improving Health, Quality of Life and Social Functioning in Adults: A Systematic Review and Meta-Analysis*. Norge: The Campbell Collaboration, 2017.
- 13 Galante J, Friedrich C, Dawson AF, et al. Mindfulness-based programmes for mental health promotion in adults in nonclinical settings: a systematic review and meta-analysis of randomised controlled trials. *PLOS Med* 2021;18:e1003481.
- 14 Lomas T, Medina JC, Ivtzan I, et al. The impact of mindfulness on the wellbeing and performance of educators: a systematic review of the empirical literature. *Teaching and Teacher Education* 2017;61:132–41.
- 15 Zarate K, Maggin DM, Passmore A. Meta-analysis of mindfulness training on teacher well-being. *Psychol Schs* 2019;56:1700–15.
- 16 Hilton LG, Marshall NJ, Motala A, et al. Mindfulness meditation for workplace wellness: an evidence map. *Work* 2019;63:205–18.
- 17 Rose G, Khaw K-T, Marmot M. *Rose’s Strategy on Preventive Medicine*. New York: Oxford University Press, 2008.
- 18 Juul L, Frydenberg M, Beck MS, et al. Stress-free Everyday LiFe for Children and Adolescents REsearch (SELFCARE): a protocol for a cluster randomised trial testing a school teacher training programme to teach mindfulness (“b”). *BMC Psychol* 2021;9:31.
- 19 Udtræk fra Institutionsregisteret (Extraction from the Registry of Institutions). 2019 Version 1.4. Available at: <https://statistik.uni-c.dk/instregudtraek/> (29 April 2021, date last accessed).
- 20 DATATILSYNET. *Generelt om forskning og statistik (General about research and statistics)*. 2021. Available at: <https://www.datatilsynet.dk/emner/forskning-og-statistik/generelt-om-forskning-og-statistik> (5 May 2021, date last accessed).
- 21 Harris PA, Taylor R, Thielke R, et al. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42:377–81.
- 22 Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:385–96.
- 23 Cohen SW. Perceived stress in a probability sample in the United States. In: Spacapan S, Oskamp S, editors. *The Claremont Symposium on Applied Social Psychology. The Social Psychology of Health*. Newbury Park, California: SAGE Publications, 1988; 31–67.
- 24 Eskildsen A, Dalgaard VL, Nielsen KJ, et al. Cross-cultural adaptation and validation of the Danish consensus version of the 10-item Perceived Stress Scale. *Scand J Work Environ Health* 2015;41:486–90.
- 25 Lee EH. Review of the psychometric evidence of the perceived stress scale. *Asian Nurs Res (Korean Soc Nurs Sci)* 2012;6:121–7.
- 26 Tambs K, Moum T. How well can a few questionnaire items indicate anxiety and depression? *Acta Psychiatr Scand* 1993;87:364–7.
- 27 Strand BH, Dalgard OS, Tambs K, et al. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry* 2003;57:113–8.

- 28 Topp CW, Østergaard SD, Søndergaard S, et al. The WHO-5 Well-Being Index: a systematic review of the literature. *Psychother Psychosom* 2015;84:167–76.
- 29 Smith BW, Dalen J, Wiggins K, et al. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med* 2008;15:194–200.
- 30 Windle G, Bennett KM, Noyes J. A methodological review of resilience measurement scales. *Health Qual Life Outcomes* 2011;9:8.
- 31 Juul L, Pallesen KJ, Piet J, et al. Effectiveness of mindfulness-based stress reduction in a self-selecting and self-paying community setting. *Mindfulness (N Y)* 2018;9:1288–98.
- 32 Gu J, Strauss C, Crane C, et al. Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after mindfulness-based cognitive therapy for people with recurrent depression. *Psychol Assess* 2016;28:791–802.
- 33 Diaz BA, Van Der Sluis S, Moens S, et al. The Amsterdam Resting-State Questionnaire reveals multiple phenotypes of resting-state cognition. *Front Hum Neurosci* 2013;7:446.
- 34 Lakens D. Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Front Psychol* 2013;4:863.
- 35 Larsen FB, Pedersen MH, Lasgaard M, et al. *Hvordan Har du Det? 2017—Sundhedsprofil for Region og Kommuner (Bind 1) (How Are You? 2017—Health Profile for Region and Municipalities)*. Aarhus: DEFACTUM, Region Midtjylland (Aarhus: DEFACTUM, Central Denmark Region), 2018.
- 36 Beshai S, McAlpine L, Weare K, et al. A non-randomised feasibility trial assessing the efficacy of a mindfulness-based intervention for teachers to reduce stress and improve well-being. *Mindfulness* 2016;7:198–208.
- 37 Emerson L-M, Leyland A, Hudson K, et al. Teaching mindfulness to teachers: a systematic review and narrative synthesis. *Mindfulness (N Y)* 2017;8:1136–49.
- 38 Hwang Y-S, Bartlett B, Greben M, et al. A systematic review of mindfulness interventions for in-service teachers: a tool to enhance teacher wellbeing and performance. *Teaching and Teacher Education* 2017;64:26–42.

Supplemental Online Content

Content and table-headings:

eTable 1: Loss to follow-up analysis at 6 months; included participants and participants lost to 6-months follow-up in both the MBSR intervention group and the waitlist control group

eTable 2: Loss to follow-up analysis at 6 months in the intervention group; included participants and participants lost to 6-months follow-up in the MBSR intervention group

eTable 3: Loss to follow-up analysis at 6 months in the wait-list control group; included participants and participants lost to 6-months follow-up in the wait-list control group

eTable 4: Sensitivity analysis of perceived stress level, symptoms of depression and anxiety and wellbeing

eTable 5: Sensitivity analysis of resilience, dispositional mindfulness and thoughts and feelings in rest

eTable 1: Loss to follow-up analysis at 6 months; included participants and participants lost to six months follow-up in both the MBSR intervention group and the waitlist control group.

Characteristic	Included	Lost to follow-up	p value
Sex, n (%)	n = 150	n = 41	
Men	13 (8.7)	3 (7.3)	0.782
Women	137 (91.3)	38 (92.7)	
Age, mean (SD)	46.0 (7.9)	42.3 (9.6)	0.0120
Geographical region, n (%)			
Central Denmark Region	41 (27.3)	9 (21.9)	0.015
The Capital Region of Denmark	51 (34.0)	5 (12.2)	
Region Zealand	21 (14.0)	7 (17.1)	
The Region of Southern Denmark	28 (18.7)	14 (34.2)	
The North Denmark Region	9 (6.0)	6 (14.6)	
School type, n (%)			
Private	47 (31.3)	15 (36.6)	0.524
Municipal	103 (68.7)	26 (63.4)	
School size, (%)			
≤499 pupils	76 (50.7)	24 (58.5)	0.371
≥500 pupils	74 (49.3)	17 (41.5)	
Self-reported mental health			
<i>PSS, mean (SD)</i>	15.9 (5.6)	15.8 (6.3)	0.923
<i>SCL-5, mean (SD)</i>	1.9 (0.5)	1.8 (0.6)	0.370
<i>WHO-5, mean (SD)</i>	59.0 (16.4)	59.6 (19.3)	0.849
<i>BRS, mean (SD)</i>	4.3 (0.9)	4.2 (0.7)	0.637
<i>FFMQ-15, mean (SD)</i>	41.9 (5.6)	42.1 (5.6)	0.875
<i>ARSQ, mean (SD)</i>			
Discontinuity of Mind	9.0 (2.7)	8.8 (2.5)	0.675
Theory of Mind	8.9 (2.8)	9.1 (2.7)	0.727
Self	9.6 (2.1)	8.8 (2.2)	0.0625
Planning	9.5 (2.9)	8.9 (2.9)	0.302
Sleepiness	6.4 (2.4)	7.0 (2.7)	0.136
Comfort	10.7 (2.0)	10.7 (2.0)	0.970
Somatic Awareness	10.7 (2.2)	9.9 (2.2)	0.0449

Test for no difference between included and missing participants at 6 months. Paired t-test was used for continuing variables, while Pearson's chi-squared test were used for categorical variables.

Abbreviations: ARSQ: Amsterdam Resting-State Questionnaire, BRS: Brief Resilience Scale, FFMQ: Five Facet Mindfulness Questionnaire, MBSR: Mindfulness-based Stress Reduction, n: number, PSS: Cohen's Perceived Stress Scale, SCL-5: The Hopkins Symptom Checklist 5, SD: standard deviation, WHO-5: WHO-5 Well-being Scale

eTable 2: Loss to follow-up analysis at 6 months in the intervention group; included participants and participants lost to six months follow-up in the MBSR intervention group

Characteristic	Included	Lost to follow-up	p value
Sex, n (%)	n = 77	n = 20	
Men	7 (9.1)	3 (15.0)	0.439
Women	70 (90.9)	17 (85.0)	
Age, mean (SD)	47.7 (7.9)	40.3 (9.4)	0.0005
Geographical region, n (%)			
Central Denmark Region	21 (27.3)	5 (25.0)	0.045
The Capital Region of Denmark	27 (35.0)	2 (10.0)	
Region Zealand	12 (15.6)	2 (10.0)	
The Region of Southern Denmark	13 (16.9)	8 (40.0)	
The North Denmark Region	4 (5.2)	3 (15.0)	
School type (%)			
Private	23 (29.9)	10 (50.0)	0.090
Municipal	54 (70.1)	10 (50.0)	
School size, (%)			
≤499 pupils	37 (48.1)	13 (65.0)	0.177
≥500 pupils	40 (51.9)	7 (35.0)	
Self-reported mental health			
<i>PSS, mean (SD)</i>	15.2 (5.3)	16.6 (6.2)	0.342
<i>SCL-5, mean (SD)</i>	1.9 (0.5)	1.8 (0.5)	0.513
<i>WHO-5, mean (SD)</i>	60.6 (16.5)	56.0 (18.5)	0.294
<i>BRS, mean (SD)</i>	4.4 (0.9)	4.2 (0.7)	0.500
<i>FFMQ-15, mean (SD)</i>	42.2 (5.6)	39.7 (4.8)	0.0585
<i>ARSQ, mean (SD)</i>			
Discontinuity of Mind	9.0 (2.7)	9.1 (2.3)	0.891
Theory of Mind	8.5 (2.8)	9.3 (2.5)	0.289
Self	9.3 (2.3)	8.4 (2.0)	0.136
Planning	9.0 (3.0)	9.2 (2.5)	0.817
Sleepiness	6.3 (2.5)	8.0 (2.8)	0.011
Comfort	10.7 (1.9)	10.8 (1.8)	0.909
Somatic Awareness	10.6 (2.2)	9.7 (2.4)	0.117

Abbreviations: ARSQ: Amsterdam Resting-State Questionnaire, BRS: Brief Resilience Scale, FFMQ: Five Facet Mindfulness Questionnaire, MBSR: Mindfulness-based Stress Reduction, n: number, PSS: Cohen's Perceived Stress Scale, SCL-5: The Hopkins Symptom Checklist 5, SD: standard deviation, WHO-5: WHO-5 Well-being Scale

eTable 3: Loss to follow-up analysis at 6 months in the wait-list control group; included participants and participants lost to six months follow-up in the wait-list control group

Characteristic	Included	Lost to follow-up	p value
Sex, n (%)	n = 73	n = 21	
Men	6 (8.2)	0 (0.0)	0.175
Women	67 (91.8)	21 (100.0)	
Age, mean (SD)	44.2 (7.7)	44.2 (9.6)	0.999
Geographical region, n (%)			
Central Denmark Region	20 (27.4)	4 (19.0)	0.250
The Capital Region of Denmark	24 (32.9)	3 (14.3)	
Region Zealand	9 (12.3)	5 (23.8)	
The Region of Southern Denmark	15 (20.5)	6 (28.6)	
The North Denmark Region	5 (6.9)	3 (14.3)	
School type (%)			
Private	24 (32.9)	5 (23.8)	0.428
Municipal	49 (67.1)	16 (76.2)	
School size, (%)			
≤499 pupils	39 (53.4)	11 (52.4)	0.933
≥500 pupils	34 (46.6)	10 (47.6)	
Self-reported mental health			
<i>PSS, mean (SD)</i>	16.6 (5.9)	15.1 (6.4)	0.316
<i>SCL-5, mean (SD)</i>	2.0 (0.6)	1.9 (0.7)	0.517
<i>WHO-5, mean (SD)</i>	57.3 (16.2)	63.0 (19.9)	0.191
<i>BRS, mean (SD)</i>	4.3 (0.9)	4.3 (0.7)	0.982
<i>FFMQ-15, mean (SD)</i>	41.4 (5.7)	44.4 (5.5)	0.0393
<i>ARSQ, mean (SD)</i>			
Discontinuity of Mind	9.1 (2.8)	8.6 (2.7)	0.481
Theory of Mind	9.3 (2.6)	8.9 (3.0)	0.528
Self	9.8 (1.9)	9.2 (2.4)	0.223
Planning	10.0 (2.7)	8.7 (3.3)	0.0831
Sleepiness	6.5 (2.3)	6.2 (2.3)	0.589
Comfort	10.6 (2.0)	10.6 (2.1)	0.884
Somatic Awareness	10.8 (2.3)	10.1 (2.1)	0.200

Abbreviations: ARSQ: Amsterdam Resting-State Questionnaire, BRS: Brief Resilience Scale, FFMQ: Five Facet Mindfulness Questionnaire, n: number, PSS: Cohen's Perceived Stress Scale, SCL-5: The Hopkins Symptom Checklist 5, SD: standard deviation, WHO-5: WHO-5 Well-being Scale

eTable 4: Sensitivity analysis of perceived stress level, symptoms of depression and anxiety and wellbeing

	MBSR intervention			Wait-list control		
	Between-group difference	95% CI	p-value	Between-group difference	95% CI	p-value
Primary outcome						
+ 0.2 SD*						
PSS						
3 months	-1.6	-3.1; -0.1	0.032	-2.1	-3.6; -0.6	0.005
6 months	-2.1	-3.6; -0.6	0.006	-2.6	-4.1; -1.1	0.001
- 0.2 SD*						
PSS						
3 months	-2.1	-3.6; -0.6	0.006	-1.6	-3.1; -0.1	0.038
6 months	-2.6	-4.1; -1.1	0.001	-2.1	-3.6; -0.6	0.006
Secondary mental health outcome measures						
+ 0.2 SD*						
SCL-5						
3 months	-0.1	-0.3; 0.02	0.091	-0.2	-0.3; -0.03	0.020
6 months	-0.1	-0.2; 0.07	0.278	-0.1	-0.3; 0.02	0.087
WHO-5						
3 months	6.1	1.3; 10.8	0.013	4.5	-0.2; 9.3	0.062
6 months	5.0	0.2; 9.8	0.040	3.6	-1.2; 8.3	0.141
- 0.2 SD*						
SCL-5						
3 months	-0.2	-0.3; -0.02	0.024	-0.1	-0.3; 0.03	0.105
6 months	-0.1	-0.3; 0.02	0.086	-0.08	-0.2; 0.07	0.276
WHO-5						
3 months	4.5	-0.2; 9.3	0.060	6.1	1.3; 10.9	0.013
6 months	3.5	-1.3; 8.2	0.150	4.9	0.1; 9.7	0.044

* Missing values were replaced by model-based predictions adding or subtracting 0.2 SD in either the intervention or the wait-list control arm. Thus, when adding or subtracting 0.2 SD to the intervention group, the wait-list control group estimate was kept constant. When adding or subtracting 0.2 SD to the wait-list control group, the intervention group estimate was kept constant.

Abbreviations: CI: confidence interval, MBSR: Mindfulness-based Stress Reduction, PSS: Cohen's Perceived Stress Scale, SCL-5: The Hopkins Symptom Checklist-5, SD: standard deviation, WHO-5: The WHO-5 Well-being Scale.

eTable 5: Sensitivity analysis of resilience, dispositional mindfulness and thoughts and feelings in rest

	MBSR intervention			Wait-list control		
	Between-group difference	95% CI	p-value	Between-group difference	95% CI	p-value
+ 0.2 SD*						
BRS						
3 months	0.2	-0.1; 0.4	0.067	0.1	-0.1; 0.3	0.309
6 months	0.07	-0.1; 0.3	0.473	-0.006	-0.2; 0.2	0.949
FFMQ-15						
3 months	2.1	0.9; 3.4	0.001	1.6	0.4; 2.8	0.011
6 months	1.7	0.4; 2.9	0.008	1.2	-0.06; 2.4	0.062
ARSQ						
<i>Discontinuity of mind</i>						
3 months	-1.3	-2.1; -0.6	0.001	-1.6	-2.3; -0.8	<0.001
6 months	-0.9	-1.6; -0.1	0.029	-1.1	-1.8; -0.3	0.006
<i>Theory of mind</i>						
3 months	-0.3	-1.1; 0.5	0.439	-0.6	-1.4; 0.3	0.183
6 months	-0.2	-1.0; 0.6	0.618	-0.4	-1.2; 0.4	0.297
<i>Self</i>						
3 months	-0.01	-0.7; 0.7	0.970	-0.2	-0.9; 0.5	0.538
6 months	0.7	0.03; 1.4	0.042	0.5	-0.2; 1.2	0.145
<i>Planning</i>						
3 months	-1.4	-2.2; -0.5	0.002	-1.6	-2.5; -0.8	<0.001
6 months	-0.4	-1.3; 0.4	0.341	-0.7	-1.5; 0.2	0.124
<i>Sleepiness</i>						
3 months	-1.0	-1.8; -0.2	0.016	-1.2	-2.1; -0.4	0.003
6 months	-0.9	-1.7; -0.05	0.038	-1.1	-1.9; -0.3	0.010
<i>Comfort</i>						
3 months	0.6	0.003; 1.2	0.049	0.4	-0.2; 1.0	0.167
6 months	0.9	0.3; 1.5	0.002	0.8	0.2; 1.4	0.013
<i>Somatic awareness</i>						
3 months	1.0	0.3; 1.7	0.004	0.8	0.1; 1.5	0.024
6 months	1.1	0.4; 1.7	0.003	0.9	0.2; 1.6	0.016
- 0.2 SD*						
BRS						
3 months	0.1	-0.1; 0.3	0.275	0.2	-0.005; 0.4	0.056
6 months	-0.007	-0.2; 0.2	0.944	0.07	-0.1; 0.3	0.475
FFMQ-15						
3 months	1.6	0.4; 2.8	0.010	2.11	0.9; 3.3	0.001
6 months	1.2	-0.04; 2.4	0.058	1.7	0.5; 2.9	0.007
ARSQ						
<i>Discontinuity of mind</i>						
3 months	-1.5	-2.3; -0.8	<0.001	-1.3	-2.1; -0.5	0.001
6 months	-1.1	-1.9; -0.3	0.004	-0.9	-1.6; -0.1	0.023
<i>Theory of mind</i>						
3 months	-0.5	-1.3; 0.3	0.199	-0.3	-1.1; 0.5	0.469
6 months	-0.4	-1.3; 0.4	0.288	-0.2	-1.0; 0.6	0.604
<i>Self</i>						

3 months	-0.2	-0.9; 0.5	0.560	-0.001	-0.7; 0.7	0.998
6 months	0.5	-0.2; 1.2	0.155	0.7	0.01; 1.4	0.045
<i>Planning</i>						
3 months	-1.6	-2.4; 0.7	<0.001	-1.3	-2.2; -0.5	0.002
6 months	-0.7	-1.5; 0.2	0.117	-0.4	-1.3; 0.4	0.325
<i>Sleepiness</i>						
3 months	-1.2	-2.0; -0.4	0.005	-1.0	-1.8; -0.2	0.021
6 months	-1.1	-1.2; -0.3	0.010	-0.9	-1.7; -0.06	0.036
<i>Comfort</i>						
3 months	0.4	-0.2; 1.0	0.152	0.6	0.02; 1.2	0.044
6 months	0.8	0.2; 1.4	0.014	0.9	0.3; 1.5	0.002
<i>Somatic awareness</i>						
3 months	0.8	0.1; 1.5	0.020	1.1	0.4; 1.8	0.003
6 months	0.9	0.2; 1.6	0.016	1.1	0.4; 1.8	0.003

* Missing values were replaced by model-based predictions adding or subtracting 0.2 SD in either the intervention or the wait-list control arm. Thus, when adding or subtracting 0.2 SD to the intervention group, the wait-list control group estimate was kept constant. When adding or subtracting 0.2 SD to the wait-list control group, the intervention group estimate was kept constant.

Abbreviations: ARSQ: Amsterdam Resting-State Questionnaire, BRS: Brief Resilience Scale, FFMQ: Five Facet Mindfulness Questionnaire, CI: confidence interval, MBSR: Mindfulness-based Stress Reduction, SD: standard deviation.

STUDY 2

Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention

Published in *Frontiers in Psychology*



OPEN ACCESS

EDITED BY

Isabel Saz-Gil,
University of Zaragoza,
Spain

REVIEWED BY

Lene E. Søvdal,
Independent Researcher, Oslo,
Norway
Gilbert Ernest Franco,
Beacon College,
United States

*CORRESPONDENCE

Emilie Hasager Bonde
emilie.bonde@clin.au.dk

SPECIALTY SECTION

This article was submitted to
Organizational Psychology,
a section of the journal
Frontiers in Psychology

RECEIVED 16 August 2022

ACCEPTED 18 November 2022

PUBLISHED 06 December 2022

CITATION

Bonde EH, Mikkelsen EG, Fjorback LO and
Juil L (2022) Impacting employees' and
managers' mental health skills using a
workplace-adapted mindfulness-based
intervention.

Front. Psychol. 13:1020454.

doi: 10.3389/fpsyg.2022.1020454

COPYRIGHT

© 2022 Bonde, Mikkelsen, Fjorback and
Juul. This is an open-access article
distributed under the terms of the [Creative
Commons Attribution License \(CC BY\)](#). The
use, distribution or reproduction in other
forums is permitted, provided the original
author(s) and the copyright owner(s) are
credited and that the original publication in
this journal is cited, in accordance with
accepted academic practice. No use,
distribution or reproduction is permitted
which does not comply with these terms.

Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention

Emilie Hasager Bonde^{1*}, Eva Gemzøe Mikkelsen², Lone Overby Fjorback¹ and Lise Juul¹

¹Department of Clinical Medicine, Danish Center for Mindfulness, Aarhus University, Aarhus, Denmark, ²Department of Psychology, University of Southern Denmark, Odense, Denmark

Background: During the past decades, the mental health of the population has been declining. Mindfulness-based stress reduction (MBSR) has been found effective in enhancing well-being along with reducing perceived stress and symptoms of anxiety and depression. Mindfulness-based interventions (MBIs) in the workplace have shown promising results relating to the mental health of employees and managers. However, the research field of organizational-level MBIs being offered to entire companies is still nascent. Practicing mindfulness may affect skills related to good mental health. Thus, the objective of this study was to investigate the impact of an organizational-level MBI on the mental health skills of employees and managers.

Methods: This qualitative study was part of a quasi-experimental multi-method study. Four small and medium-sized private enterprises with a total of 368 employees and managers were included. The intervention contained: 1. An obligatory introductory session on mental health and mindfulness, 2. Voluntary participation in a 10-week live online workplace-adapted MBSR course, and 3. A workshop for selected employee representatives and managers on further implementation of mindfulness in the organization. A total of 27 focus group interviews including 76 respondents were conducted pre- and post-intervention. Verbatim transcription was performed. Data was analyzed using inductive qualitative content analysis.

Results: Through analysis, four pre-intervention categories emerged: 1. Bodily sensations and awareness in stressful situations, 2. Reactive and passive behavior during stressful situations, 3. Differences in perception as a stressor, 4. Self-criticism and low ability to practice self-care. Six post-intervention categories were identified: 1. Enhanced ability to be aware in the present moment, 2. Increased acknowledgement of how others may view things differently from oneself, 3. Increased kindness to oneself and being able to practice self-care, 4. Moving from reactive to responsive behavior in stressful situations, 5. Mindfulness as an accelerator for an ongoing personal process and 6. Practicing mindfulness – setting time aside or being mindful in everyday life.

Conclusion: This study indicates that it is possible to enhance employees' and managers' mental health skills using an organizational-level MBI. Enhanced awareness in the present moment transcended through post-intervention categories, facilitating increased self-kindness and responsive behavior in stressful situations.

KEYWORDS

mental health, mindfulness, workplace, health promotion and prevention, qualitative methods

Introduction

During the past decades, the mental health of the European population has been continuously declining (WHO, 2018a). A process which was reinforced by the Covid-19 pandemic. As such, the prevalence of anxiety and symptoms of depression amongst adults in OECD countries has risen dramatically from pre-pandemic 2019 to 2021 (OECD, 2021). In Denmark, the percentage of the population with a low mental health score measured on SF-12 has increased from 13.2% in 2017 to 17.4% in 2021 (Jensen et al., 2022). Moreover, a similar increase in percentage is evident in Danes experiencing a perceived high stress level (Jensen et al., 2022). However, mental health is more than the absence of psychological distress. Indeed, it is defined as: "... a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community" (WHO, 2018b). Hence, more positive elements such as realization of abilities and capabilities to cope with stress are fundamentals for having good mental health. Consequently, and as stressed by the Covid-19 pandemic, there is a need for implementing mental health promoting and preventing interventions to increase the population's mental health.

To identify which mental health promoting and preventing interventions to utilize, knowledge of causes related to poor mental health must be obtained. According to the World Health Organization's (WHO) World mental health report (WHO, 2022), individuals' mental health depends on multiple factors within the domains of individual factors, family and community factors and structural factors (WHO, 2022). Therefore, interventions working to promote protective factors within the three domains are needed. Protective factors for individuals' mental health within the individual domain is, i.e., "sense of self-worth and mastery" and "social and emotional skills" (WHO, 2022). In this study, acquired or intrinsic skills serving as protective factors to one's mental health are referred to as *mental health skills*. These may be skills such as regulating emotions, self-esteem and capability to engage in interpersonal relations (WHO, 2012).

In WHO's World mental health report (WHO, 2022), mindfulness-based interventions (MBIs) are mentioned as examples of evidence-based psychosocial interventions that have

been found effective in improving mental health (WHO, 2022). Being mindful enables individuals to be aware in the present moment with a kind and curious attitude. Mindfulness is defined as "... the awareness arising through paying attention on purpose in the present moment, non-judgmentally, in the service of self-understanding, wisdom, and compassion" (Kabat-Zinn, 2018). Being aware in the present moment allows one to actually experience that moment. It also allows one to notice bodily sensations, mood, thoughts and feelings; A knowledge, which is very helpful in order to be able to respond to life instead of reacting automatically (Fjorback, 2015). In a study by Killingsworth and Gilbert (2010), the authors investigated how not being mentally present in what you are doing affects self-reported happiness (Killingsworth and Gilbert, 2010). Using an App-based approach, they measured individuals' happiness and the degree to which they were aware in the present moment in real-time. The authors found that, on average, we humans are not mentally present in what we are doing 46.9% of the time, and that participants were happiest when they were mentally present in what they were doing (Killingsworth and Gilbert, 2010). Hence, according to this study, people are less happy when they are not mentally present in the moment – regardless of where to their thoughts might wander (Killingsworth and Gilbert, 2010). Moreover, practicing mindfulness often involves focusing the attention on bodily sensations. Being aware of bodily sensations is proposed to be fundamental in for example self-regulation (Treves et al., 2019).

Mindfulness-based stress reduction (MBSR) is an 8-week programme designed to assist participants in developing abilities to be consciously aware in the present with kindness toward oneself and the surroundings. Furthermore, the curriculum-based programme entails practices focussing on becoming aware of reactions during stress. The programme is delivered by a trained MBSR teacher in a group format with weekly sessions of 2.5 h and a 7-h silent retreat day (Santorelli, 2014; Brown Mindfulness Center, 2020).

Previous research on MBSR has been conducted across study populations including both clinical and non-clinical populations. Furthermore, MBSR has been studied in various settings such as in schools, hospitals and workplaces (De Vibe et al., 2017). Across study populations and settings, MBSR has been found effective in

improving mental health among adults (De Vibe et al., 2017). Furthermore, participation in MBSR enhanced coping and empathy (De Vibe et al., 2017), both of which are factors relating to social and emotional skills put forward by the WHO as protective factors of mental health (WHO, 2022). Hence, MBSR is a universal intervention that can be delivered to both clinical and non-clinical populations demonstrating favourable effects on participants' mental health and protective mental health skills. Moreover, a recent systematic review and meta-analysis found MBIs to be some of the most effective in improving mental well-being compared to other mental health interventions (van Agteren et al., 2021).

According to McHenry (2012), mental health promoting interventions should be implemented in settings where people live their lives, i.e., workplaces (McHenry, 2012). Therefore, there is an incentive to implement mental health promoting and preventive interventions in workplace settings. The research area of implementing MBIs in workplaces is steadily developing with the majority of previous research of MBIs having been conducted within the public sector (Janssen et al., 2018). A systematic review and meta-analysis of randomized controlled trials of MBIs in the workplace showed these interventions to be effective in improving mental health (Vonderlin et al., 2020). Online and App-based MBIs have also demonstrated positive effects regarding stress reduction, mindfulness and concentration (Aikens et al., 2014; Nadler et al., 2020; Axelsen et al., 2022). However, most of these interventions targeted individuals within workplace settings.

According to the Medical Research Council, interventions can effectively target entire organizations to facilitate system change (Skivington et al., 2021). When intervening at an organizational level, a population-based strategy may be utilized. By using a population-based strategy, interventions are provided to the entire risk-spectrum of a population, including low, moderate and high-risk individuals (Rose et al., 2008). Such a risk-spectrum might represent a spectrum ranging from high to low degree of mental health. Hence, when using a population-based strategy, the interventions do not focus on selected high-risk individuals but instead target entire populations (Rose et al., 2008), such as organizations, i.e., workplaces. Utilizing a population-based strategy may prevent individuals at low and moderate risk of, i.e., poor mental health from transcending to the high-risk population, thereby preventing poor mental health in a wider population. In a study by Kersemaekers et al. (2018), they found an organizational-level workplace-adapted MBI effective in reducing perceived stress and enhancing well-being and mindfulness (Kersemaekers et al., 2018). Moreover, they also demonstrated improvements in the organizational climate (Kersemaekers et al., 2018). By intervening at an organizational level, the intervention is offered to the entire staff with the hopes of contributing to the creation of healthier work environments. Additionally, the impact on leader capabilities of this workplace-adapted MBI was investigated in a qualitative study by Rupprecht et al. (2019). In that study, managers showed enhanced abilities in both self-management and management of employees (Rupprecht et al.,

2019). However, knowledge of how a workplace-adapted MBI impacts mental health skills among employees and managers is lacking. To gain insights into how employees and managers express the impact of a workplace-adapted MBI on their mental health skills, there is a need for further qualitative research.

The results of previous research may be dependent on context and generalization to other settings and/or study populations might not be feasible (Galante et al., 2021; Skivington et al., 2021). Therefore, there is a need for investigating how an organization-level intervention aimed at implementing a workplace-MBI to as many employees and managers as possible can impact mental health skills.

Accordingly, the main objective of this qualitative study was to gain an understanding of how a workplace-MBI including a workplace-adapted MBSR course impacts the expressed mental health skills of employees and managers employed in small and medium-sized enterprises (SMEs). Secondary, this understanding will generate insights into the feasibility of implementing MBIs in private workplaces and of using workplaces as mental health promoting settings.

Materials and methods

Design

The present study presents qualitative results from a quasi-experimental, multi-method trial which main objective was to support the creation of healthy work environments using a workplace-adapted MBI. The main trial was registered with the Danish Data Protection Agency (2016-051-000001/1715). The present qualitative study however focuses on how mental health skills of employees and managers are impacted by a workplace-adapted MBI. The trial enrolled four SMEs with 10-249 employees and managers with the entire company or divisions thereof based in Denmark. The four SMEs represented businesses within media (Company 1), restaurants (Company 2), production (Company 3) and health-IT (Company 4). Company 4 was an international SME with employees working from offices across the globe. The remaining three companies were based in Denmark.

Participants and recruitment

To be eligible for inclusion in the study, companies were required to be privately owned and have a total of 10-249 employed at enrolment. Furthermore, top management at the companies had to give permission for the employees to spend working hours participating in the intervention.

Companies were recruited *via* multiple channels including direct contact to relevant companies, digital newsletters from business organizations within IT and production businesses, social media post on Twitter, Facebook and LinkedIn as well as posts on

TABLE 1 Intervention components and content.

Component	Content	Delivered by	Participants
Information session	A two-hour lecture concerning: <ul style="list-style-type: none"> • What is mental health? • The bodily stress response • The possibility to train one's mental health • Mindfulness as a way of training one's mental health • Previous research on MBSR • Two guided mindfulness exercises • Information about the possibility to participate in a 10-weeks workplace-adapted MBSR course 	A certified MBSR teacher	All employees and managers
10-weeks live online workplace-adapted MBSR course	A systematically workplace-adapted 10-week MBSR course including: <ul style="list-style-type: none"> • Same themes as the original MBSR programme • Experience-based approach was utilized, engaging participants in mindfulness practices • Horizontal inquiry of direct experiences during mindfulness practices • Delivered live online <i>via</i> Zoom • Invitation to practice a minimum of 3 times a week for 15 min 	A certified MBSR teacher	Self-selected employees and managers
Implementation workshop	A two-hour workshop focusing on further implementation of mindfulness in the participating companies consisting of: <ul style="list-style-type: none"> • Discussions in groups and plenary about the wish for and possible barriers to further implementation of mindfulness • Presentations of ideas emerging from these discussions • Facilitators presenting possible ways to further implementation • Creating an action plan for further implementation 	An organizational psychologist, a certified MBSR teacher and an observant	Selected employee representatives and managers

the Danish Center for Mindfulness' webpage. Recruitment was performed between January 2020 and October 2020.

Upon a company's expressed interest in participation, a preliminary meeting with selected managers hosted by the research project leader, LJ, and an MBSR teacher took place. At this meeting, managers were informed that signing up for the project would require them to enable all employees and managers to participate in an obligatory two-hour information session during working hours. Furthermore, the managers were informed that the intervention were to be an organizational-level intervention. Hence, the intervention was not to be offered only to selected groups of employees and/or managers. The aim was to support a positive mental health environment in the organisation. During the meeting, the research project leader (LJ) emphasized that to participate, employees and managers had to be able to attend a live online 10-weeks workplace-adapted MBSR course either during working hours or with monetary payment for time spent participating during leisure time. After committing to these conditions, a formal contract of participation was signed by a company representative, typically by a person in the top management.

Intervention

In all companies, the intervention consisted of three components: obligatory participation in a two-hour

information-session on mental health and mindfulness for all employees and managers, a live online 10-weeks workplace-adapted MBSR course for self-selecting employees and managers, and lastly a workshop for selected employee representatives and managers on the subsequent implementation of mindfulness in the company (Table 1).

Participation in a two-hour information-session was obligatory so to ensure that all employees and managers got the same information. The 10-weeks workplace-adapted MBSR course was systematically adapted from the original MBSR curriculum. Adaptation of the original MBSR programme was conducted with caution of what elements of the intervention could be varied to enhance intervention-context-fit, and which intervention elements were essential to ensure reliability of the programme theory (Crane et al., 2017). This workplace-adapted MBSR course followed the original MBSR curriculum with all weekly themes represented along the 10 weeks. Furthermore, a trained MBSR teacher delivered the course live online *via* Zoom in groups of 5–22 employees and/or managers. Through the course, the MBSR teachers utilized an experience-based approach, engaging participants in mindfulness practices followed by horizontal inquiry of direct experiences during the practices (Crane et al., 2017). During the 10-weeks workplace-adapted MBSR courses, LF supervised all MBSR teachers delivering one or more courses in the participating companies in weekly 1.5-h sessions (see Table 2).

TABLE 2 Differences between the original and workplace-adapted MBSR programme.

	Workplace-adapted 10-weeks MBSR course	Original MBSR course
Length of programme	10 weeks	8 weeks
Length of sessions	1.5 h	2.5 h
Silent retreat session	Included as one of the 10 sessions. Duration: 1.5 h	Added as a 9th session within the 8-week programme. Duration: 7 h

TABLE 3 Distribution of respondents.

Company	Respondents, <i>n</i>	Managers, <i>n</i>	Employees, <i>n</i>	Females, <i>n</i> (%)
Company 1	5	1	4	4 (80.0)
Company 2	18	8	10	12 (66.6)
Company 3	25	5	20	16 (64.0)
Company 4	28	8	20	9 (32.1)
Total	76	22	54	41 (53.9)

Respondents

Sampling of respondents for the focus group interviews were conducted using the Matrix sampling method (Campbell et al., 2020). This purposive sampling method allowed managers to select employees that represented positive, negative and neutral attitudes towards mindfulness pre-intervention. Post-intervention, the Matrix sampling method was applied to allow MBSR teachers to recommend respondents that had participated in their respective workplace-adapted MBSR courses. It was made clear to the MBSR teachers that the recommended respondents had to represent both individuals who expressed a high degree of engagement during the workplace-adapted MBSR course as well as individuals with lower levels of engagement. In total, 76 respondents representing the four participating companies were included in a pre- and/or a post-intervention focus group interview. As shown in Table 3, across companies, a slight majority of the respondents were female.

Data collection

Semi-structured focus group interviews were conducted by EM and EB, with EM as the primary interviewer and EB as observer and substitute. In Company 1, management consisted of one manager, therefore an individual semi-structured interview was conducted with this manager at both pre- and post-intervention. In total 14 pre-intervention focus group interviews and 13 post-intervention focus group interviews were performed between March 2020 and May 2021. At the beginning of all conducted interviews, respondents received detailed information

about the study, the use of data, and the possibility to withdraw from the study at any given time. All respondents provided oral consent.

Apart from being a researcher, EM is an experienced interviewer and has in-depth knowledge of and practical experience with establishing safe sharing environments. EM is an organizational psychologist with no previous personal or professional experience of mindfulness or MBIs. EB holds an MSc in public health and has personal experience with and scientific knowledge of mindfulness and MBIs.

All 14 pre-intervention interviews were conducted before the two-hour information session using a semi-structured interview guide. The purpose of the interviews was two-fold: (1) to get insights into employees and managers knowledge of mindfulness and their patterns of behavior during stressful situations and (2) to gain insight into the social dynamics of the workplace as an organization. Therefore, the interview guide consisted of 9 themes: (a) Thoughts related to mindfulness, (b) Information and thoughts about the project, (c) Stress, (d) Coping with stress/overload, (e) The company's prioritization of well-being, (f) Collaboration within the company, (g) Communication and tone, (h) Feedback culture within the company and (i) Expectations regarding one's own and the organisation's participation in the research project (themes e-i) will not be elaborated on in the present study.

The 13 post-intervention interviews were conducted following the implementation workshop. The purpose of the post-intervention interview guide was to gain insights into the intervention's possible effects on the mental health skills of employees and managers as well as possible effects on the social dynamics within work groups and the organization as a whole. The post-intervention interview guide consisted of 8 themes: (a) Experiences of participating in the intervention, (b) Abilities to be in the present moment and notice bodily sensations, (c) Stress and behavior during stress, (d) Interpersonal relations, (e) Feedback culture and prioritization of well-being, (f) How the intervention is being narrated in the organization, (g) Facilitating and inhibiting factors for engagement and (h) Wishes for the future implementation of mindfulness. The organizational effects are to be published elsewhere and hence, this study focuses on themes a-d.

Due to the Covid-19-pandemic, most interviews were conducted live online using Zoom. Hence, 19 of the 27 interviews (70.4%) were performed live online. These 19 interviews were recorded using the record-function in Zoom. The remaining 8 interviews, performed in person, were recorded using a Dictaphone. During the interviews, EB made notes of seemingly relevant statements, demeanour and atmosphere.

Analysis

Verbatim transcription of the interviews was conducted by EB. The transcriptions included pauses, length of pauses, changes in voice and pitch as well as changes in body language. Data

analysis was performed following the four steps of inductive qualitative content analysis (Schreier, 2014; Bjerrum and Lyhne, 2021): 1. Create an overview of the data, 2. Identify and extract meaning units using analytical questions, 3. Categorize meaning units into descriptive categories, and 4. Transversal analysis of categories to condense explanatory themes.

Firstly, EB read through all transcripts and noted preliminary analytical reflections. Secondly, meaning units were identified and extracted using three analytical questions: 1. How do employees and managers describe their awareness in the present moment? 2. What reactions to stress are described by employees and managers? 3. How do employees and managers relate to themselves and their felt needs? These analytical questions were based on the programme theory developed before the trial commenced. EB and EM independently identified meaning units on parts of the transcripts. Diverging identifications were discussed until agreement was reached. EB then conducted the identification and extraction of meaning units in all transcripts. Thirdly, meaning units were categorized into descriptive categories. Four pre-intervention and six post-intervention categories were condensed. During this analytical step, notes made during the interviews and the first analytical step were consulted to ensure that the individual meaning unit was not extracted from its context, leading to potential risk of over-interpretation. Following initial categorization, inter-coder validation of the descriptive categories was performed. Inter-coder agreement was 75.8%. The majority of disagreement was due to differences of the interpretation of specific meaning units. Upon discussion and consultation with notes, agreement was reached on interpretation of all meaning units and their respective categories. All categories were found to be valid. Fourthly, transversal analysis across categories was conducted. In collaboration, EM and EB compared categories that resulted in two explanatory themes. EM and EB was in close contact and had running discussions during the analytical process. Descriptive categories and explanatory themes were discussed with LJ and LF.

Results

The obtained results are generated on the basis of: 1. Pre-intervention focus groups, 2. Post-intervention focus groups. First, results from pre-intervention focus groups followed by those from post-intervention.

Qualitative pre-intervention focus groups

Pre-intervention, four descriptive categories were condensed using inductive content analysis: 1. Bodily sensations and awareness in stressful situations, 2. Reactive and passive behavior during stressful situations, 3. Differences in perception

as a stressor, 4. Self-criticism and low ability to practice self-care.

Bodily sensations and awareness during stressful situations

When asked about what bodily sensations employees and managers noticed during stressful situations, the majority were able to identify a number of these. The most commonly mentioned bodily sensations during a stressful situation were faster heartbeat, a feeling of unease, stomachache and chest tightness. Others were unable to identify any bodily sensations during stressful situations. A few of these individuals described themselves as mentally detached from their body during stress, e.g., using a metaphor of being like a machine and thereby depersonalize themselves:

“I’m made for... I am a machine that just runs” (Female manager, Company 3).

“so... I do not have any signals that I’m like aware of where I think: “oh, that’s why”” (Female manager, Company 2).

This mental detachment and lack of ability to describe bodily sensations could indicate a low level of awareness of bodily sensations, and hence lower ability to be consciously aware in the present moment, indicating lowered mental health skills.

Furthermore, some managers and employees reported having previously been on sick leave due to stress. Going through this experience, several of these individuals described becoming aware of bodily sensations during stress, which enhanced their ability to act on feelings of stress:

“Actually, I was just on sick leave due to stress (...) if somebody has bombarded me with 10,000 questions (...), I can get a slight tingling in my fingers and at the same time, I get kind of a dry mouth and things like that” (Female production worker, Company 3).

This indicates that previous experiences with sick leave due to stress may act as a facilitator to one’s ability to identify bodily sensations during stressful situations, posing an example of an acquired mental health skill.

Reactive and passive behavior during stressful situations

Across companies, employees and managers were generally able to describe specific patterns of behavior during and following stressful situations. As such, both managers and employees described examples of being reactive during stressful situations. Being reactive, respondents described acting on impulse without the ability to reflect when in a stressful situation:

“... because I need to be able to convince myself that the decision... so, I cannot reflect on it [her reaction while in a

stressful situation, red.] right in that moment. I might be able to in an hour or so” (Female employee, Company 2).

However, a few managers gave examples of being more responsive during stressful situations, e.g., taking a break from work to get “a birds-eye view of things” (male manager, Company 4).

When describing specific patterns of behavior while in stressful situations, both managers and employees offered examples of specific reactions, i.e., being less patient, enhanced tendency to be defensive of oneself to others or wanting to avoid whatever is causing stress:

“personally, I react kind of outward, I think... Or not outward, I’m not like yelling and screaming, but... I defend myself a bit” (Female employee, Company 2).

Others spontaneously mention that they occasionally get “passive” and mentally shut down during stressful situations:

“(...) then I begin to push things around without solving them. Then I notice that I get inefficient, I get passive” (Female employee, Company 4).

The respondents’ demonstrated ability to describe patterns of behavior in stressful situations might indicate that they were consciously aware of their behavior. However, it is not clear whether they were aware of their behavior whilst going through a stressful situation or strictly retrospectively through thinking about the transpired situation.

Differences in perception as a stressor

This emerging category was not part of the interview guide. However, multiple managers and employees across companies spontaneously described feelings of pressure due to others (coworkers, employees, managers) having different perceptions of a specific situation than themselves. Most commonly, respondents described experiencing lowered ability to view situations from other persons’ perspective while in a stressful situation. As such, having different perspectives on things may act as an additional stressor in an already stressful situation.

“... He could not see how far behind he actually was. (...) and to be standing there with someone who did not share my view of the situation was almost more frustrating than it was for me to just run faster” (Female employee, Company 2).

Self-criticism and low ability to practice self-care

Generally, managers and employees across companies demonstrated lack of kindness towards oneself and their own felt needs. This was expressed as self-criticism in situations where they were not able to concentrate and when they made mistakes. Furthermore, a manager in Company 1 described feeling guilty

when acting on her felt needs, e.g., taking a day off from work when needed:

“I sometimes feel guilty in relation to my employees when I say “I’m not coming tomorrow” or something, and I really want that [feeling] to go away (...) but at the same time, I scold myself a bit” (Female manager, Company 1).

One employee in Company 1 describe how she is able to retrospectively express kindness to herself following an unpleasant or stressful situation, e.g., having made a mistake at work. However, while being in the stressful situation, she is prone to self-criticism. This might indicate an ability to reflect on a specific situation without it turning into rumination generating negative thoughts.

When becoming aware of bodily sensations indicating stress, a small number of managers expressed the ability to exercise self-care by acting on their felt needs, e.g., taking time off from work. These managers also represented individuals that were able to describe bodily sensations in stressful situations. This may indicate that being aware of bodily sensations during stress enhances ones’ ability of acting on felt needs, thereby exercising self-care. However, the majority of both managers and employees across companies gave examples illustrating a lack of attention to and taking care of ones’ physical and mental health:

“... I’ve sometimes worked all night without sleeping. Then I’ve gone to a client meeting at 9 AM next morning (...) and then I’ve gone home again to continue working. So awake for like almost 48h without sleeping to get the job done, right?” (Male manager, Company 3).

Qualitative post intervention focus groups

During the analysis of the transcribed post-intervention interview data, two individuals independently reported experiencing that feelings seemed bigger or with a higher magnitude during and after the intervention than before. This resulted in enhanced worrying about the cause of why this was the case. However, none of the other participants in the respective focus groups reported having had the same experience. Furthermore, in the beginning of several post-intervention interviews, several respondents reported not having experienced any changes from participating in the intervention. Nonetheless, during the interviews, the majority of those same individuals described specific situations, where they had noticed changes, for example in their own behavior, following the intervention.

The analysis of the transcribed post-intervention interview data revealed six categories describing the perceived impact of participating in the intervention: 1. Enhanced ability to be aware in the present moment, 2. Increased acknowledgement of how others may view things differently from oneself, 3. Increased kindness to

oneself and being able to practice self-care, 4. Moving from reactive to responsive behavior in stressful situations, 5. Mindfulness as an accelerator for an ongoing personal process and 6. Practicing mindfulness – setting time aside or being mindful in everyday life.

Enhanced ability to be aware in the present moment

An increased ability to be aware in the present moment was apparent from the use of specific examples provided by the respondents. Both managers and employees experienced being more aware of themselves as well as their surroundings, indicating a higher degree of awareness. Being more aware of themselves resulted in an enhanced ability to sense how they were feeling, which may again influence one's actions:

“(...) I have a better sense of how I'm feeling. I am more able to feel joy, and I'm more able to feel if I'm sad, angry... And that also means that I can... sense what I really need” (Female manager, Company 2).

Moreover, the ability to be more aware in the present moment manifested itself by an increased ability to concentrate during work-tasks as compared to pre-intervention. The ability to notice when one is not mentally aware in the present moment allows one to purposely return to the work-task at hand. A male employee in Company 4 stated:

“I have a tendency to have my thoughts wander off or I start doing something else and I actually think I've gotten better and more conscious on staying in the assignment at hand” (Male employee, Company 4).

Furthermore, increased awareness in the present moment seemed to allow employees and managers to become aware of when they ruminated, indicating a higher degree of meta-cognition. Employees across companies described themselves being able to stop rumination and to let go of thoughts concerning situations that are outside their control. Being aware of rumination enabled respondents across companies to notice what they were thinking of and then actively chose to let go of the rumination:

“you become aware of if you are stuck in some things (...) that I become aware of “hey, I do not have to use my energy on this. I can let it go” (Female manager, Company 2).

Being aware in the present moment was not only restricted to the ability to notice, for example, rumination or elevated concentration. Both managers and employees gave examples of being more aware of the good things in life when talking about the expressed impact of participating in the workplace-MBI:

“I also noticed (...) where I go running and I do not even remember much of it. Like I do not remember taking in the atmosphere sensing my surroundings and now I'm just like enjoying it. Like take it all in” (Female employee, Company 4).

As such, the ability to be aware in the present moment seems to impact employees and managers both while performing work-related tasks as well as insights into one's emotional state.

Increased awareness of how others may view things differently from oneself

Pre-intervention, a category emerged that concerned experiences of individual differences in perceptions of specific situations that seemed to act as an additional stressor during an already stressful work situation. Following the workplace-MBI, managers and employees across companies reported an increased awareness of how others might perceive social situations differently from themselves. This heightened awareness of individual differences in perceptions enabled employees and managers to be curious as to how others perceive their own behavior:

“I try to get an idea of their view of what happened is instead of having a preconceived opinion of “yeah, that's what I said, so of course you understood it like that”” (Female employee, Company 4).

Moreover, this increased awareness appears to allow for reflections on interpersonal differences in how one prefers work-tasks presented. This exemplifies a way for how employees and managers approach each other and communicate, in turn, possibly affecting the way employees and managers approach each other and may reflect on the level of interpersonal understanding in the workplace:

“That you just remember (...) “how did the other person view this [situation]?” or “how is this going to be received?.” Just take the time to either understand what the other party said or take the time to explain what needs to be done” (Female manager, Company 2).

Furthermore, results point to the intervention influencing how participants view interpersonal differences in perceptions. At pre-intervention, some interviewees appeared to view differences in perception of specific situations as a stressor in itself and something one wanted to avoid. At post-intervention, more positive feelings towards these differences seemed to have been cultivated. This was exemplified by a greater amount of respect for and accept of how others may view things, and behave, differently from oneself:

“I do not feel that I notice these differences MORE [than before, red.] but I have become sort of more accepting and respectful, that there are others think and do and act differently than I” (Male employee, Company 3).

Cultivating a greater appreciation of how others view social situations differently from oneself may reduce the added feelings of frustration and stress in such situations leading to a reduction in the total amount of stress among employees and managers.

Increased kindness to oneself and being able to practice self-care

Several employees and managers across companies expressed an increase of self-kindness post-intervention. Contrary to what was seen pre-intervention, participating respondents reported lower degrees of self-criticism following the workplace-MBI. This was most often exemplified by how the respondents acted when making mistakes. As with the ability to let go of rumination, employees and managers experienced capabilities in letting go of mistakes thereby reducing the amount of self-criticism:

“(...) like when I do something wrong, it’s “oh, that’s silly, that’s kind of dumb” instead of saying “Dang, you are so stupid! That’s... you are bad at all kinds of other things, too,” right? Now I just go “oops”” (Female employee, Company 1).

The ability to show oneself more kindness may affect how one handles work tasks. One employee describe how self-criticism can add to the feeling of “chaos” during stressful situations (female employee, Company 2). By reducing that added feeling of chaos, the respondent felt more able to accept the stressful situation for what it was:

“You accept it more, that this is how it is now, instead of thinking “stop, you cannot think like that!” and then it just becomes even more chaos” (Female employee, Company 2).

Interview data points to that the ability to practice self-kindness is intertwined with the ability to practice self-care. Pre-intervention, only a small number of managers offered examples of self-care for example by taking time off from work. However, following the workplace-MBI, several managers and employees across all participating companies reported an increased ability to practice self-care, most often exemplified as taking breaks during the workday. Pre-intervention, a male manager reported that he sometimes worked through the night to finish a presentation for work. This same manager reported not only being aware of taking breaks but of the importance of working during the day instead of evenings and nights:

“Well... to put in some space between them [meetings, red.], so you have time during the day, so you have time to prepare the meetings. (...) That, I’m completely convinced mindfulness did to me. (...) That you need this break now and then” (Male manager, Company 3).

However, the ability to practice self-care did not limit itself to taking more breaks during the workday. Employees experienced increased awareness of their personal boundaries and situations where these boundaries were crossed. The same individuals reported a greater ability to speak up or ask for help when they had reached their emotional boundaries:

“But [I’ve, red.] become better at holding back and saying “I cannot make it. I’m not super-human” (...).” Then

you [manager, red.] have to tell me what to do (...).” Not long ago, I would have just said, “Okay, I’ll keep going, and then I’ll stay a couple of hours” (Female employee, Company 3).

Moving from reactive to responsive behavior in stressful situations

Pre-intervention, the majority of employees and managers showed patterns of being reactive by acting on impulse in stressful situations. Following participation in the workplace-MBI, an elevated level of responsiveness had replaced this reactivity. As such, employees and managers described having acquired the ability to “count to ten and breathe” in stressful situations (female manager, Company 2). The ability to respond to others instead of acting on impulse, allows the possibility of consciously choosing how to behave in situations of conflict or differences in opinion. This ability transcended into both working relationships and personal relationships. One employee in Company 1 reported that her daughter commented on her increased ability to listen and be more tolerant. At the workplace, this ability may have a positive effect on the collaboration and communication between departments, as illustrated by the below comment:

“(...) breathe and count to ten and think, “OK, how do I want to challenge this down in the Planning department? (...)” as opposed to previously, where I would maybe just’ve said “where are those Products?!”” (Male manager, Company 3).

However, being more aware of one’s reaction patterns in stressful situations does not necessarily eliminate reactive behavior during these situations. Sometimes, the enhanced level of awareness – in this case, the ability to notice how one reacts in stressful situations – enabled employees to notice their behavior, yet they felt unable to change this behavior while being in the situation:

“(...) then I cannot do anything. I could see it from the outside, (...) that “now, it [reaction] has happened, now it has happened... now, my body has already reacted (...). Then I cannot do anything about it, other than noticing that it’s happening” (Male employee, Company 4).

Furthermore, enhanced bodily awareness seemed to aid some employees in stressful situations. By using the body as an anchor to the present moment, these employees were able to handle these situations with a calmer demeanour than before:

“[I’ve, red.] gotten better at noticing.” OK, now I need to do one thing at a time” (...) when you are at work and stressing around. Also [MBSR-teacher, red.] said to notice one’s feet if you were stressed out. Think like “now, I’ve got my foot down here. Think of that and get an overview” (Female employee, Company 2).

Hence, participation in this workplace-MBI appears to translate into concrete changes in the employees’ and managers’ behavior in stressful situations. This affected both personal

experiences of being in stressful situations and work relationships. Moreover, personal relationships may also be impacted following participation in this workplace MBI. However, only a limited number of respondents gave examples of this.

Mindfulness as an accelerator for ongoing personal development

This category emerged from experiences described by employees and managers who had previous experience with mindfulness practice and/or previous experiences of working on changing their behavioral patterns, e.g., by seeing a psychologist. Participating in the workplace-MBI appeared to fuel the ongoing personal development of these individuals, causing it to accelerate:

“(...) I actually think it’s two things [ongoing personal work on changing behavior while frustrated and workplace-MBI, red.] that has been put into motion simultaneously, which then really has had a self-perpetuating effect” (Male manager, Company 3).

Data do not give insights into potential mechanisms for this accelerating effect. However, the use of the workplace setting for practicing mindfulness may make it easier for employees and managers with a preexisting mindfulness practice to implement mindfulness into their daily lives:

“it [mindfulness exercises] was kind of the same as what I had already started. But (...) yeah, some of it has become kind of more related to reality” (Male employee, Company 4).

Practicing mindfulness – Setting time aside or being mindful in everyday life

The majority of employees and managers across companies did not establish a structured, formal mindfulness practice following participation in the workplace-MBI. However, informal exercises such as focusing on specific parts of the body when stressed were frequently employed. Moreover, following the workplace-MBI, employees and managers were aware of specific mindfulness exercises, they could use when needed:

“(...) I’ve discovered a lot of... eh... like exercises and things like that, and I could imagine that in the future I might do a body scan just because I felt like it” (Female employee, Company 2).

Most employees and managers perceived mindfulness exercises as means to reduce stress and not as a way of preventing it. However, several employees and managers with previous experience of practicing mindfulness, re-established or intensified their practice following the workplace-MBI:

“(...) this course has... I already use it [mindfulness], but it has made me completely aware that I need to remember and use it more. (...) and I practice yoga about every other day, and I use

mindfulness to, as you say, thoughts and living in the moment (...)” (Female employee, Company 3).

Furthermore, following the workplace-MBI some employees and managers used mindfulness exercises in relation to physical workouts. In this way, they had implemented mindfulness in their daily lives. This speaks to three different approaches to implementing mindfulness into one’s life. Either by establishing a structured, formal mindfulness practice, or by using mindfulness exercises sporadically to diminish feelings of stress when this occurs, or by using mindfulness informally by means of being more aware in the present moment.

Discussion

The purpose of this study was to investigate how participation in a workplace-MBI including a workplace-adapted MBSR course impact employees’ and managers’ mental health skills. A minority of respondents reported having experienced no impact from participating in the workplace-MBI intervention or adverse effects in the form of enhanced worrying of experienced feelings. However, the transversal analysis (Bjerrum and Lyhne, 2021) of the condensed categories resulted in two explanatory themes of how this workplace-MBI impacted the majority of employees and managers: “Enhanced awareness as a facilitator of kindness towards oneself and felt needs” and “Enhanced awareness as a facilitator of behavior change during stressful situations.” These two themes offer explanations as to how participating in a workplace-MBI including a workplace-adapted live online MBSR course impacts mental health skills of employees and managers. Being aware in the present moment allows employees and managers to notice how they are feeling in specific situations giving rise to both greater abilities to register individual needs and to act on these. Furthermore, the increased awareness of bodily sensations during stress and automatic reaction patterns allows employees and managers to utilize the space between stimuli and response for reflection, leading to less reactivity in stressful situations.

Enhanced awareness as a facilitator of kindness towards oneself and felt needs

Pre-intervention, the majority of the employees and managers reported a lack of kindness toward themselves, resulting in self-criticism and not responding to felt needs, for example needing a break from work. However, at post-intervention, both employees and managers across companies reported enhanced kindness toward oneself and enlarged ability to practice self-care as illustrated by, for example taking breaks during the workday. The transversal analysis showed a link between increased awareness in the present moment and the ability to practice self-kindness and self-care. Being more

aware in the present moment, enabled employees and managers to notice when they were being self-critical and instead, actively treat oneself with kindness. Furthermore, the ability to become aware of thoughts was evident in categories concerning both awareness and self-kindness. Hence, by being more aware in the present moment, employees and managers expressed a greater ability to let go of both rumination and mistakes, compared to pre-intervention-categories. Previous research has found similar results of a workplace-MBI for palliative care teams, i.e., showing increased abilities to notice and to let go of ruminative thoughts (Orellana-Rios et al., 2017). Moreover, in a study on a workplace-MBI for managers, Vonderlin et al. (2021) demonstrated elevated self-care and lowered mental distress (Vonderlin et al., 2021). However, the effect on mental distress was mediated by the amount of practice performed by managers (Vonderlin et al., 2021). In the present study, only a modest number of the respondent established a formal mindfulness practice following the workplace-MBI. As such, the question is how much employees' and managers' mental health skills may be increased through participation in this workplace-MBI. Still, respondents reported performing informal or sporadic mindfulness practices, indicating that some respondents were engaging in mindfulness practices, despite not having established a formal mindfulness practice.

Dahl et al. (2020) propose a framework for cultivating well-being through training (Dahl et al., 2020). This framework describes four dimensions relating to strengthening well-being through mental training: *awareness*, *connection*, *insight*, and *purpose* (Dahl et al., 2020). Training one's abilities within these dimensions are linked to skills that promote well-being (Dahl et al., 2020). Following participation in this workplace-MBI including a workplace-adapted MBSR course, employees and managers expressed enhanced capabilities regarding both *awareness* and *insight*. According to the framework, awareness relates to a more attentive way of perceiving both external and internal cues, i.e., bodily sensations (Dahl et al., 2020). Previous research has found that not being aware in what you are doing in the present moment is associated with lower levels of perceived happiness (Killingsworth and Gilbert, 2010). Hence, enhancing awareness in the present moment may result in increased perceived happiness. Dahl et al. understand insight as self-knowledge of how one relates to for example, emotions and thoughts as well as one's "sense of self" (Dahl et al., 2020). By enhancing awareness and insight, some employees and managers can approach themselves with newfound kindness. Previous research has underpinned the importance of self-awareness in order to become more self-kind and thereby less self-critical (Barnard and Curry, 2011). Self-criticism has previously been found associated with major depressive disorder (MDD), indicating that self-criticism may increase the risk of developing MDD (Ehret et al., 2015). Furthermore, treating oneself with compassion has been found to be associated with lower levels of depression and anxiety (Ehret et al., 2015; Muris et al., 2016) and

enhanced well-being (Barnard and Curry, 2011). Therefore, the skill of self-kindness may serve as a protective mental health skill. Thus, actively training the two dimensions *awareness* and *insight* through a workplace-MBI including workplace-adapted MBSR, can impact the mental health skills of employees and managers. Furthermore, the results of the present study indicate that utilizing workplaces as settings for MBIs may help integrate mindfulness practices into the way, employees and managers conduct their work. This emphasises the potential for using workplaces as mental health promoting and preventive settings.

Enhanced awareness as a facilitator of behavior change during stressful situations

The transversal analysis demonstrated a link between employees and managers' expressed enhanced awareness in the present moment and their ability to behave more responsively in stressful situations. Hence, by being more aware, employees and managers were sometimes able to utilize the space between stimuli and reaction to choose a more responsive approach to for example, a disagreement between colleagues. In a study among adolescents, Zimmer-Gembeck et al. (2021) found that dispositional mindfulness in the form of mindful awareness directly affected involuntary emotional reactions to stress resulting from peer relationship problems, such as conflicts (Zimmer-Gembeck et al., 2021). Moreover, mindful non-reactivity was found to have a direct effect on the experience of fewer involuntary reactions to stress (Zimmer-Gembeck et al., 2021). These effects appear to be mirrored in the responses by employees and managers in the four included companies in the present study. The expressed changes from reactive to responsive behavior during stressful situations relates directly to WHO's definition of mental health: "... can cope with the normal stresses of life..." (WHO, 2018b). Hence, these expressed changes in behavior in stressful situations may indirectly affect the mental health of employees and managers *via* enhanced mental health skills. In a study of how an MBI impacted university employees, respondents stated that following participation in the MBI, they listen more actively, think and then respond during interactions at work (Hegney et al., 2021). However, as pointed to in the present study, increased awareness may not always lead to changes in the automated patterns of reaction in stressful situations. This might reflect that there is a leap from awareness to actual change, or that there is a need to practice over a longer period for the increased awareness to result in actual change.

Pre-intervention, differences in how people perceive social situations could cause additional stress in stressful situations. Employees and managers expressed that being aware of differences in perception in a stressful situation affected how they related to these and buffered the feeling of added stress caused by differences in perception. Changes in how one relates to interpersonal

differences in perceptions may play a role in enhancing the second dimension, *connection*, of the well-being training framework by Dahl et al. (2020). Positive interpersonal relationships have previously been found to be a protective factor against for example, depression (Santini et al., 2015). Additionally, previous research in workplaces has demonstrated associations between the quality of social relationships and mental health (Rydstedt et al., 2012). As expressed by one employee, changing how one relates to differences in perception may generate a greater amount of respect for other people's views. The enhanced respect might affect how one interacts with others and hence the social relationships. Thus, these changes in how employees and managers manage emotions and their relations to others serve as mental health skills, which may in turn impact their mental health.

Strengths and limitations

One of main strengths of this study is that it utilized a population-based strategy, thereby making this mental health promoting and preventive intervention available for all employees and managers within the participating companies. Furthermore, the interview guide was based on theoretical assumptions from previous research and the programme theory (Supplementary material). Adding to the strength of the present study is that the delivered workplace-MBI was systematically developed in accordance with the recommendations on adaptation of MBIs (Crane et al., 2017) by experienced MBSR teachers. Moreover, the study included a large number of respondents from four private SMEs representing four different business areas. The similarities in responses from employees and managers across companies imply that these results may represent implications one could expect to find in private SMEs across business areas. Moreover, given that EM did not have prior professional or personal experience of mindfulness or MBIs this contributes to the internal validity of the study, ensuring the results are not a product of preunderstanding.

Nonetheless, the study has some limitations. Being a part of a research project with an overall aim of creating healthy work environments, data for the present study was collected using focus group interviews. By being collected in focus groups, data may not offer the same insights to respondents' lived experiences, as individual interviews (Halkier, 2010). Therefore, these results are situated in social contexts and may be influenced by group dynamics between the focus group participants. However, as demonstrated in the explanatory themes, similar results have been found among individuals in previous studies (Orellana-Rios et al., 2017; Hegney et al., 2021), indicating validity of the obtained results. An added benefit of conducting data collection using focus groups was that respondents validated the experiences of peers and followed up with their own examples of similar experiences. However, during the focus groups, sometimes employees and managers expressed disagreement or did not

recognize experiences from peers. This tendency may indicate that respondents generally felt safe sharing personal experiences relating to the intervention in the focus group setting. Future research should include individual interviews to obtain data on the lived experiences of the respondents. Another limitation was that the majority of data was collected live online *via* Zoom. To the extent that respondents were not present in the same room, this format challenged the interpretation of group dynamic and body language. This may have affected how the respondents participated in the discussions within the focus groups. However, in the majority of focus groups, EM and EB did not experience that the online format hampered the participation of the respondents. Furthermore, EM and EB made sure to invite all respondents into the discussions within the respective focus groups.

Conclusion

This study sheds light on how the mental health skills of employees and managers in private SMEs in Denmark may be impacted by a workplace-MBI including a systematically developed online workplace-adapted MBSR course. Following participation in this workplace-MBI, employees and managers expressed enhanced abilities in being aware in the present moment by for example, noticing how one is feeling and noticing when ruminating. Furthermore, participants demonstrated more kindness towards themselves and were more aware of how they behaved during stressful situation. The enhanced awareness facilitated changes in their abilities to practice self-kindness and self-care and to change behavior during stressful situations from reactive to responsive. These results indicate a strengthening of the mental health skills of employees and managers participating in this workplace-adapted MBI. Data underlying these results are based on focus group interviews. Future research should include individual interview to gain insights into the lived experiences of respondents. This may contribute to more in-depth knowledge of how individual employees and managers experiences of participating in the intervention and its potential impact on their mental health skills.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for

participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

LJ and EM designed the study. EM and EB developed the interview guide and collected data and performed inter-coder reliability tests of the validity of the coding and categorization, were in dialog throughout the analysis process, and finally discussed the results with LJ and LF. EB transcribed the interviews, performed coding, and categorization of all interviews, and drafted the manuscript. LJ, EM, and LF contributed with valuable corrections. All authors contributed to and approved of the final submitted manuscript.

Funding

This study was funded by The Velliv Association. Grant number: 19-0506.

Acknowledgments

We would like to thank all employees and managers that participated in this study and all managers who wished for their company to participate. We also thank MBSR teachers Bente Pedersen, Mie Glud Pedersen and Camilla Victoria Marcinkowski

References

- Aikens, K. A., Astin, J., Pelletier, K. R., Levanovich, K., Baase, C. M., Park, Y. Y., et al. (2014). Mindfulness goes to work: impact of an online workplace intervention. *J. Occup. Environ. Med.* 56, 721–731. doi: 10.1097/JOM.0000000000000209
- Axelsen, J. L., Meline, J. S. J., Staiano, W., and Kirk, U. (2022). Mindfulness and music interventions in the workplace: assessment of sustained attention and working memory using a crowdsourcing approach. *BMC Psychol.* 10:108. doi: 10.1186/s40359-022-00810-y
- Barnard, L. K., and Curry, J. F. (2011). Self-compassion: conceptualizations, correlates, & interventions. *Rev. Gen. Psychol.* 15, 289–303. doi: 10.1037/a0025754
- Bjerrum, M., and Lyhne, C. (2021). Kvalitativ indholdsanalyse - en hands-on introduktion [qualitative content analysis - a hands on introduction]. *Klinisk sygepleje [Clinical nursing]* 35, 304–322. doi: 10.18261/issn.1903-2285-2021-04-04
- Brown Mindfulness Center (2020). MBSR teachers training and development [online]. Brown University. Available at: <https://www.brown.edu/public-health/mindfulness/learn-more/mbsr-teacher-training-and-development> (Accessed May 28, 2021).
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., et al. (2020). Purposive sampling: complex or simple? Research case examples. *J. Res. Nurs.* 25, 652–661. doi: 10.1177/1744987120927206
- Crane, R. S., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J. M., et al. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychol. Med.* 47, 990–999. doi: 10.1017/S0033291716003317
- Dahl, C. J., Wilson-Mendenhall, C. D., and Davidson, R. J. (2020). The plasticity of well-being: a training-based framework for the cultivation of human flourishing. *Proc. Natl. Acad. Sci. U. S. A.* 117, 32197–32206. doi: 10.1073/pnas.2014859117
- De Vibe, M., Bjørndal, A., Fattah, S., Dyrdal, G.M., Halland, E., and Tanner-Smith, E.E. (2017). "Mindfulness-based Stress Reduction (MBSR) for Improving Health, Quality of Life and Social Functioning in Adults: A Systematic Review and Meta-analysis". Norway: Campell Syst. Rev.
- Ehret, A. M., Joormann, J., and Berking, M. (2015). Examining risk and resilience factors for depression: the role of self-criticism and self-compassion. *Cogn. Emot.* 29, 1496–1504. doi: 10.1080/02699931.2014.992394
- Fjorback, L.O. (2015). *Må jeg hjælpe dig? Fri af depression [may I help you? Free from depression]*. Copenhagen: Gads Forlag.
- Galante, J., Friedrich, C., Dawson, A. F., Modrego-Alarcón, M., Gebbing, P., Delgado-Suárez, I., et al. (2021). Mindfulness-based programmes for mental health promotion in adults in nonclinical settings: a systematic review and meta-analysis of randomised controlled trials. *PLoS Med.* 18:e1003481. doi: 10.1371/journal.pmed.1003481
- Halkier, B. (2010). "Kapitel 5: Fokusgrupper [chapter 5: focus groups]," in *Kvalitative metoder - en grundbog [qualitative methods - a textbook]*. eds. S. Brinkmann and L. Tanggaard. Hans Reitzels Forlag. 121–135.
- Hegney, D., Tsai, L., Craigie, M., Crawford, C., Jay, S., and Rees, C. (2021). Experiences of university employees of the impact of a mindful self-care and resiliency program on their well-being. *High. Educ. Res. Dev.* 40, 524–537. doi: 10.1080/07294360.2020.1764508
- Janssen, M., Heerkens, Y., Kuijer, W., Van Der Heijden, B., and Engels, J. (2018). Effects of mindfulness-based stress reduction on employees' mental health: a systematic review. *PLoS One* 13:e0191332. doi: 10.1371/journal.pone.0191332
- Jensen, H. A. R., Davidsen, M., Møller, S. R., Román, J. E. I., Kragelund, K., Christensen, A. I., et al. (2022). *Danskernes sundhed - Den Nationale Sundhedsprofil 2021 [the Danes' health - the National Health Profile 2021]*. 1.0 ed. (Copenhagen: Sundhedsstyrelsen [Danish Health Authority]). Available at: <https://www.sst.dk/da/Udgivelser/2022/Danskernes-sundhed>
- Kabat-Zinn, J. (2018). *Meditation is not what you think*. New York: Hachette Book Group.
- Kersemackers, W., Rupprecht, S., Wittmann, M., Tamdjidi, C., Falke, P., Donders, R., et al. (2018). A workplace mindfulness intervention may be associated with improved psychological well-being and productivity. A preliminary field study in a company setting. *Front. Psychol.* 9:11. doi: 10.3389/fpsyg.2018.00195

for their invaluable contribution to the development of the workplace-adapted MBSR curriculum and for taking part in the delivery of the intervention.

Conflict of interest

The Danish Center for Mindfulness, Aarhus University, offers MBSR courses and MBSR teacher training. The Danish Center for Mindfulness receive payment for both services. The authors declare no conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

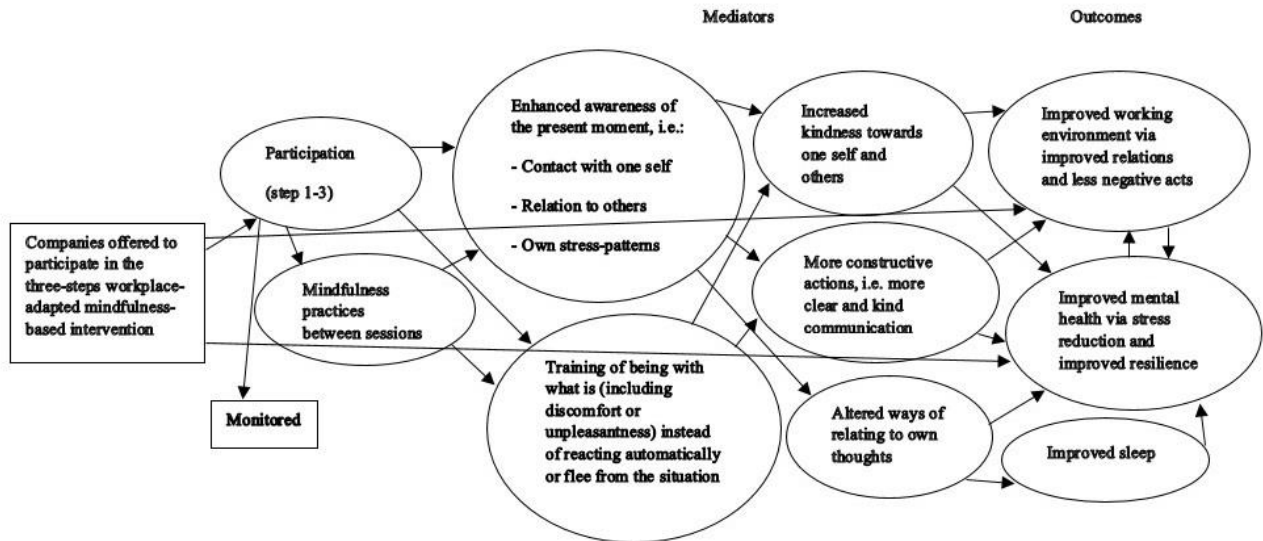
Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1020454/full#supplementary-material>

- Killingsworth, M. A., and Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science* 330:932. doi: 10.1126/science.1192439
- McHenry, J. A. (2012). *Perth charter for the promotion of mental health and wellbeing in Seventh World Conference on the promotion of mental health and the prevention of mental and behavioural disorders*. Perth, Western Australia: Clifford Beers Foundation and Mentally Healthy WA.
- Muris, P., Meesters, C., Pierik, A., and De Kock, B. (2016). Good for the self: self-compassion and other self-related constructs in relation to symptoms of anxiety and depression in non-clinical youths. *J. Child Fam. Stud.* 25, 607–617. doi: 10.1007/s10826-015-0235-2
- Nadler, R., Carswell, J. J., and Minda, J. P. (2020). Online mindfulness training increases well-being, trait emotional intelligence, and workplace competency ratings: a randomized waitlist-controlled trial. *Front. Psychol.* 11:11. doi: 10.3389/fpsyg.2020.00255
- OECD (2021). *Health at a Glance 2021: OECD Indicators*. (Paris: OECD).
- Orellana-Rios, C. L., Radbruch, L., Kern, M., Regel, Y. U., Anton, A., Sinclair, S., et al. (2017). Mindfulness and compassion-oriented practices at work reduce distress and enhance self-care of palliative care teams: a mixed-method evaluation of an "on the job" program. *BMC Palliat. Care* 17:3. doi: 10.1186/s12904-017-0219-7
- Rose, G., Khaw, K., and Marmot, M. (2008). *Rose's Strategy on Preventive Medicine*. New York: Oxford University Press.
- Rupprecht, S., Falke, P., Kohls, N., Tamdjidi, C., Wittmann, M., and Kersemaekers, W. (2019). Mindful leader development: how leaders experience the effects of mindfulness training on leader capabilities. *Front. Psychol.* 10:10. doi: 10.3389/fpsyg.2019.01081
- Rydstedt, L. W., Stansfeld, S. A., Head, J., and Woodley-Jones, D. (2012). Quality of workplace social relationships and perceived health. *Psychol. Rep.* 110, 781–790. doi: 10.2466/01.13.21.PR0.110.3.781-790
- Santini, Z. I., Koyanagi, A., Tyrovolas, S., Mason, C., and Haro, J. M. (2015). The association between social relationships and depression: a systematic review. *J. Affect. Disord.* 175, 53–65. doi: 10.1016/j.jad.2014.12.049
- Santorelli, S. (2014). Mindfulness-based stress reduction (MBSR): standards of practice [online] Massachusetts: University of Massachusetts Medical School. Available at: https://mindfulness.au.dk/fileadmin/mindfulness.au.dk/Artikler/Santorelli_mbsr_standards_of_practice_2014.pdf (Accessed April 24, 2020).
- Schreier, M. (2014). "Qualitative content analysis" in *The SAGE Handbook of Qualitative Data Analysis*. ed. U. Flick (London: SAGE Publications Ltd)
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., et al. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ* 374:n2061. doi: 10.1136/bmj.n2061
- Treves, I. N., Tello, L. Y., Davidson, R. J., and Goldberg, S. B. (2019). The relationship between mindfulness and objective measures of body awareness: a meta-analysis. *Sci. Rep.* 9:17386. doi: 10.1038/s41598-019-53978-6
- Van Agteren, J., Iasiello, M., Lo, L., Bartholomaeus, J., Kopsaftis, Z., Carey, M., et al. (2021). A systematic review and meta-analysis of psychological interventions to improve mental wellbeing. *Nat. Hum. Behav.* 5, 631–652. doi: 10.1038/s41562-021-01093-w
- Vonderlin, R., Biermann, M., Bohus, M., and Lyssenko, L. (2020). Mindfulness-based programs in the workplace: a meta-analysis of randomized controlled trials. *Mindfulness* 11, 1579–1598. doi: 10.1007/s12671-020-01328-3
- Vonderlin, R., Müller, G., Schmidt, B., Biermann, M., Kleindienst, N., Bohus, M., et al. (2021). Effectiveness of a mindfulness- and skill-based health-promoting leadership intervention on supervisor and employee levels: a quasi-experimental multisite field study. *J. Occup. Health Psychol.* 26, 613–628. doi: 10.1037/ocp0000301
- WHO (2012). *Risks to Mental Health: An Overview of Vulnerabilities and Risk factors. Background Paper by WHO Secretariat for the Development of a comprehensive Mental Health Action Plan*. (Geneva: World Health Organization).
- WHO (2018a). Fact Sheet on sustainable development goals: Health targets - mental health.
- WHO (2018b). Mental health: strengthening our response [online]. Available at: <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response> (Accessed June 2, 2022).
- WHO (2022). "World Mental Health Report: Transforming Mental Health for All". (Geneva: World Health Organization).
- Zimmer-Gembeck, M. J., Clear, S. J., and Campbell, S. M. (2021). Peer relationships and stress: indirect associations of dispositional mindfulness with depression, anxiety and loneliness via ways of coping. *J. Adolesc.* 93, 177–189. doi: 10.1016/j.adolescence.2021.11.003

Supplementary Material

1. Programme theory of the intervention



Supplementary figure 1: Programme theory of the three-step workplace-adapted mindfulness-based intervention including a 10 weeks live online workplace-adapted mindfulness-based stress reduction course.

STUDY 3

The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis

Published in *Frontiers in Psychology*



OPEN ACCESS

EDITED BY

Marta Gil-Lacruz,
University of Zaragoza,
Spain

REVIEWED BY

Aymen Sajjad,
Massey University Business School,
New Zealand
Jun Justin Li,
South China Normal University,
China

*CORRESPONDENCE

Emilie Hasager Bonde
✉ emilie.bonde@clin.au.dk

SPECIALTY SECTION

This article was submitted to
Organizational Psychology,
a section of the journal
Frontiers in Psychology

RECEIVED 30 November 2022

ACCEPTED 15 February 2023

PUBLISHED 07 March 2023

CITATION

Bonde EH, Mikkelsen EG, Fjorback LO and
Juul L (2023) The impact of an organizational-
level mindfulness-based intervention on
workplace social capital and psychological
safety: A qualitative content analysis.
Front. Psychol. 14:1112907.
doi: 10.3389/fpsyg.2023.1112907

COPYRIGHT

© 2023 Bonde, Mikkelsen, Fjorback and Juul.
This is an open-access article distributed under
the terms of the [Creative Commons Attribution
License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis

Emilie Hasager Bonde^{1*}, Eva Gemzøe Mikkelsen²,
Lone Overby Fjorback¹ and Lise Juul¹

¹Danish Center for Mindfulness, Department of Clinical Medicine, Aarhus University, Aarhus, Denmark,

²Department of Psychology, University of Southern Denmark, Odense, Denmark

Background: Through the past decades, the mental health of the European population has been continuously declining. Social relations in various spheres of life, including workplace settings, have been shown to impact mental health. Mindfulness-based stress reduction (MBSR) has been found effective in enhancing well-being, and reducing perceived stress, and symptoms of depression and anxiety. Research into mindfulness-based interventions (MBIs) in workplace settings has shown that these interventions may positively affect workplace outcomes, such as interpersonal relations. However, research regarding the organizational impacts of MBIs is still nascent. The objective of this study was to investigate how an organizational-level mindfulness-based intervention (MBI) including a workplace-adapted MBSR programme may impact workplace social capital and psychological safety.

Methods: Four small and medium-sized private companies were included in this study, representing 368 employees and managers. The intervention consisted of three steps: 1. Mandatory participation in introductory sessions on mental health and mindfulness, 2. Voluntary participation in a 10-week workplace-adapted MBSR programme, and 3. A workshop for selected employee representatives and managers on further implementation of mindfulness. Data was collected using pre and post-intervention focus group interviews. In total, 27 interviews including 76 respondents were conducted. Verbatim transcription was performed. Data was analyzed using deductive content analysis with theoretical frameworks for social capital and psychological safety.

Results: The analysis resulted in three main categories: 1. Social capital (1.1. bonding social capital, 1.2. bridging social capital, 1.3. linking social capital), 2. Psychological safety, and 3. Emergent theme: The role of lockdown on the perceived organizational impact of a workplace MBI. The greatest impact was found relating to the bridging social capital, i.e., social capital between departments, and psychological safety among colleagues at the same level of employment.

Conclusion: The results indicate that company participation in this organizational-level MBI including a workplace-adapted MBSR programme may positively impact social relations at work, especially the bridging social capital and psychological

safety between colleagues at the same level of employment. These results may have been influenced by lockdowns due to the COVID-19 pandemic.

KEYWORDS

workplace, psychosocial work environment, mindfulness, mental health promotion and prevention, qualitative methods, social capital, psychological safety

1. Introduction

The mental health of the European population has been eroding through the past decades (WHO, 2018), and data from the Global Burden of Disease demonstrate a global increase in disability adjusted life years (DALYs) due to mental disorders during the past 30 years (GBD Mental Disorders Collaborators, 2022). Previous research has shown social relations to be of great importance to mental well-being (Roffey, 2021). As such, positive social relations are associated with higher levels of well-being, and have been seen to have a buffering effect on mental disorders, such as anxiety (Teo et al., 2013) and depression (Santini et al., 2015). Conversely, negative social relations are associated with poor mental health outcomes and ultimately higher mortality (Holt-Lunstad et al., 2010). People engage in social relations of shorter or longer duration in a multitude of settings, including the workplace. Of the World's population, about 60% are part of the work force (ILO, 2022). Thus, interpersonal relationships in workplace settings are likely to affect the well-being of a large part of the World's population. Indeed, previous research has shown that negative social relations at work, such as interpersonal conflict, workplace bullying, social isolation, and a lack of social support pose a serious threat to the mental health of employees and managers (Mikkelsen et al., 2020; WHO, 2022). Accordingly, there is a potential preventative and health promoting gain by implementing interventions that may ameliorate or enhance social relations in workplace settings.

A relevant research area to look to when aiming to positively affect social relations in workplace setting is workplace social capital. The concept of social capital refers to “[...] features of social organisation such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam, 1995). Research shows that low workplace social capital may be associated with decreased well-being, and increased psychological stress and depression (Pattussi et al., 2016). Thus, impacting workplace social capital may potentially affect employees' and managers' mental health positively.

Woolcock and Narayan (2000) and Szreter and Woolcock (2004) divide social capital into three categories; bonding social capital, bridging social capital, and linking social capital. Bonding social capital refers to the social capital within a group with a shared social identity, for example, a team. Bridging social capital refers to the horizontal social capital between groups, for example, two different departments within the same organization. Linking social capital refers to the vertical social capital between people who engage in interactions characterized by a formal or informal difference in power, for example, managers and employees (Szreter and Woolcock, 2004).

The concept of social capital is multi-faceted entailing both networks, norms, and trust as key-features affecting social organizations such as workplaces. *Networks* refer to “ties that people

and organizations use over time to get access to the resources they need” (Schneider, 2009), *norms* are the normative way of doing things in an organization (Olesen et al., 2008), and trust is the willingness to be vulnerable, based on the expectations that others will react favorable to this vulnerability (Edmondson, 1999). According to Edmondson (2004), as a descriptor of the quality of interpersonal relations, trust relates to longer time perspectives, for example, several weeks from a given time point. Thus, trust entails a general feeling of trust in others to behave in a certain way, for example, to behave favorably to individual displays of vulnerability (Edmondson, 2004). However, the level of trust in a given workplace relationship does not necessarily offer insights into employees' or managers' feelings of being psychological “safe” in specific situations, for example, feeling safe that one will not be scolded for blunders at work or for raising a difficult issue (Edmondson, 2004).

When studying shared feelings of being psychological safe within given work-spheres, the concept of *psychological safety* may be employed. Psychological safety concerns the individual or shared feeling of how others (e.g., co-workers) will react when difficult subjects are raised, blunders are made, or someone suggests a different way to approach a work problem (Edmondson, 2004). As such, psychological safety is defined as “individuals' perceptions about the consequences of interpersonal risks in their work environment” (Edmondson, 2004). Hence, in groups with a high degree of psychological safety, group members, such as employees and managers within a department, would for example, feel safe to suggest new ways of doing things, and admitting to blunders. On the contrary, in groups with a low degree of psychological safety, group members may fear admitting to blunders or providing feedback to other team members. Thus, the concept of psychological safety may contribute to a more in-depth understanding of the general level of trust within an organization that might be captured by solely investigating workplace social capital.

Improving the workplace social capital and psychological safety and thereby enhancing mental well-being may be approached in a multitude of ways. Mindfulness-based interventions (MBI) have been found to be among the most effective psychological interventions to improve mental well-being (van Agteren et al., 2021). Mindfulness is defined as “... the awareness arising through paying attention on purpose in the present moment, non-judgmentally, in the service of self-understanding, wisdom, and compassion” (Kabat-Zinn, 2018). Previous research has also demonstrated MBIs in workplace settings to be effective in enhancing well-being as well as reducing perceived stress and self-reported symptoms of depression and anxiety (Vonderlin et al., 2020). Furthermore, a recent integrated review of the effect of mindfulness in the workplace demonstrated effects on both work-related well-being and organizational outcomes, such as enhanced leadership qualities and better interpersonal relationships

(Panditharathne and Chen, 2021). On the basis of findings from previous research, the World Health Organization (WHO) mentions 5 MBIs as potential beneficial interventions to strengthen mental health in the workplace in their recent publication from Autumn 2022 (WHO, 2022).

Where the effects of MBIs on the mental health of individuals are well-documented (De Vibe et al., 2017; Panditharathne and Chen, 2021; van Agteren et al., 2021), less is known about the potential impact of such MBIs on entire organizations. However, based on the evidence of effects of MBIs on individuals, Good et al. (2015) propose mindfulness to be effective in improving the psychosocial work environment. Being purposefully aware in the present moment allows individuals to notice when the attention is wandering and to kindly bring the attention back to the present moment (Dahl et al., 2020). In a study by Killingsworth and Gilbert (2010), the authors find that humans are only mentally present in what they are doing approximately half of the time (Killingsworth and Gilbert, 2010). Being on this mental time travel may have consequences for individuals' relationships. When one is unaware of thoughts, feelings, or mood, this may lead to automatic reactions and to not responding constructively to any given social situation (Kabat-Zinn, 2013; Crane et al., 2017). For example, one could be thinking about other things, while having a conversation, which would prevent one from really listening to the other person. Practicing mindfulness may cause a shift in how individuals relate to, e.g., their thoughts, perceptions and feelings as well as to outer circumstances, including social relations (Crane et al., 2017). This competence is called meta-awareness (Dahl et al., 2020). Meta-awareness may enhance individuals' possibility of responding more skillfully. Thus, when an individual is aware of his or her physical and emotional state, it allows for a greater awareness and understanding of others and how others act (Glomb et al., 2011). In social situations, these competencies may enable individuals to listen more actively and not get distracted, for example, during a conversation (Dahl et al., 2020), or to respond in a reflected manner instead of automatically reacting (Kabat-Zinn, 2013). Accordingly, in an integrative review on mindfulness and social sustainability, Sajjad and Shahbaz (2020) found that mindful individuals may affect workplaces at an organizational level by means of enhanced pro-social behavior and improved interpersonal relationships (Sajjad and Shahbaz, 2020). Proposed mediators of the association between mindfulness and interpersonal relations are, for example, reduced number conflicts, improved communication and higher levels of empathy and compassion (Good et al., 2015). Hence, mindful individuals may impact interpersonal relationships in the workplace (Sajjad and Shahbaz, 2020; Panditharathne and Chen, 2021). As workplace social capital and psychological safety are both social, interpersonal constructs, changes in relationship quality following an MBI may be reflected by changes in the workplace social capital and psychological safety.

Mindfulness-based stress reduction (MBSR) is an 8-week curriculum-based programme delivered by a trained MBSR teacher. The programme entails a total of nine sessions: eight weekly 2.5 h sessions and one 7-h silent retreat day. Importantly, MBSR is a group-based intervention delivered in groups of up to 30 individuals. The MBSR programme includes experience-based knowledge of, for example, how people perceive social situations differently, and the ability to view challenging interactions from the other person's perspective (McCown et al., 2010; Kabat-Zinn, 2013; Santorelli, 2014).

Moreover, throughout the 8-week programme, the MBSR teacher focusses on creating a safe and trusting group environment. We propose that this explicit focus on a safe and trusting environment for sharing one's experiences may have an independent influence on the workplace social capital and psychological safety as trust and safety are key elements of these two theoretical concepts (Putnam, 1995; Edmondson, 1999). According to the Medical Research Council, to support a mental health promoting environment, interventions may effectively target entire organizations and not merely selected groups within organizations (Skivington et al., 2021). By implementing interventions at an organizational-level, these interventions may facilitate system change, and hence result in healthier work environments (Skivington et al., 2021). Based on theoretical assumptions and findings from previous research, the purpose of the present study was to investigate if and how the social capital and psychological safety may be impacted by company participation in an organizational-level MBI including a workplace-adapted MBSR programme. Specifically, we propose that organizational participation in an MBSR programme may affect the psychosocial work environment through improvements in interpersonal relationships in the workplace. We propose that these improvements may be brought about by enhanced awareness of, e.g., one's own thoughts, feelings, and mood, patterns of reaction, and attention to others. Moreover, we propose that the explicit focus on creating safe environments in the MBSR programme may impact interpersonal relationships and thus influence the workplace social capital and psychological safety. Therefore, two research questions relating to how mindfulness may affect interpersonal relationships in the workplace were explored: (1) how might the organizational norms, networks, and trust be impacted by an organizational-level, mindfulness-based intervention?, and (2) how might this intervention affect employees' and managers' perception of safety regarding interpersonal risk-taking?

2. Methods

2.1. Design

The present qualitative study was part of a quasi-experimental multi-method trial that investigated the feasibility and impact of implementing workplace-adapted MBSR at organizational level in small or medium-sized Danish companies. The present study concerns the interpersonal impact. Prior to commencement, the trial was registered with the Danish Data Protection Agency (2016-051-000001/1715).

2.2. Participants and recruitment

To be eligible for inclusion in the trial, companies had to be small or medium-sized companies (SMEs), with 10-249 employees and managers, either partly or entirely based in Denmark. To enroll, top management in each company had to consent to the employees and managers participating in the intervention during working hours, or alternatively give monetary compensation for the time spent participating outside working hours.

In total, four SMEs enrolled in the trial, each representing a different business area: Media Company, chain of restaurants,

Production Company, and an IT-company. Company 1–3 represent companies based entirely in Denmark, while Company 4 is based partly in Denmark but operates with offices worldwide.

Multi-channel recruitment of the companies were conducted using digital newsletters from trade organizations, direct contact to seemingly relevant SMEs, social media posts on LinkedIn, Twitter and Facebook, and posts on the Danish Center for Mindfulness’s webpage. Recruitment were ongoing from January 2020 to October 2020. When a company expressed interest in participating, an initial meeting was held between project manager, the last author LJ, an MBSR teacher and representatives from the company management. At this meeting, the company representatives were informed that the intervention was to be at an organization level. Hence, participation in the intervention had to be offered to all employees and managers, and not solely offered to selected groups. Furthermore, the company management were informed that, as an obligatory part of the intervention, all employees and managers were to participate in a two-hour information session during working hours. Moreover, LJ emphasized the requirement that all employees and managers should have the opportunity to participate in a 10-weeks live online MBSR programme during working hours or alternatively receive compensation for the time spend outside working hours. Upon acceptance of these terms, a contract was signed by a company representative, most often a representative of the top management.

2.3. Intervention

The intervention in this study was a workplace-adapted MBI in three steps: (1) an obligatory two-hour introductory session concerning mental health and mindfulness for all employees and managers in each company. (2) Participation in a 10-weeks workplace-adapted live online MBSR programme delivered *via* Zoom to all self-selected employees and managers. (3) A workshop on further implementation of mindfulness in the companies for selected employee representatives and managers.

The two-hour introductory sessions were held either live online *via* Zoom (Company 1, 3 and 4) or at a company site (Company 2) according to the company’s preference. The sessions consisted of a power point presentation regarding mental health, stress, mindfulness and research within this area. Furthermore, employees and managers were invited to engage in a brief seated meditation and standing yoga

practices during the introductory sessions. At the end of the sessions, employees and managers were offered the opportunity to sign up for participation in a 10-weeks workplace-adapted MBSR programme. The purpose of the obligatory introductory sessions was to provide information about mental health and mindfulness and to ensure that all employees and managers received the same information about the intervention.

To secure that the workplace-adapted MBSR programme entailed all active components of the original MBSR programme, while also aiming for optimal contextual fit, adaptations were made using Crane et al.’s (2017) framework for adapting MBIs to new contexts and/or populations. Hence, the content of this workplace adapted MBSR programme was structured according to the MBSR curriculum. However, the duration of the programme was 10 weeks with weekly 1.5h sessions. Adaptations from the original MBSR programme to the workplace-adapted MBSR programme is illustrated in Table 1. A trained MBSR teacher delivered the 10-weeks workplace-adapted MBSR programme live online *via* Zoom to groups of 5–22 managers and/or employees. In two out of four companies, employees and managers were divided into different groups. In the other two companies, this division was either not feasible due to a small number of managers, or because of a request made by the company to have mixed employee-manager groups. The MBSR teaching includes an experienced-based learning approach, where participants are invited to practice mindfulness through, for example, meditation, body scan and yoga practices. Moreover, the MBSR teachers engage participants in inquiry regarding direct experiences during these mindfulness practices (Crane et al., 2017). To ensure fidelity, the third author (LOF) supervised all MBSR teachers who delivered one or more of the 10-weeks workplace-adapted MBSR programmes throughout the intervention. Supervision was done according to the Mindfulness-based interventions: teaching assessment criteria (MBI-TAC; Crane et al., 2021).

A workshop on further implementation of mindfulness in the companies was offered to all four companies. The workshop was hosted by the second author (EGM), the first author (EHB), and an MBSR teacher. At the workshop, participating employee representatives and managers engaged in in-group discussions of *if* they were interested in further implementation of mindfulness and *if so, how* they could imagine this might work best within their company. These in-group discussions led to plenary discussions, and ended with a drafted plan for further implementation of mindfulness in the respective company.

TABLE 1 Structural differences between the original MBSR programme and the workplace-adapted MBSR programme.

	Workplace-adapted 10-weeks MBSR programme	Original MBSR programme
Duration of programme	10 weeks	8 weeks
Duration of sessions	1.5 h	2.5 h
Total number of sessions	10 sessions	9 sessions
Silent retreat session	Imbedded within the 10 sessions Duration: 1.5 h	Added as the 9th session in the 8-week programme Duration: 7 h

MBSR: mindfulness-based stress reduction.

2.4. Respondents

Respondents were sampled using the purposive sampling method; Matrix sampling (Campbell et al., 2020). By deploying this method at baseline, EHB reached out to a company representative, typically a person from the management team, and asked this person to invite employees and managers to engage in a focus group interview. The company representative was asked to sample employees and managers that represented both those interested in mindfulness and those not to ensure different perspectives in the focus groups and hence further discussions.

Sampling respondents for the post-intervention focus groups interviews, the Matrix sampling method was again utilized. However,

now the MBSR teachers, who had delivered one or more workplace-adapted MBSR programme(s) in the company, were asked to propose employees and managers, who in their opinion would contribute with valuable information regarding the research question. It was made clear to the MBSR teachers that the proposed respondents were to represent both those highly engaged and those who were less engaged during the 10-weeks workplace-adapted MBSR programme. Furthermore, for the post-intervention focus groups, both employees and managers who participated in a 10-week workplace-adapted MBSR programme, non-participants and those who dropped out during a 10-week workplace-adapted MBSR programme were invited to be respondents. In total, 76 respondents participated in a focus group/individual interview at baseline and/or post-intervention. Across companies, 53.9% of respondents were female.

2.5. Data collection

Data was collected using semi-structured focus group interviews with 2–5 respondents in each. Focus groups were chosen to enable investigation into the reported individual experiences and shared meaning between respondents. In one of the companies, there was only one manager, and hence, both baseline and post-intervention management interviews in this company was conducted as individual semi-structured interviews. EGM and EHB collected all data, with EGM as the primary moderator and EHB as substitute moderator and observer. In total, 14 baseline interviews (13 focus groups, and 1 individual), and 13 post-intervention interviews (12 focus groups, and 1 individual) were conducted between March 2020 and May 2021. Upon commencement of each interview, respondents were informed about the purpose of the study, their possibility to withdraw at any time, and of the use and storage of data. Oral informed consent was obtained from all respondents.

EGM is an organizational psychologist and researcher. Moreover, EGM is a skilled interviewer and moderator with an extensive amount of experience in establishing safe interview environments. EGM has no previous either personal or professional experience with mindfulness. EHB has an MSc in Public Health, and has both knowledge of, and personal and professional experience with mindfulness and MBIs.

At baseline, the 14 interviews were conducted prior to implementation of the first intervention element. The interviews were performed using a semi-structured interview guide. The interview guide consisted of nine themes, four of which related to workplace social capital and psychological safety: (a) Company prioritization of employee well-being, (b) Collaboration, (c) Tone and communication, (d) The company’s feedback culture. A question related to workplace social capital was, for example, “How would you characterize working relationships in your company – do you collaborate well or is there sometimes problems?” while a question about psychological safety was, for example, “If something needs to be corrected – or needs to be criticized – how is that done?”

Post-intervention, the 13 interviews were performed following the workshop on further implementation of mindfulness. However, one of the companies did not wish to participate in such a workshop, and hence, the interviews were conducted following the 10-weeks workplace-adapted MBSR programme. The entire interview guide consisted of eight themes, of which three were related to the workplace

social capital and psychological safety: (a) Relations within the company, (b) prioritization of well-being and feedback culture, (c) how employees and managers experience the narrative of the intervention within the company. A question related to workplace social capital was, for example, “Do you feel that the mindfulness course has affected the way you work together in your company? If yes, how?” while a question related to psychological safety was, for example, “Since the course started, have you then noticed any changes in how you or other people give or receive criticism?”

Baseline interviews in the four companies took place from February 2020 to November 2020. Post-intervention interviews were conducted from June 2020 to May 2021. Due to the Covid-19 pandemic, two major lockdowns affected this study. Therefore, 19 interviews (70.4%) were performed live online via Zoom. These interviews were all recorded using the record function in Zoom and downloaded to a secure drive immediately after the interview. Eight interviews were conducted in-person at the respective workplace sites. These interviews were recorded using Dictaphone and uploaded to the same secure drive and subsequently deleted from the Dictaphone. Throughout the interviews, EHB took notes on atmosphere, sense of tone and appearances, and made initial analytical remarks in the notes.

2.6. Analysis

Initially, EHB performed verbatim transcription of all focus group interviews and individual interviews, including noting breaks, length of pauses and tone of voice. Primary analysis was performed using deductive content analysis (Elo and Kyngäs, 2008). This method was chosen because it offers a systematic approach to condensing large amounts of data and enables discussion of possible explanations of why and how mindfulness may impact social capital and psychological safety (Lyhne and Bjerrum, 2021). Hence, two structured categorization matrices were made; one for social capital (Table 2) and one for psychological safety (Table 3) (Elo and Kyngäs, 2008). The matrix for social capital was constructed according to work of

TABLE 2 Categorization matrix, social capital.

	Type of social capital		
	Bonding	Bridging	Linking
What characterizes the experienced social capital of the participating companies?	What characterizes the networks within teams/ departments?	What characterizes the networks between teams/ departments?	What characterizes the networks between managers and employees?
	What characterizes the norms within teams/ departments?	What characterizes the norms between teams/ departments?	What characterizes the norms between managers and employees?
	What characterizes the trust within teams/ departments?	What characterizes the trust between teams/ departments?	What characterizes the trust between managers and employees?

TABLE 3 Categorization matrix, psychological safety.

	Psychological safety		
	To which extent does one feel, he or she can ask for help on a specific problem?	How are mistakes or errors received?	How is the feedback culture; appraisal and criticism?
What characterizes the degree of experienced psychological safety within participating companies?			

TABLE 4 Examples of the use of research questions from the categorization matrices to identify and extract meaning units.

Theoretical construct	Research question	Meaning units
Social capital	What characterizes the networks between teams/departments?	<i>"[Department X] and [Department Y] had a good collaboration before, (...) but as I say, I also think, it's become closer, well we talk even more now, eh, and spar a lot more now, I think, during the past three months"</i> (Male office employee, Company 1)
Psychological safety	To which extent does one feel, he or she can ask for help on a specific problem?	<i>"Yeah, I think we have become like, a bit more open towards each other, also about things that may be a little vulnerable. That we can use each other. That we can lean on each other"</i> (Female middle manager, Company 2)

Woolcock and Narayan's on the three types of social capital; bonding, bridging and linking social capital (Woolcock and Narayan, 2000). The matrix for psychological safety was constructed according to the work of Edmondson on psychological safety within teams and organizations (Edmondson, 1999; Nembhard and Edmondson, 2011).

Firstly, EHB carefully read through all transcript, and preliminary analytical notes were made. Secondly, meaning units from the transcripts were categorized using the categorization matrices. The categorization matrices were developed using theory of the constructs of workplace social capital (including bonding, bridging, and linking social capital) and psychological safety. The categorization matrices were used to enable identification and extraction of interviewee responses that informed of either the workplace social capital

(bonding, bridging, and linking) or psychological safety. Thus, transcripts were read through with the research questions from the categorization matrices in mind. Each time an interviewee response informed of either the workplace social capital or the psychological safety, this meaning unit was extracted. Meaning units were then categorized according to which research question they informed of (workplace social capital, including bonding, bridging, and linking, or psychological safety). For examples of the use of the categorization matrices (see Table 4). EHB and EGM independently categorized a part of the data, and subsequently compared categorized meaning units. Whenever there was divergence in categorization, agreement was reached upon discussion. EHB then conducted the categorization on the rest of the data. Following categorization, inter-coder validation between EGM and EHB was performed. This resulted in an inter-coder agreement of 72.2%. Disagreement was most often caused by differences in interpretation. Hence, agreement was reached on all categorizations upon consultation with notes, full transcripts, and discussion. Throughout the analysis, EGM and EHB remained open to emerging themes of importance to the research question.

3. Results

Firstly, an overview of the baseline social capital and psychological safety in the workplaces will be presented. Secondly, results from the analysis of post-intervention data are presented in three main categories 1. Social capital (with three sub-categories: 1.1. Bonding social capital, 1.2. Bridging social capital, 1.3. Linking social capital), 2. Psychological safety, and 3. Emergent theme: The role of lockdown on the perceived organizational impact of a workplace MBI.

3.1. Overview of the social capital and psychological safety at baseline

Pre-intervention focus groups provided insights to the social capital (bonding, bridging and linking) and the psychological safety in the companies at baseline. Across companies, employees and managers indicated a high level of bonding social capital within team/departments, where employees took notice of one another and offered help to those who needed it. A male employee in Company 4 exemplified this:

"I ... just to see if there is anything, we could do to help. Just to ease off ... ease off their workload" (Male office worker, Company 4)

However, the bridging social capital was strained at baseline in all four companies. Across the four companies, employees and managers reported difficulties in the collaboration between departments. Thus, the interdepartmental networks were under pressure. The strained collaborations were mainly centred on a lack of understanding of why the employees in the other departments acted the way, they did, as illustrated by a female employee in Company 3:

"(...) we're in the [x department] and those, who are in [y department], (...) we don't think alike. So, we're often like ... it might be a bit exaggerated, but we don't understand why they're not [delivering] what we need" (Female office worker, Company 3)

Yet, in Company 2, the interviewees expressed that the collaboration between departments was good, illustrated by descriptions of how they would help each other out. Nonetheless, during work intensive times, this ability to help each other appeared to diminish.

The linking social capital was high at baseline in all four companies with managers expressing that they cared about their employees and their well-being. Importantly, employees echoed this experience across companies, especially regarding their immediate manager. Thus, the norm in all four companies was that the management cared about the employees' well-being, and the employees trusted that their manager did indeed care. In Company 3, however, a female production worker reported not knowing if top management was interested in employee well-being, indicating a lower level of trust between employees and top management:

"I think, well, I feel, that my immediate manager focusses on it [employee wellbeing, red.], (...) but the top manager, I have no idea, that's for sure" (Female production worker, Company 3)

With respect to psychological safety, interviewees from one company expressed that the psychological safety at baseline was high. This high degree of safety was exemplified by feeling safe approaching one's immediate manager, talking about difficult subjects such as stress as well as acknowledging each other for a job well done. Interviewees from the remaining companies initially reported that it was acceptable to make mistakes and safe to provide negative feedback to colleagues. However, as each interview progressed, interviewees from three companies gave examples of strained psychological safety, for example, that they feared expressing disagreement with the top management, or feared social stigmatization if they violated group norms. Furthermore, two employees at Company 2 independently expressed not wanting to tell anyone at work if they felt stressed, as others might perceive them as being incompetent:

"I think, if you tell someone that you're stressed, it's like saying "I don't know how to do what I'm doing" (...). I don't think anyone wants to tell if they're stressed" (Male employee, Company 2).

3.2. Post-intervention categories

Using deductive qualitative analysis, two main categories and three sub-categories were deduced; (1) *Social capital* with the subcategories: (1.1) *Bonding social capital*, (1.2) *Bridging social capital* and (1.3) *Linking social capital*, and (2) *Psychological safety*. Throughout the analysis, EGM and EHB were open to emerging themes. Thus, an emergent theme resulted in a third main category; (3) *Emergent theme: The role of lockdown on the perceived organizational impact of a workplace MBI*. In only one instance, an employee reported having experienced a potential negative impact on bonding social capital. Neither employees nor managers reported any other potential negative effects. Some respondents reported not having noticed any changes. However, the majority of respondents

offered multiple examples of positive changes in both the social capital and psychological safety.

3.2.1. Social capital

3.2.1.1. Bonding social capital

At baseline, employees and managers across companies demonstrated a high degree of bonding social capital, expressed by, for example, helping colleagues within one's own department. Following the intervention, employees and managers in all four companies reported not having experienced any changes in these regards. However, in Company 1 and Company 4, one or more employees described a positive change concerning their relationship with immediate colleagues, such as, for example, feeling closer to them:

I (interviewer): "... as a result of this course, have you then become more aware of how your colleagues are doing, or is it the same as before?"

IP: "Especially those that I have worked with most. (...) those people, I'm now more in touch with [how they're doing] (Female office employee, Company 1)

Results thus indicate that participation in the workplace-adapted MBI may positively influence the bonding social capital at team and departmental level—even when the bonding social capital was high at baseline. This effect was, however, limited to strengthened *networks* within teams or departments. Based on the questions posed, and the interviewees' responses, there were no indications of changes to norms or trust within teams or departments. Furthermore, as mentioned one employee from Company 4 mentioned frictions between those team members who participated in an MBSR programme, and those who did not:

"(...) I brought it [further implementation of mindfulness in the organization] up at a Teams meeting, I had with my team, and [I] experienced several people who objected to it and asked how they [non-participants] could be compensated for the time, we [participants] spend practicing mindfulness" (Male office employee, Company 4)

3.2.1.2. Bridging social capital

Analyses of baseline groups interviews revealed strained interdepartmental collaborations across all four companies, as expressed primarily by an experienced lack of understanding of each other's work tasks between departments. However, in post intervention interviews, managers and employees across companies expressed that collaboration between departments had increased just as interdepartmental relations had been improved. In Company 1 and Company 4, employees explicitly described how collaboration had improved because of an increase in interdepartmental conversations, which also resulted in constructive discussions concerning work related tasks. A male office employee in Company 1 expressed the following:

"[Department X] and [Department Y] had a good collaboration before, (...) but as I say, I also think, it's become closer, well we talk even more now, eh, and spar a lot more now, I think, during the past three months" (Male office employee, Company 1)

In Company 2 and Company 3, changes directly related to relations between departments were mainly apparent within management groups. Compared to baseline, relations between managers representing different departments improved following the intervention. These changes in bridging social capital indicated a higher level of interdepartmental trust, illustrated by a manager experiencing a greater ability to approach other managers.

"... well ... we can easily walk up to each other and talk. We can come and say: "Hey, do you have five minutes?", or "I need some help"" (Male middle manager, Company 2)

Moreover, managers in Company 3 also described an improved interdepartmental collaboration between managers. According to the interviewees, an increased understanding for each other's work tasks, resulting in better communication and fewer interdepartmental "clashes", was the main driver of this improvement.

"I actually think that my work relationship with one of the others, who's also in the manager group, has improved, where sometimes, we've had some misunderstandings or clashes, (...) and he's gotten a better understanding of the context, I'm a part of" (Female manager, Company 3)

While the above quote might be analyzed as an expression of bonding social capital within the manager group, it was clear from the interviews that the managers primarily identified themselves as being part of their respective departments, not the management team.

These examples of enhanced bridging social capital—at both employee level and management level—may be felt directly on, for example, improved understanding of each other's work tasks resulting in improved collaboration, as described above. However, an indirect effect of the intervention on the bridging social capital was evident in all four companies, where participation in the workplace-adapted MBI resulted in an enhanced feeling of knowing one's colleagues and—as illustrated here—a greater sense of connectedness within the company:

"I feel, I bring it [mindfulness] with me to work, when I share it with others because of these [mindfulness sessions], and I think, that's such a good thing to share. Well, we know that we've been to the same place. That, I think, actually creates a sense of connectedness" (Female office employee, Company 4)

Hence, owing to enhanced trust and/or networks between departments, the bridging social capital may be improved between employees as well as between managers through company participation in this organizational level, workplace adapted MBI. Furthermore, this improvement in bridging social capital may be demonstrated both directly through enhanced interdepartmental collaborations as well as indirectly *via* improved interdepartmental connectedness.

3.2.1.3. Linking social capital

At baseline, managers described that the linking social capital was high across all four companies, primarily indicated by a shared norm of caring about one's employees' well-being. Employees shared this experience. Hence, room for improvement was small in this regard. Following the intervention, there was still a feeling among employees in all companies, that their managers genuinely cared about the well-being of their employees, and that implementation of the intervention had emphasized this feeling. Moreover, one employee described experiencing his immediate manager as more able to listen to others and generally more caring:

"now, we have a very strict boss, and she's very ... she's very strict with us, but as soon as you've got something that you want to unload, she's really sweet and really good at listening. And I don't know if this mindfulness has made her a better listener, but (...) she seems a lot more loving now and [more] listening" (Male employee, Company 2)

An enhanced ability to listen to one's employees may facilitate greater trust between managers and employees. However, the respondents did not directly express this.

Across companies, several managers utilized skills learned through participation in the 10-weeks MBSR programme, such as enhanced awareness, when interacting with their employees, for example in one-to-one conversations:

"I think, for me, it's [how mindfulness has affected the way you work] really the way I work with my employees. Well, (...) I continuously try to be aware when I have one-to-ones with them" (Female manager, Company 3)

This renewed focus on being aware in meetings with one's employees may foster a strengthened relationship between management and employees. This could happen *via* changes in the norms of how managers and employees engage in these one-to-ones. Thus, participation in this workplace-adapted MBI may impact the linking social capital even in organizations with a high degree of linking social capital at baseline.

3.2.2. Psychological safety

Baseline group interviews revealed that in three of the companies, the psychological safety was strained in some regards. As such, employees reported not wanting to share with managers or colleagues if they felt stressed. Post-intervention interviews pointed to some improvements on psychological safety in these companies. As such, the psychological safety between colleagues appeared to have improved in most of the companies, with interviewees reporting a mutual feeling of being able to share with colleagues how they were feeling or if they had a bad day. Also, they reported being able to bring up difficult topics with colleagues:

"(...) I feel that I can very easily tell my colleagues if I'm having a bad day (...). I feel like I can share everything with them, actually" (Female employee, Company 2)

This feeling of psychological safety was also evident among manager colleagues within management, especially in Company 2. Here, the management team had increased their ability to make use of each other's strengths and actively share experiences:

"Yeah, I think we've become like, a bit more open towards each other, also about things that may be a little vulnerable. That we can use each other. That we can lean on each other" (Female middle manager, Company 2)

However, a subgroup of employees from one department in one company expressed that that it might not be legitimate to share how they were doing:

"I don't think, we do that [share how we're doing]. This is a ... there might be some girls here, but it's a male dominated workplace" (Female production employee, Company 3)

The above quote seems to indicate that the interviewed subgroup of women felt that the possible impact of this workplace-MBI on psychological safety may have been hampered as a consequence of the department culture being male dominated. In this particular department, only a small proportion of the employees participated in a 10-weeks MBSR programme. Thus, an additional explanation to the lack of perceived impact on psychological safety might be that only few employees in this department participated in a 10-weeks MBSR programme.

At baseline, interviewees in all four companies described that it was acceptable to make mistakes and to provide feedback to one's colleagues, which is an indication of high psychological safety. At post-intervention, no changes regarding the acceptability of mistakes or feedback culture were evident in these companies. Yet, as was seen at baseline, employees from one company still expressed a fear of providing feedback to top management:

"(...) and then I thought that actually I didn't dare approach her [manager] myself, because I had heard other stories about [how] you got your head ripped off, and that it's not the easiest conversation to have with her" (Female office employee, Company 1)

Hence, interviews indicate that company participation in this workplace adapted MBI may impact the psychological safety between colleagues at the same level of employment. However, across the four companies, no impact was evident in the expressed psychological safety between management and employees.

3.2.3. Emergent theme: The role of lockdown on the perceived organizational impact of a workplace MBI

Through the analysis, it became apparent that the lockdowns due to the COVID-19 pandemic may have affected the impact of the intervention on, for example, workplace social capital and psychological safety. The intervention was provided to the four participating companies over the course of 13 months, from March 2020 to April 2021. Hence, the intervention was delivered during several lockdowns due to COVID-19 restrictions. Our analysis gave insights into how these lockdowns may have affected interviewees' perceptions of the interventions' impact on social capital and

psychological safety. Three out of four companies were particularly affected by lockdowns with employees and managers working from home during the intervention. An objective of this workplace-MBI was to enhance social relations through improved workplace social capital and psychological safety. With employees and managers working from home, and thus being isolated physically from each other, this enhancement in social relations may be challenged, since the amount of social contact was reduced to a minimum. This tendency may also affect how well the impact among participating employees and managers diffuses to the non-participants and thereby the entire organization. A non-participating male employee from Company 3 talked about this potential lack of diffusion:

"I think that if we'd been together, and we'd sat together in the canteen and the like, well, then there would probably have been some talk [relating to mindfulness]. But seeing we've all been isolated, then it becomes very ... well ... when you're in a meeting and the like, then it's only work-related and talk about the things we need to solve" (Male employee, Company 3)

As such, in these companies, the interventions' impact on organizational outcomes might in fact be lower than what could have been the case, if employees had been able to meet at work had there not been lockdowns during the intervention period. However, the effect of COVID-19-lockdowns on this study's results remains unknown and a cause for speculation.

4. Discussion

The main purpose of this study was to examine the potential impact of an organizational-level workplace-MBI including a workplace-adapted MBSR programme on social capital and psychological safety. By applying deductive content analysis to the transcribed pre and post intervention focus group interviews, we gained insight into how this intervention could potentially impact the psychosocial work environment following changes in the social capital and psychological safety.

In this study, interviewees expressed a high degree of both bonding and linking social capital at baseline, leaving only a small room for improvement within these domains. However, the bridging social capital was strained in all four companies. Post-intervention data indicate that the bridging social capital may have been improved across companies, and that both managers and employees reported experiencing small positive changes to the bonding and linking social capital. The psychological safety was somewhat strained at baseline in three of the included companies. Post intervention, the psychological safety at the same level of employment—manager to manager or employee to employee—appeared enhanced.

Albeit the research area of mindfulness in the workplace is a budding field, the impact of mindfulness on specific psychosocial factors, such as social capital and psychological safety, is an even more uncharted territory. However, the results of the present study indicate changes in these two theoretical concepts following a workplace-MBI including a workplace-adapted MBSR programme. Thus, company participation in this intervention may have the potential to enhance workplace relations affecting the social capital and psychological safety in the workplace. Previous research on

mindfulness in workplace settings has found similar positive relational effects. Hence, mindfulness training has been found to foster intergroup prosocial behaviour (Berry, 2017; Sajjad and Shahbaz, 2020). The promotion of such behavior is proposed to be facilitated *via* enhanced empathy and reduced tendency to engage in “them” versus “us”-thinking (Berry, 2017). Similar to the present study, such prosocial behaviour may result in enhanced interdepartmental collaboration, understanding and trust. Moreover, research on mindfulness in workplace settings has demonstrated associations between high levels of mindfulness and lower levels of enacted incivility at work (Hülshager et al., 2021) as well as less moral disengagement (Brendel and Hankerson, 2021). Minimizing these negative relational characteristics may in effect enhance the psychosocial work environment and hence improve the mental well-being of employees and managers. In the present study, managers expressed being more aware and listening when they engage in conversation with their employees. In a qualitative study of a workplace-MBI on leader capabilities by Rupprecht and colleagues, the authors found similar results (Rupprecht et al., 2019). Similar to the present study, Rupprecht et al. (2019) found that managers experienced enhanced abilities to listen actively when engaging in conversations, and greater ability to maintain their attention during social interactions, such as in meetings. Hence, the relational impact of this workplace-MBI including a workplace-adapted MBSR programme is in line with previous research. Moreover, the quality of interpersonal relations—also in the workplace—impacts greatly on mental health and well-being (Holt-Lunstad et al., 2010; Teo et al., 2013; Santini et al., 2015; Dahl et al., 2020; Roffey, 2021; WHO, 2022). Therefore, the relational effects regarding especially bridging social capital and psychological safety between same-level colleagues may have the potential to contribute to improved mental health of employees and managers in workplaces.

It is noteworthy that MBSR is a complex intervention consisting of a number of activities. Hence, MBSR includes, for example, both the active ingredient, practice of mindfulness, and a group-based approach. One might argue that positive changes in the workplace social capital and psychological safety might have been brought about by simply creating a space for employees and managers to interact outside regular work related meetings or the likes. Put differently; might the same results have been obtained without the active ingredient, that is mindfulness? With no active control group, this question will inevitably remain unanswered. Nevertheless, according to mindfulness theory and previous research, mindfulness is linked to enhanced relational outcomes by means of, for example, increased self-regulation, attention, active listening as well as understanding and compassion for others (Glomb et al., 2011; Kabat-Zinn, 2013; Good et al., 2015; Rupprecht et al., 2019; Dahl et al., 2020). Some of these underlying competencies are also evident in the results of the present study, for example, improved active listening and understanding for and of others. Also demonstrated in another study from the present research project, participation in this workplace-MBI may improve the mental health skills of employees and managers (Bonde et al., 2022). Mental health skills are here understood as skills that serve as protection of one's mental health, such as emotion regulation, and engagement in social relations (WHO, 2012). Findings from that study indicate that following this workplace-MBI, employees and managers may develop an increased awareness of how others perceive things

differently from one self and be more responsive instead of reactive in social interactions (Bonde et al., 2022). These acquired skills are thus also in line with mindfulness theory and previous research. Therefore, it seems unlikely that the impact on workplace social capital and psychological safety could have been obtained without the active mindfulness component. However, the group-based mode of delivery is an intrinsic part of the MBSR programme, and hence, results from following an MBSR programme entails effects related to the intervention being group based (McCown et al., 2010; Kabat-Zinn, 2013). Adding to this, the explicit focus on creating safe and trusting group environments that facilitates sharing of experiences, may also serve as an important component of the intervention to impact social relations in the workplace. This only strengthens the notion that MBSR may be merited even more in organizations, such as workplaces, where relations are of long duration and of great importance to our well-being.

Through the analysis it became apparent that the Covid-19 pandemic and the lockdowns resulting thereof might have affected the diffusion of organizational effects, causing potential dilution of the impact on workplace social capital and psychological safety. However, a more critical theoretical stance could be that the effects might be magnified by the lockdowns. This could be the case if colleagues had been separated for longer periods of time, and that simply re-connecting with one's colleagues might cause the perceived impacts on the workplace social capital and psychological safety. Yet, referring to the above argument that specific competencies related to mindfulness theory and findings from previous research (Glomb et al., 2011; Kabat-Zinn, 2013; Good et al., 2015; Rupprecht et al., 2019; Dahl et al., 2020) are evident in the results of this present study, this is deemed unlikely.

4.1. Strengths and limitations

This study was conducted in a close collaboration between mindfulness experts and an experienced work and organizational psychologist. Therefore, in-depth knowledge of both mindfulness and workplaces where represented in the research group, ensuring that both knowledge of the intervention, mechanisms and, context were sufficiently represented. Furthermore, one of the main strengths of this study was that the intervention was offered to all employees and managers in the respective four companies. By deploying this population-based approach, no groups were singled out as having a special need for this intervention, and were thus not stigmatized (Rose et al., 2008). Also, the workplace-adapted MBSR programme was systematically developed using best practice when adapting MBIs to specific contexts (Crane et al., 2017). Moreover, the study includes data from 76 respondents from four companies representing different business areas with interviews from both baseline and post-intervention. This has resulted in a large data material allowing for thorough understanding of how the social capital and psychological safety may be impacted by this workplace-MBI across business areas. Lastly, EGM did not have any pre-existing experience with mindfulness, neither personal nor professional. Hence, close collaboration between EGM and EHB ensured that the analysis did not rely on a preunderstanding of how mindfulness might

impact psychosocial factors such as social capital and psychological safety. Four companies representing different business areas were included in this research project. Similar patterns in impact on workplace social capital and psychological safety were seen across companies. Hence, this may indicate that the results presented in this study are not limited to specific companies or business areas.

Still, the included companies were all self-selected, and chose to either actively seek out to be part of the research project or expressed interest upon direct contact from a representative of the research group. Thus, the results of this study may be restricted to companies with a preceding interest in mindfulness or mental health promotion. Moreover, interview questions relating to workplace social capital and psychological safety could have benefitted from being more systematically included in the interview guide. As such, questions related to workplace social capital might, for example, have been structured in interview questions divided into networks, norms, and trust. Yet, the interview guide was formulated to capture psychosocial factors such as workplace social capital and psychological safety in broad terms and therefore captured essential data needed for interpreting the impacts on these two theoretical concepts. Furthermore, by the words of Edmondson & Lei "... *psychological safety is essentially a group-level phenomenon*" (Edmondson and Lei, 2014). Hence, the psychological safety may vary across teams, departments, between managers and employees and so on. Thus, it may be problematic to conclude on the psychological safety for an entire organization, since this entails multiple teams and levels of hierarchy. Therefore, the analysis of psychological safety would have benefitted from data collected within teams with several team members from each team. Instead, focus groups in this study consisted of, respectively, employees and managers from different teams and departments. Thus, this study does not provide information of the impact of this workplace-adapted MBI on team psychological safety. Hence, future research may benefit from including focus group interviews within teams. However, it is unknown whether employees and managers in this study intuitively provided answers based on their experiences within their respective teams when engaging in a focus group interview. Moreover, the majority of focus group interviews were conducted live online *via* Zoom. This digital format made it difficult to interpret body language and inter-respondent interactions when respondents were not in the same room. However, beyond the difficulties in interpreting these non-verbal interactions, EGM and EHB did not experience any complications conducting focus groups live online. Yet, conducting focus group interviews live online does have potential positive aspects (Flayelle et al., 2022). By using the online format, we were able to reach more respondents and gain access to international managers and employees, we normally would not have had access to (Flayelle et al., 2022). Furthermore, the online format was both time and cost effective and allowed for EGM and EHB to communicate occasionally *via* the chat function when needed during the interviews (Flayelle et al., 2022). Lastly, in this study, one employee reported having experienced some negative effects in the bonding social capital relating to frictions between participants and non-participants within his department. Such frictions could cause

disruption in the networks within a team or department and thus possibly negatively affect the bonding social capital if not dealt with properly. These frictions may pose a barrier to further implementation of mindfulness in an organization. Therefore, future research ought to investigate facilitating and obstructing factors that may influence the impact of a workplace-adapted MBI.

4.2. Implications and perspectives

According to the results of the present study, the utilized MBI seems to have a potential for facilitating a positive impact on workplace social capital as well as psychological safety among people at the same level of employment. Thus, this study contributes with knowledge to the budding field of potential organizational impacts of MBIs delivered in a workplace setting. Hence, this study adds to the notion that mindfulness training in a workplace setting not only has the capacity to improve individual well-being or mental health skills (Good et al., 2015; Vonderlin et al., 2020; Bonde et al., 2022), but that it may also have the potential to contribute to improved psychosocial work environments. For employees and managers workplace-MBIs may lead to improved mental health skills (Bonde et al., 2022). For organizations, workplace-MBIs may contribute to healthier psychosocial work environments adding to improved individual mental well-being (WHO, 2012; Mikkelsen et al., 2020; WHO, 2022). Furthermore, the study provides additional knowledge of the ways that MBIs may affect the psychosocial work environment. These insights may be used for developing program theories for future research both in the fields of mindfulness, and work and organizational psychology. Future research would benefit from investigating barriers and facilitators to implementing mindfulness in workplace settings in order to gain insight into what works for whom and under what circumstances.

5. Conclusion

The aim of this study was to investigate how an organizational-level workplace-MBI including a workplace-adapted MBSR programme may impact on workplace social capital and psychological safety, potentially leading to improved individual mental health. Compared to baseline, a positive impact on especially the bridging social capital was seen in all included companies. Moreover, small positive changes to the psychological safety between people at the same level of employment were uncovered. The perceived impact may be affected by the COVID-19 pandemic and following lockdowns. However, it is deemed unlikely that this would lead to an exaggeration of the intervention impact. Thus, this workplace-MBI appear to have a positive impact on workplace social capital and psychological safety, which may in turn contribute to improved mental well-being of employees and managers. However, even though the study included companies representing different business areas, the results may be limited to companies that have a pre-existing interest in either mindfulness or workplace well-being. Future

research should include a range of different types of companies, and investigate facilitators and barriers of implementing mindfulness-based interventions in workplace settings.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

LJ and EGM designed the study. The interview guide was developed by EGM and EHB, who also collected the data analyzed in the present study. EHB was responsible for the transcription of the interviews. EGM and EHB performed initial coding of part of the data. EHB subsequently performed coding and categorization of all the data. In collaboration, EGM and EHB performed inter-coder reliability tests to ensure validity of the categorization. EGM and EHB were in continuous dialogue through the analysis process. The final results were discussed with LJ and LOF. LJ, LOF, EGM, and EHB collectively decided on the focus of the present publication. EHB drafted the manuscript, while EGM, LJ, and LOF made invaluable comments and corrections. All authors contributed to the article and approved the submitted version.

References

- Berry, D. R. B. (2017). "Reducing Separateness with presence" in *Mindfulness in Social Psychology*. ed. J. C. P. Karresmans. 1st ed (London: Routledge), 153–166.
- Bonde, E. H., Mikkelsen, E. G., Fjorback, L. O., and Juul, L. (2022). Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention. *Front. Psychol.* 13. doi: 10.3389/fpsyg.2022.1020454
- Brendel, W. T., and Hankerson, S. (2021). Hear no evil? Investigating relationships between mindfulness and moral disengagement at work. *Ethics Behav.* 32, 1–17. doi: 10.1080/10508422.2021.1958331
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., et al. (2020). Purposive sampling: complex or simple? Research case examples. *J. Res. Nurs.* 25, 652–661. doi: 10.1177/1744987120927206
- Crane, R., Bartley, T., Evans, A., Karunavira, S., Silvertown, S., Soulsby, J., et al. (2021). *Mindfulness-based Interventions: Teaching Assessment Criteria*. 3th Bangor: Bangor University.
- Crane, R. S., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J. M., et al. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychol. Med.* 47, 990–999. doi: 10.1017/S0033291716003317
- Dahl, C. J., Wilson-Mendenhall, C. D., and Davidson, R. J. (2020). The plasticity of well-being: a training-based framework for the cultivation of human flourishing. *Proc. Natl. Acad. Sci. U. S. A.* 117, 32197–32206. doi: 10.1073/pnas.2014859117
- De Vibe, M., Bjørndal, A., Fattah, S., Dyrdal, G. M., Halland, E., and Tanner-Smith, E. E. (2017). Mindfulness-based Stress Reduction (MBSR) for Improving Health, Quality of Life and Social Functioning in Adults: A Systematic Review and Meta-analysis. *Campbell Syst. Rev.* 13, 1–264. doi: 10.4073/csr.2017.11
- Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Adm. Sci. Q.* 44, 350–383. doi: 10.2307/2666999
- Edmondson, A. (2004). "Psychological safety, trust, and learning in organizations: a group-level lens" in *Trust and Distrust in Organizations: Dilemmas and Approaches*. eds. R. Kramer and K. Cook (New York, NY: Russell Sage Foundation), 239–272.
- Edmondson, A., and Lei, Z. (2014). Psychological safety: the history, renaissance, and future of an interpersonal construct. *Annu. Rev. Organ. Psych. Organ. Behav.* 1, 23–43. doi: 10.1146/annurev-orgpsych-031413-091305
- Elo, S., and Kyngäs, H. (2008). The qualitative content analysis process. *J. Adv. Nurs.* 62, 107–115. doi: 10.1111/j.1365-2648.2007.04569.x
- Flayelle, M., Brevers, D., and Billieux, J. (2022). The advantages and downsides of online focus groups for conducting research on addictive online behaviours. *Addiction* 117, 2142–2144. doi: 10.1111/add.15944
- GBD Mental Disorders Collaborators (2022). Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *Lancet Psychiatry* 9, 137–150. doi: 10.1016/S2215-0366(21)00395-3
- Glomb, T. M., Duffy, M. K., Bono, J. E., and Yang, T. (2011). "Mindfulness at work" in *Research in Personnel and Human Resources Management*. eds. A. Joshi, H. Liao and J. J. Martocchio (Bingley, UK: Emerald Group Publishing Limited), 115–157.

Funding

This study was funded by The Velliv Association. Award number: 19-0506.

Acknowledgments

The authors would like to thank all participating companies, employees and managers. The authors would also like to thank MBSR teachers, Mie Glud Pedersen, Camilla Victoria Marcinkowski and Bente Pedersen for their vital involvement and collaboration in developing the systematically workplace-adapted MBSR programme, and for taking part in delivering the intervention. Furthermore, the authors would also to thank The Velliv Association for funding the development of the intervention, data collection and data analysis.

Conflict of interest

The Danish Center for Mindfulness, Department of Clinical Medicine, Aarhus University offers revenue-funded MBSR programmes and MBSR teacher training.

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

- Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., et al. (2015). Contemplating mindfulness at work: an integrative review. *J. Manag.* 42, 114–142. doi: 10.1177/0149206315617003
- Holt-Lunstad, J., Smith, T. B., and Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLoS Med.* 7:e1000316. doi: 10.1371/journal.pmed.1000316
- Hülshager, U. R., Van Gils, S., and Walkowiak, A. (2021). The regulating role of mindfulness in enacted workplace incivility: an experience sampling study. *J. Appl. Psychol.* 106, 1250–1265. doi: 10.1037/apl0000824
- ILO (2022). "World Employment and Social Outlook: Trends 2022". Geneva: International Labour Office.
- Kabat-Zinn, J. (2013). *Full Catastrophe Living: How to Cope With Stress, Pain and Illness Using Mindfulness Meditation. Revised edn.*: New York, NY: Bantam Books.
- Kabat-Zinn, J. (2018). *Meditation is Not What You Think*. New York, NY: Hachette Book Group.
- Killingsworth, M. A., and Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science* 330:932. doi: 10.1126/science.1192439
- Lyhne, C., and Bjerrum, M. (2021). Kvalitativ indholdsanalyse - en hands-on introduktion [Qualitative content analysis - a hands on introduction]. *Klinisk Sygepleje [Clin. Nursing]* 35, 304–322. doi: 10.18261/issn.1903-2285-2021-04-04
- Mccown, D., Reibel, D., and Micozzi, M. S. (2010). *Teaching Mindfulness: A Practical Guide for Clinicians and Educators*. New York, NY: Springer.
- Mikkelsen, E. G., Hansen, Å. M., Persson, R., Byrgesen, M. F., and Høgh, A. (2020). "Individual consequences of being exposed to workplace bullying," in *Bullying and Harassment in the Workplace: Theory, Research and Practice*. eds. S. Einarsen, H. Hoel, D. Zapf and C. L. Cooper. 3rd ed (Boca Raton, FL: CRC Press).
- Nembhard, I. M., and Edmondson, A. C. (2011). "Psychological safety: A foundation for speaking up, collaboration, and experimentation in organizations" in *The Oxford Handbook of Positive Organizational Scholarship*. eds. G. M. Spreitzer and K. S. Cameron (Oxford: Oxford University Press)
- Olesen, K. G., Thoft, E., Hasle, P., and Kristensen, T. S. (2008). "Virksomhedens sociale kapital [The workplace's social capital]" in *Copenhagen: Det Nationale Forskningscenter for Arbejdsmiljø [the National Research Centre for the Working Environment]*
- Panditharathne, P. N. K. W., and Chen, Z. (2021). An integrative review on the research Progress of mindfulness and its implications at the workplace. *Sustainability [Online]* 13, 1–27. doi: 10.3390/su132413852
- Pattussi, M. P., Olinto, M. T. A., Canuto, R., Da Silva Garcez, A., Paniz, V. M. V., and Kawachi, I. (2016). Workplace social capital, mental health and health behaviors among Brazilian female workers. *Soc. Psychiatry Psychiatr. Epidemiol.* 51, 1321–1330. doi: 10.1007/s00127-016-1232-5
- Putnam, R. (1995). Bowling alone: America's declining social capital. *J. Democr.* 6, 65–78. doi: 10.1353/jod.1995.0002
- Roffey, S. (2021). "Chapter 5: relationships" in *Creating the world we want to live in: How positive psychology can build a brighter future*. eds. B. Greenville-Cleave, D. Guðmundsdóttir, F. Huppert, V. King, D. Roffey and S. Roffey et al. 1st ed (Abingdon, Oxon, and New York, NY: Routledge), 91–107.
- Rose, G., Khaw, K., and Marmot, M. (2008). *Rose's Strategy on Preventive Medicine*. New York, NY: Oxford University Press.
- Rupperecht, S., Falke, P., Kohls, N., Tamdjidi, C., Wittmann, M., and Kersemaekers, W. (2019). Mindful leader development: how leaders experience the effects of mindfulness training on leader capabilities. *Front. Psychol.* 10. doi: 10.3389/fpsyg.2019.01081
- Sajjad, A., and Shahbaz, W. (2020). Mindfulness and social sustainability: an integrative review. *Soc. Indic. Res.* 150, 73–94. doi: 10.1007/s11205-020-02297-9
- Santini, Z. I., Koyanagi, A., Tyrovolas, S., Mason, C., and Haro, J. M. (2015). The association between social relationships and depression: a systematic review. *J. Affect. Disord.* 175, 53–65. doi: 10.1016/j.jad.2014.12.049
- Santorelli, S. (2014). Mindfulness-based stress reduction (MBSR): Standards of practice [online]. Massachusetts: University of Massachusetts Medical School. Available at: https://mindfulness.au.dk/fileadmin/mindfulness.au.dk/Artikler/Santorelli_mbsr_standards_of_practice_2014.pdf [Accessed April 24, 2020].
- Schneider, J. A. (2009). Organizational social capital and nonprofits. *Nonprofit Volunt. Sect. Q.* 38, 643–662. doi: 10.1177/0899764009333956
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., et al. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ* 374:n2061. doi: 10.1136/bmj.n2061
- Szreter, S., and Woolcock, M. (2004). Health by association? Social capital, social theory, and the political economy of public health. *Int. J. Epidemiol.* 33, 650–667. doi: 10.1093/ije/dyh013
- Teo, A. R., Lerrigo, R., and Rogers, M. A. (2013). The role of social isolation in social anxiety disorder: a systematic review and meta-analysis. *J. Anxiety Disord.* 27, 353–364. doi: 10.1016/j.janxdis.2013.03.010
- Van Agteren, J., Iasiello, M., Lo, L., Bartholomaeus, J., Kopsaftis, Z., Carey, M., et al. (2021). A systematic review and meta-analysis of psychological interventions to improve mental wellbeing. *Nat. Hum. Behav.* 5, 631–652. doi: 10.1038/s41562-021-01093-w
- Vonderlin, R., Biermann, M., Bohus, M., and Lyssenko, L. (2020). Mindfulness-based programs in the workplace: a meta-analysis of randomized controlled trials. *Mindfulness* 11, 1579–1598. doi: 10.1007/s12671-020-01328-3
- WHO (2012). "Risks to Mental Health: An Overview Of Vulnerabilities and Risk Factors. Background Paper by WHO Secretariat for the Development of a Comprehensive Mental Health Action Plan". (Geneva: World Health Organization).
- WHO (2018). "Fact Sheet on Sustainable Development Goals: Health Targets—Mental Health". (Geneva: World Health Organization).
- WHO (2022). "WHO Guidelines on Mental Health at Work". (Geneva: World Health Organization).
- Woolcock, M., and Narayan, D. (2000). Social capital: implications for development theory, research, and policy. *World Bank Res. Obs.* 15, 225–249. doi: 10.1093/wbro/15.2.225

STUDY 4

An organizational-level mindfulness-based intervention in private workplace settings – is it feasible and what are the mental health and organizational impacts?

Submitted to Mindfulness

Title page

An organizational-level mindfulness-based intervention in private workplace settings: is it feasible, and what are the mental health and organizational impacts?

Authors and affiliations:

Emilie Hasager Bonde¹ (ID: 0000-0003-1730-8506)

Eva Gemzøe Mikkelsen² (ID: 0000-0001-8405-5356)

Lone Overby Fjorback¹ (ID: 0000-0002-9043-8967)

Lise Juul¹ (ID: 0000-0003-3640-7593)

1: Danish Center for Mindfulness, Department of Clinical Medicine, Aarhus University, Aarhus, Denmark

2: Department of Psychology, University of Southern Denmark, Odense, Denmark

Corresponding author: emilie.bonde@clin.au.dk

Acknowledgements:

The authors would like to thank all employees and managers, who participated in this study. Moreover, we would like to thank the company representatives who took the opportunity to engage their company in this research project. Furthermore, a heartfelt thank you to the MBSR teachers, Bente Pedersen, Mie Glud Pedersen, and Camilla Marcinkowski for invaluable contributions to the development and delivery of the 10-week workplace-adapted MBSR program.

Declarations:

Funding:

This study was funded by The Velliv Association (Grant number: 19-0506).

Competing interests:

The Danish Center for Mindfulness, Department of Clinical Medicine, Aarhus University offers revenue-funded MBSR courses and MBSR teacher training. The authors declare that they have no financial interests. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Ethics approval:

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Danish Data Protection Agency (2016–051-000001/1715) on February 13 2020.

Consent:

Before providing consent, all eligible subjects received written information on the research project, and intention to publish results thereof. In accordance with national legislation, consent was obtained from all subjects involved in the study upon contribution with questionnaire data.

Data availability:

Data will be provided without reservations upon request to the corresponding author.

Author Contributions:

Conceptualization: Lise Juul and Eva Gemzøe Mikkelsen; Methodology: Lise Juul and Emilie Hasager Bonde.; Formal analysis and investigation: Lise Juul and Emilie Hasager Bonde; Writing - original draft preparation: Emilie Hasager Bonde; Writing - review and editing: Lise Juul, Eva Gemzøe Mikkelsen, Lone Overby Fjorback, and Emilie Hasager Bonde; Funding acquisition: Lise Juul; Supervision: Lise Juul.

Abstract:

Objectives: The primary objective of this study was to investigate the feasibility and impact of an organizational-level workplace-adapted mindfulness-based intervention (MBI).

Secondarily, tendencies of change in mental health and organizational outcomes were

evaluated. **Methods:** The study was performed using a quasi-experimental no-control group design, and included four small and medium-sized private companies. A three-step MBI was delivered live online via Zoom. Feasibility was assessed using data on reach and dose. Data

on mental health and organizational outcomes was collected at baseline, 3, and 12 months follow-up and analyzed using mixed effects linear regression for continuous variables, and

mixed effects logistic regression for dichotomous variables. **Results:** In total, 75.54% of employees and managers participated in an introductory session, 45.92% signed up for a

workplace-adapted 10 week MBSR course, while 75% of companies participated in an

implementation workshop. Among MBSR-participants, the median dosage was 9/10 sessions in three companies, and 8/10 in one company. Little to no changes in mental health outcomes

were evident. Yet, a positive impact was seen on the outcome EQ-Decentering at both 3 and 12 months follow-up. Organizational impact at 3 months follow-up varied across outcome

measures, with a statistically significant reduction of odds of occasionally experiencing

negative acts. However, at 12 months follow-up, this reduction was no longer statistically

significant, and measures of social capital and psychological safety had generally decreased.

Conclusions: This workplace-MBI is deemed feasible. However, results on the impacts on distal mental health and organizational outcomes are uncertain.

Keywords: Mental health promotion and prevention; Workplace; Psychosocial work environment; Mindfulness; MBSR; Covid-19

Introduction

The declining mental health of the World's population is concerning, and actions to ameliorate this decline is of immense importance (WHO, 2018). The World Health Organization (WHO) defines 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*" (WHO, 2021). Thus, good mental health is not limited to the absence of mental disorders, but entails skills such as coping with stress and working productively which may positively affect an individual's mental health. Practicing mindfulness has been found to positively affect such individual skills by, for example, improving awareness and connection to others (Bonde, Mikkelsen, Fjorback, & Juul, 2022; Dahl, Wilson-Mendenhall, & Davidson, 2020), as well as enhancing distal mental health outcomes, such as reduced perceived stress, and improved well-being (De Vibe, 2017; Khoury, Sharma, Rush, & Fournier, 2015; van Agteren et al., 2021). Moreover, mindfulness-based are intended to improve emotion regulation, potentially leading to enhanced ability to modulate emotional responses (Vago & David, 2012).

Mindfulness may be defined as "*... the awareness arising through paying attention on purpose in the present moment, non-judgmentally, in the service of self-understanding, wisdom, and compassion*" (Kabat-Zinn, 2018). Mindfulness practice enables individuals to experience the present moment with curiosity and kindness. By being aware in the moment, one has the possibility of noticing thoughts, feelings, and bodily sensations. Moreover, practicing mindfulness may result in changes in how one relates to these thoughts, feelings, and perceptions, which could affect social situations (R. S. Crane et al., 2017). Hence, being aware of one's own internal state may impact the way individuals engage in social interactions, e.g., by listening actively and responding in a more reflected manner as opposed to reacting automatically in, for example, stressful situations (Dahl et al., 2020; Kabat-Zinn,

2013, 2018). In a study by Killingsworth and Gilbert (2010), the authors found that humans are not mentally present in what we are doing approximately 47% of our waking hours (Killingsworth & Gilbert, 2010). Being aware in the present moment allows for the possibility of noticing when the mind is on a mental time travel, which enables individuals to bring the attention back to the present. In their study, Killingsworth and Gilbert (2010) also found that people are most happy when mentally present in what they are doing independently of what activity, they are engaged in (Killingsworth & Gilbert, 2010). Therefore, being aware in the present moment may enhance individual skills that protect the mental health (mental health skills), such as emotion regulation and connection to others (WHO, 2022b), as well as independently positively affect well-being (Killingsworth & Gilbert, 2010).

Mindfulness-based stress reduction (MBSR) is a curriculum-based 8-week program designed to support participants in developing the ability to be aware in the present moment with kindness to one self and others. The program is delivered by a trained MBSR teacher in a group format over the course of 8 weeks with weekly 2.5 hour sessions and one 7-hour silent retreat day (Santorelli, 2014). Each session focuses on a specific topic, such as perception, pleasant experiences, and communication. MBSR has been evaluated in both clinical and non-clinical study populations as well as in various settings, including, e.g. hospitals and workplaces (De Vibe, 2017). Across these study populations and settings, MBSR has been found effective in reducing perceived stress, and symptoms of depression and anxiety, as well as enhancing overall well-being (De Vibe, 2017).

Since the release of the Perth Charter in 2012, it has been recommended, that mental health promoting interventions are to be implemented in everyday-life settings, such as schools, universities, and workplaces (Foundation & WA, 2012; WHO, 2021, 2022a). Recently, WHO released guidelines on mental health at work (WHO, 2022a), including recommendations of

implementing interventions to improve and protect the mental health among the working population (WHO, 2022a). In these guidelines, mindfulness-based interventions (MBIs) are explicitly recommended by the WHO as individual universal interventions to enhance workers' stress-management skills (WHO, 2022a). Furthermore, WHO makes the point that *“When people have good mental health, they are better able to cope with the stresses of life, realize their own abilities, learn and work well and contribute actively to their communities. And when people have good working conditions, their mental health is protected”* (WHO, 2022a). Thus, mental health and working conditions exist in a mutually enhancing relationship where improved mental health may positively affect (work) communities, and good working conditions may positively affect individual's mental health.

The research field of mindfulness in the workplace has continuously grown during the past decades, and positive effects on both individual and organizational outcomes have been uncovered (Bonde et al., 2022; Bonde, Mikkelsen, Fjorback, & Juul, 2023; Good et al., 2015; U.R. Hülshager, van Gils, & Walkowiak, 2021a; Kay & Skarlicki, 2020; Panditharathne & Chen, 2021; Vonderlin, Biermann, Bohus, & Lyssenko, 2020). Still, most research has been conducted in public workplace contexts (Janssen, Heerkens, Kuijer, van der Heijden, & Engels, 2018), with the majority carried out in health care settings (Lomas et al., 2017). Thus, there is a call for investigating MBIs in private workplace settings. Based on previous and emergent research, Good et al. (2015) proposed a framework for both individual and organizational effects of implementing mindfulness in workplace contexts (Good et al., 2015). While the evidence of individual effects of practicing mindfulness in workplace contexts is more substantial, less is known about mindfulness' potential impact on organizational outcomes, such as communication and workplace climate (Good et al., 2015). Similarly, in a systematic review and meta-analysis, the authors found that MBIs offered in a workplace context are effective in enhancing employee mental health across occupational

settings, but the evidence of effects on organizational outcomes, such as work engagement and job satisfaction, is still scarce (Vonderlin et al., 2020). Recent research has however found that mindfulness may contribute to organizational impacts, such as prosocial behavior, reduced incivility at work, and a more conflict positive work environment (Bonde et al., 2023; U.R. Hülshager et al., 2021a; Kay & Skarlicki, 2020; Panditharathne & Chen, 2021). Thus, there is indications that mindfulness in workplace contexts may positively affect both individual mental health and working conditions, through improved psychosocial work environment. Thereby mindfulness may contribute to the mutually enhancing relationship between mental health and working conditions, as proposed by the WHO (WHO, 2022a). However, more research is needed to build the evidence base of potential organizational outcomes of mindfulness in workplace contexts. To affect such organizational outcomes, e.g. workplace relationships, interventions may effectively be delivered at an organizational level to entire workplace populations. In their framework for developing and evaluating complex interventions, The Medical Research Council (MRC), encourages interventions to be delivered using such whole system approaches to evoke system change (Skivington et al., 2021). In a workplace context, this may be translated into targeting the whole workplace and not merely selected individuals within the workplace. Thus, by using a population-based approach (Rose, Khaw, & Marmot, 2008), an MBI may be offered to all employees and managers within a given workplace. Moreover, by integrating mindfulness in the organization, changes in social interactions may influence relations positively, and thus perhaps contribute to healthier psychosocial work environments.

The primary aim of this study was therefore to investigate the feasibility of an organizational-level MBI including a workplace-adapted MBSR program in private workplace settings. Secondly, it was hypothesized that if the intervention was found feasible, then;

Hypothesis 1: this may contribute to enhanced protective mental health skills, as well as improved mental health among employees and managers.

Hypothesis 2: this could have positive impacts on the psychosocial work environment through facilitation of changes in social relations.

Methods

Design

In this study, quantitative results from a multi-method quasi-experimental trial are presented. The trial was registered with the Danish Data Protection Agency (2016–051-000001/1715), as required by local law. To enroll in the trial, companies had to be small or medium-sized with a total of 10-249 employees and managers within the private sector.

Setting

The trial commenced in January 2020. Hence, this study was conducted during the Covid-19 pandemic. Figure 1 depicts a timeline of the intervention period in the four included companies with timestamps of influential events across the trial period. During the trial, the Covid-19 pandemic resulted in several local, regional, and national lockdowns. During these lockdowns, the majority of employees and managers were either required to work from home when possible, or sent home from work when remote work was not feasible, for example, when working as a chef in a restaurant. Moreover, lockdowns resulted in schools being closed. Therefore, some employees and managers in this trial were working from home while home schooling their children, or supporting the online teaching provided by school teachers. Additionally, Company 3 underwent an extensive re-organization during the trial period resulting in some employees and managers being reassigned or fired.

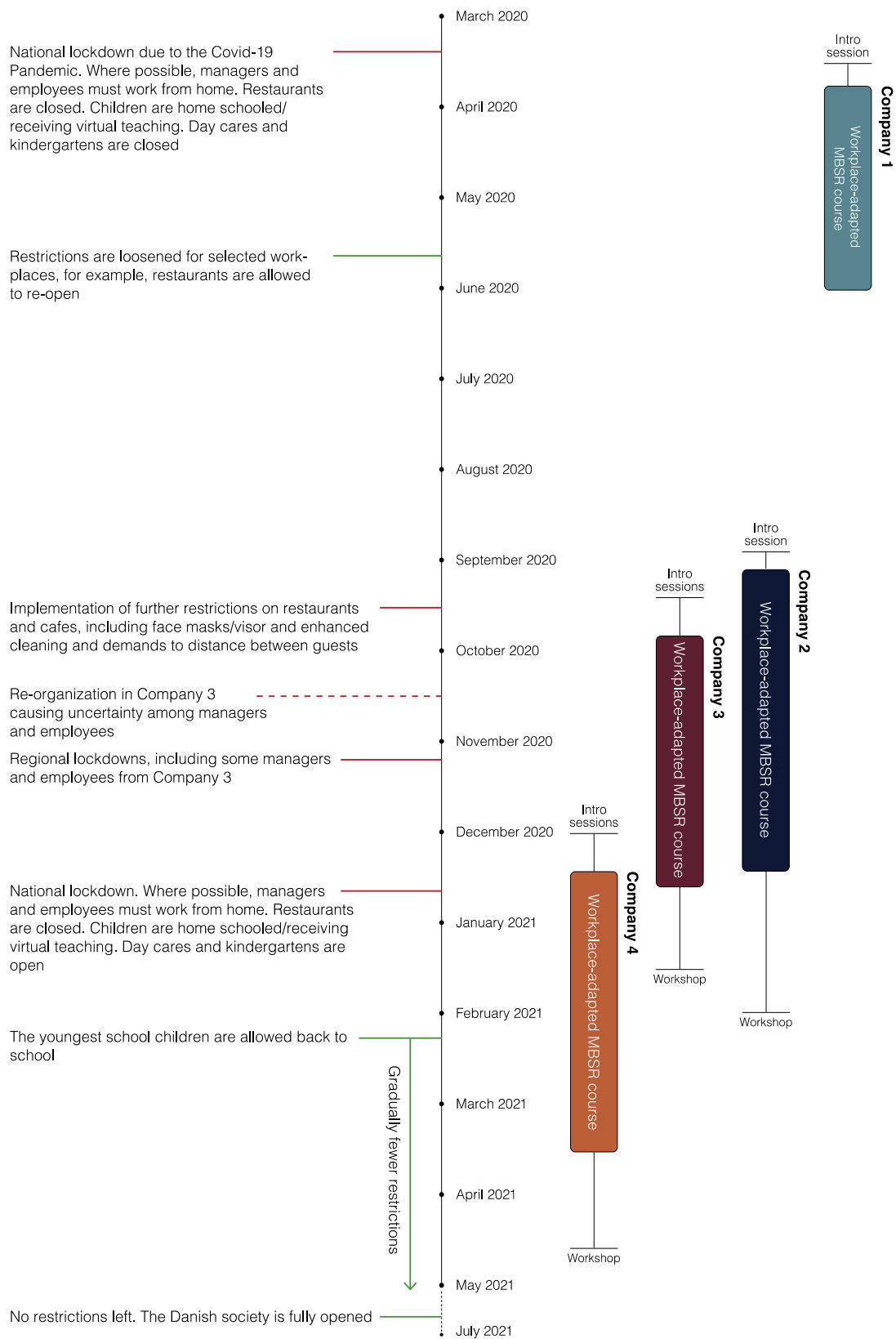


Fig. 1 Timeline of the intervention including timestamps of influential events during the trial period

Recruitment and procedure

To enroll in the trial, companies were required to meet certain criteria; (i) companies had to be privately owned, and (ii) to have a total staff count of 10-249. Companies were recruited from January 2020 to October 2020. Multiple channels were utilized for company recruitment. These included direct contact to seemingly interesting companies, and online advertisement on both social media (LinkedIn, Twitter, and Facebook) and the Danish Center for Mindfulness' webpage. Moreover, the possibility to enroll was announced in digital news letters from business organizations within, e.g., production businesses. Once a company expressed interest in participating in the trial, a preliminary meeting was held between the principal investigator, L.J., an MBSR teacher, and representatives from the company management. At this meeting, company representatives were informed that the intervention was an organizational-level intervention. Thus, the intervention was to be offered to all employees and managers and not solely for selected groups within the company. Furthermore, company representatives were informed that by enrolling in the trial, management was required to allow all employees to participate in a two-hour obligatory introductory session during working hours. Moreover, managers had to agree to enable all employees to sign up for a 10-week workplace-adapted MBSR course during working hours, or alternatively, provide monetary payment for time spend participating during leisure time. Upon commitment to these terms, a formal contract of participation was signed by a company representative and L.J. Four private companies representing different business areas enrolled in the trial. Hence, companies within production, media, IT, and restaurants were represented. A project team member collaborated with a company representative on the practical organization of the intervention in the company. Thus, company wishes for commencement date, and day and time for the 10-weeks workplace-adapted MBSR course(s) were accommodated as good as possible. Data was collected at baseline, 3 months, and 12 months

follow-up using the electronic data capture tool, REDCap, a secure web-based system hosted by Aarhus University (Harris et al., 2009).

Intervention

The intervention consisted of three steps. Firstly, an obligatory two-hour introductory session on mental health and research on mindfulness was held for employees and managers in the respective companies. Secondly, all employees and managers were offered the possibility to participate in a 10-weeks live online workplace-adapted MBSR course. Lastly, all companies were offered a workshop on further implementation of mindfulness in the company following the 10-week workplace-adapted MBSR course. The introductory session consisted of knowledge dissemination of; what mental health is, the bodily stress response, the possibility to train one's mental health and mindfulness as a way of doing this. Moreover, previous research on the effects of MBSR was presented, participants were invited to engage in two brief guided mindfulness practices, and information on the 10-weeks live online workplace-adapted MBSR course was presented. The workplace-adapted MBSR program was systematically adapted from the original MBSR program to ensure the validity of the proposed program theory (Fig. O1, Online Resources). The adaptation was conducted with due caution of core elements and flexible elements of the original MBSR program. Thus, to ensure context fit while retaining the active elements of the intervention, adaptation was conducted in accordance with recommendations proposed by Crane et al. (R. S. Crane et al., 2017). Accordingly, the workplace-adapted MBSR program was delivered by a trained MBSR teacher, followed the original MBSR curriculum, including the same weekly themes, applied an experience-based approach using mindfulness exercises, horizontal inquiry of direct experiences, and a group-based mode of delivery (R. S. Crane et al., 2017). The program was delivered live online via Zoom over the course of 10 weeks with weekly 1.5h sessions. During the 10-week workplace-adapted MBSR courses, L.O.F. provided

supervision to all MBSR teachers delivering an MBSR course in the trial in weekly 1.5h sessions. The supervisions followed the Mindfulness-based Interventions: Teaching Assessment Criteria (MBI-TAC) (R. Crane et al., 2021). The implementation workshop was a two-hour workshop for selected managers and employee representatives, hosted by E.G.M., an MBSR teacher, and E.H.B. The workshop included in-group and plenary discussions on whether mindfulness should be implemented in the company, and if so how this would be possible. Moreover, facilitators and barriers to further implementation was identified upon discussions, and finally an action plan for further implementation was agreed upon. The intervention was delivered in the four respective companies from March 2020 to April 2021 (see Fig. 1 for timeline).

Data collection and outcome measures

The primary outcome was data on the feasibility of implementing this workplace-MBI in small and medium-sized private companies. Feasibility data consisted of data on *reach* and *dose*. Reach related to proportions of employees and managers participating in the three intervention components, while dose related to medians of the number of sessions, employees and managers participated in when signed up for a 10-week workplace-adapted MBSR course.

Secondary outcomes were self-reported mental health outcomes, including measures of symptoms of depression and anxiety, well-being, resilience, decentering, disturbed sleep and awakening problems. Furthermore, secondary outcome measures also included organizational factors containing measures of social capital, negative acts, and team psychological safety. Data on secondary self-reported outcomes was collected at baseline, 3 months, and 12 months follow-up.

Perceived Stress Scale

The 10-item version of PSS was utilized to gather information on subjective stress (Cohen, Kamarck, & Mermelstein, 1983). The 10-item scale provides insights into how often during the past month, the respondent has experienced his or her life as uncontrollable, unpredictable, or overloaded. A 5-point Likert scale is used to score items with sum score ranges of 0-40. Higher values indicate higher levels of perceived stress. Previous research has found the scale to be valid and reliable (Cohen et al., 1983; Eskildsen et al., 2015; Lee, 2012).

The Hopkins Symptom Checklist-5

The Hopkins Symptom Checklist-5 (SCL-5) is a five-item scale developed for measuring self-reported symptoms of depression and anxiety (Tambs & Moum, 1993). All items are scored on a 4-point scale, and an average score is calculated across the five items (score range 1-4) with higher scores indicating more self-reported symptoms of depressions and anxiety. This 5-item version correlates with the 25-item version at $r = .92$ (Strand, Dalgard, Tambs, & Rognerud, 2003).

Brief Resilience Scale

The Brief Resilience Scale (BRS) is a 6-item self-reported measure of an individual's resilience. Items are scored on a 5-point scale, and subsequently, an average score across items is calculated (score range 1-5). Higher values indicate higher levels of resilience (B. W. Smith et al., 2008). Suggested cut-points for low, normal and high resilience are; low: 1.00-2.99, normal: 3.00-4.30, and high: 4.31-5.00 (B. W. Smith et al., 2008). To our knowledge, no construct validation of BRS has been conducted in a Danish context yet. However, BRS has been suggested by international researchers to be among the most valid resilience measures (Windle, Bennett, & Noyes, 2011).

Short Warwick-Edinburgh Mental Wellbeing Scale

The Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) is a shortened version of the original 14-item Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) (Stewart-Brown et al., 2009). SWEMWBS is a 7-item measure of self-reported well-being over the past two weeks. All items are positively worded and are scored on a 5-point Likert scale. Total score ranges from 7-35 with higher scores indicating greater well-being. The SWEMWBS has been found to correlate with the original WEMWBS at $r = .92$ in a Danish sample (Koushede et al., 2019). To our knowledge, no national norm scores have been established in Denmark. However, using data from the Health Survey in England 2010-2013, Ng Fat et al. (2017) found that men had a mean SWEMWBS score of 23.7, while women had a score of 23.6 (Ng Fat, Scholes, Boniface, Mindell, & Stewart-Brown, 2017).

Experiences Questionnaire – Decentering

In this study, the 11-item decentering factor from the 2-factorial Experiences Questionnaire (EQ) (Fresco et al., 2007). EQ – decentering is a self-reported measure of respondents' ability to observe one's own thoughts and feelings objectively, knowing that these are indeed thoughts and feelings, and not reality (Fresco et al., 2007). Items are scored on a 5-point Likert scale with total score ranges from 11-55, with higher values indicating greater ability to decenter. To our knowledge, no validation study of EQ – decentering has been conducted in a Danish Setting. However, previous international research has found the measure to be valid and reliable (Fresco et al., 2007).

Sleep problems

Problems relating to sleep in the past 4 weeks were measured using a 6-item modified version of the Karolinska Sleep Questionnaire (KSQ) (Hansen, Hogh, Garde, & Persson, 2014).

Items represent two indexes; disturbed sleep (DSI) and awakening problems (AWI)

(Rugulies, Martin, Garde, Persson, & Albertsen, 2012). Items are scored on a 5-point Likert scale. Scores are calculated as mean scores within each index with ranges on both indexes from 1-5 (Hansen et al., 2014). This modified version of the KSQ has previously been utilized in Danish research, and has been found valid and reliable (Hansen et al., 2014).

Social capital

In this study, workplace social capital was measured using the 25-item Danish social capital questionnaire (Borg, Mateu, & Clausen, 2014). The questionnaire aims at measuring social capital as experienced from a group level (Meng, Clausen, & Borg, 2018). Items are divided into four subscales; Bonding social capital (within teams), Bridging social capital (between teams), and social capital between employees and managers (Linking social capital – immediate manager, and Linking social capital – top management). Items are scored on a 5-point scale. To calculate a total score for each subscale, responses are rescaled from 0-100. Thus, total sum scores range from 0-100 with higher values indicating higher levels of social capital. The questionnaire is widely used in Danish workplace contexts.

Short Negative Acts Questionnaire

The Danish version of the 9-item Short Negative Acts Questionnaire (S-NAQ), a shortened version of the 22-item Negative Acts Questionnaire – Revised (NAQ-R) (Conway et al., 2018), was utilized to measure negative acts in the workplace. The S-NAQ is a self-reported measure of how often the respondents have experienced nine different negative acts, such as feeling ignored or being ridiculed. Items are scored on a 5-point scale. Total scores are calculated as sum scores, resulting in total score ranges from 9-45 (Conway et al., 2018), with higher scores indicating higher levels of negative acts. In previous research, a cut-off score of >12, have been used to estimate occasional experience of negative acts (Conway et al., 2018).

S-NAQ has been found valid, and to correlate with the NAQ-R at $r = 0.85$ (Conway et al., 2018).

Team Psychological Safety

To measure team psychological safety, the 7-item measure developed by Edmondson (1999) was utilized (Edmondson, 1999). Items are scored on a 7-point Likert scale. Total scores are calculated as sum scores with score ranges from 7-49, with higher values indicating greater team psychological safety. The measure has been found valid in previous research (Hastings, Jahanbakhsh, Karahalios, Marinov, & Bailey, 2018).

Data analysis

Data on the feasibility of the intervention was obtained from the records of participation, which was systematically gathered throughout the intervention. Subsequently, reach was calculated as the percentage of eligible employees and managers who participated in each of the three intervention components. Moreover, to assess the received dose of the 10-week workplace-adapted MBSR course, the median number of sessions attended was calculated. Analyses of tendencies of change in continuous variables of self-reported mental health outcomes and organizational factors were performed using a mixed-effect linear regression model with systematic effects of time, sex, age, cohabitation status (living with or without a partner), education, job type, company, and random effect of course. Analyses of tendencies of change in the dichotomized S-NAQ-scores (more or less than 12), were conducted using a mixed-effects logistic regression model with systematic effects of time, sex, age, education, job type, cohabitation status, and company. Loss to follow-up analyses at 3 months follow-up among all employees and managers were carried out using *t tests* and χ^2 tests. Two-sided *P* values were estimated, and $P = 0.05$ was set as statistical significant. Similarly, loss to

follow-up analyses at 3 months were performed for employees and managers who did not sign up for or complete a 10-week workplace-adapted MBSR course (participated in >4 sessions). Moreover, sensitivity analyses were conducted for all employees and managers at both 3 months follow-up and 12 months follow-up. In the sensitivity analyses of continuous variables, model-based predictions of the potential impact of missing data were carried out by adding or subtracting $0.2 \times SD$ to the adjusted estimate. In the sensitivity analyses of the dichotomized outcome of occasionally experiencing negative acts, model-based predictions of the proposed impact of missing data was conducted by simulating logodds by adding or subtracting nothing (missing at random), 10%, and 20% variance in the logodds of occasionally experiencing negative acts.

Results

Figure 2 illustrates the flow of participants from baseline to 12-months follow-up.

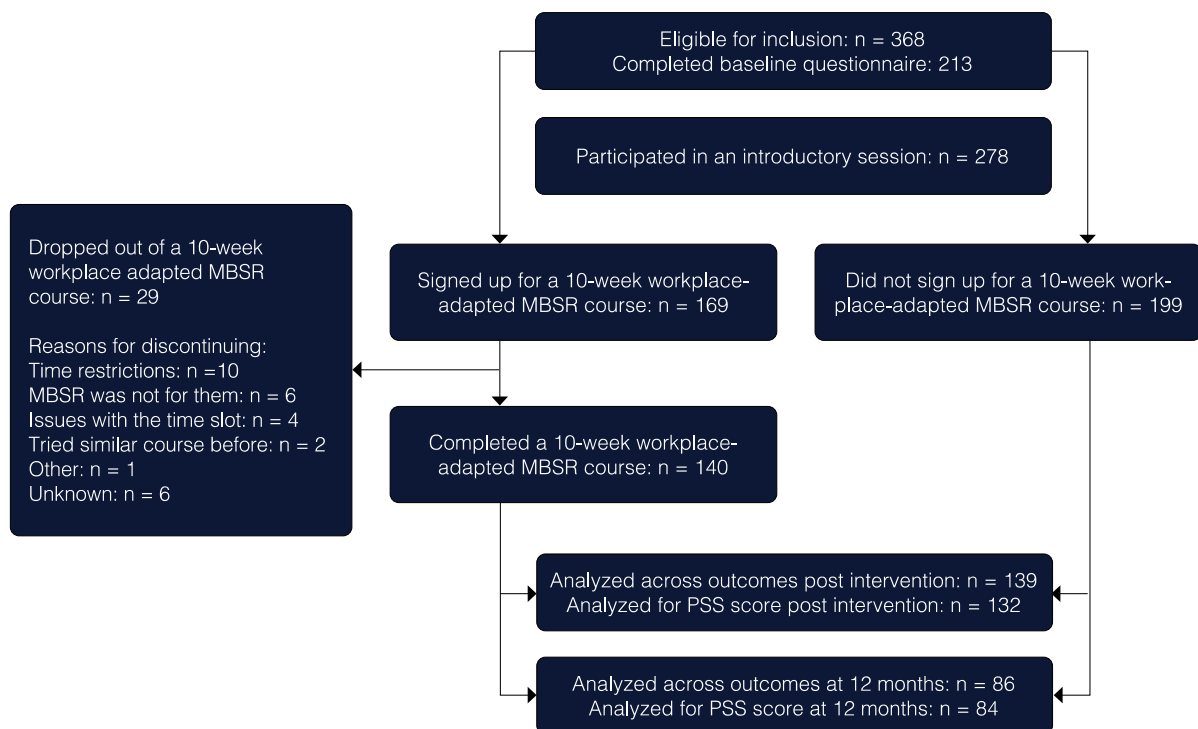


Fig. 2 Flow of participants

In total, 368 employees and managers were employed in one of the four companies at baseline. Thus, 368 persons were eligible for participation in the intervention. Of these, 278 (75.54%) participated in an obligatory two-hour introductory session. Of the 368 eligible, 169 (45.92%) employees and managers signed up to participate in a 10-week workplace-adapted MBSR course. Of these, 140 (82.84%) completed a course. In total, 213 (57.88%) completed the baseline questionnaire. To receive a follow-up questionnaire, employees and managers had to have contributed with a baseline data. Thus, of the 213 who contributed with baseline data, 139 (65.26%) completed a 3 months follow-up questionnaire, while 86 (40.38%) completed a 12 months questionnaire. Moreover, as Table O2 shows, a total of 109 (86.51%) employees and managers who participated in 4-10 sessions of a 10-week workplace-adapted MBSR course, completed the 3 months follow-up questionnaire, while 63 (50.00%) completed the 12 months follow-up questionnaire (Table O2, Online Resources). These proportions are in contrast to those of employees and managers who participated in >4 sessions, where only 30 (34.48%) completed the 3 months questionnaire, and 22 (25.29%) completed the 12 months follow-up questionnaire (Table O2, Online Resources), resulting in a differentiated loss to follow-up between completers and non-completers.

In Table 1, baseline characteristics of employees and managers who completed a baseline questionnaire are displayed. Respondents consisted equally of women and men with a mean age of 41.74 years at baseline. Approximately half of the employees and managers contributing with baseline data had more than three years of education following high school level, and were working as skilled workers/specialists at baseline.

[Insert Table 1]

Table 2 displays the reach of each of the three intervention components. Firstly, a total of 278 (75.54%) employees and managers participated in an obligatory introductory session on mental health and mindfulness. Secondly, 169 (45.92%) of the 368 eligible employees and managers signed up for a 10-week workplace-adapted MBSR course. Lastly, three (75.00%) companies participated in a workshop on further implementation of mindfulness in the company. In Table 3, the received dosage of the 10-week workplace-adapted MBSR course is presented. Across companies, employees and managers who completed a 10-week workplace-adapted MBSR course, the medians for participation out of 10 sessions were 9 in three of the companies and 8 in one company. Of those employees and managers, who discontinued a 10-week workplace-adapted MBSR course, the median participation rate was no higher than 2.5 out of 10 sessions before leaving the course.

[Insert Table 2]

[Insert Table 3]

In Table 4, tendencies of changes in self-reported mental health outcomes from baseline to 3 months and 12 months follow-up are shown. Overall, changes in distal measures of mental health, such as perceived stress, symptoms of depression and anxiety, and well-being, were small to none at both 3 months and 12-months follow-up. However, changes in the EQ-decentering score were borderline statistically significant at 3 months (1.15 (95% CI: -0.03 to 2.33)), and statistically significant at 12 months follow-up (1.46 (95% CI: 0.02 to 2.89)).

Similarly, Table 5 presents the tendencies of changes from baseline in the organizational outcomes social capital and psychological safety. At 3 months follow-up, bonding social capital, linking social capital (overall management), and psychological safety was largely unchanged, while bridging social capital (1.17 (95% CI: -2.16 to 4.50)) and linking social capital (immediate management) (-1.91 (95% CI: -5.22 to 1.40)) were affected in opposite

directions. At 12 months follow-up, all social capital subscales, as well as the psychological safety score showed varying degrees of decrease, including a statistically significant decline in linking social capital (immediate management) (-8.77 (95% CI: -12.86 to -4.68)), and a borderline statistically significant decline in psychological safety (-1.54 (95% CI: -3.18 to 0.09)).

[Insert Table 4]

[Insert Table 5]

The median S-NAQ scores for the three data collection times were: baseline: 11.0 (q25; q75: 9.0; 13.0), 3 months follow-up: 10 (q25; q75: 9.0; 12.0), and 12 months: 10.5 (q25; q75: 10.0; 12.0). Table 6 displays odds ratios for occasionally experiencing negative acts (an S-NAQ score of >12) at 3 and 12 months compared to baseline.

[Insert Table 6]

According to the loss to follow-up analysis for all employees and managers, the baseline characteristics of those who contributed with questionnaire data at 3 months follow-up largely resembled the baseline characteristics of those who did not complete a 3 months follow-up questionnaire (Table O1, Online Resources), as was the case for loss to follow-up at 12-months follow-up. However, a loss to follow-up analysis of employees and managers who did not complete a 10-week workplace-adapted MBSR course (did not sign up or participated in >4 sessions) revealed that MBSR non-completers, who answered a 3 months follow-up questionnaire had a generally better mental health at baseline compared to those MBSR non-completers, who did not answer a 3 months follow-up questionnaire (Table O3, Online Resources). Thus, the MBSR non-completers contributing with 3 months questionnaire data were not representative of the entire sub-population of MBSR non-completers. In the sensitivity analyses of the continuous variables, both mental health and

organizational outcome estimates were affected by the model-based predictions (Tables O4-O5, Online Resources). Hence, for several of the estimates, both the direction of the association and the certainty of the estimate were impacted. However, the mental health outcome demonstrating the largest tendency of change in the main analysis, EQ-Decentering, still demonstrated a positive change in the most critical model-based prediction. Hence, even in the model-based prediction in which missing data were predicted to experience $0.2 \times SD$ less than the adjusted estimate, the change in EQ-Decentering still showed a favorable development from baseline to follow-up. However, the association was no longer statistically significant at 12 months follow-up (Table O4, Online Resources). The sensitivity analyses of the dichotomous outcome of occasionally experiencing negative acts showed that the estimated odds ratio at 12 months follow-up may be biased due to the low response rate. Hence, even if data was assumed to be missing at random, non-responders may have had a lower logodds of occasionally experiencing negative acts in the workplace (Fig. O2, Online Resources).

Discussion

Implementation of mental health promoting and preventive interventions is crucial in order to ameliorate the global decline of the populations' mental health. Workplaces have been highlighted as potential mental health promoting arenas, and MBIs have demonstrated positive effects on mental health outcomes. However, less is known of the feasibility and potential impact of organizational-level workplace-MBIs in private workplace settings. The results of this study demonstrate that it is indeed feasible to implement an organizational-level MBI including a 10-week live online workplace-adapted MBSR course in small and medium-sized private companies. Yet, little to no tendencies of change were seen in distal

mental health outcome measures of perceived stress, symptoms of depression and anxiety, resilience, well-being, and sleep, while mixed tendencies were observed in organizational outcomes.

The feasibility of the intervention was assessed using data on reach of the three intervention components, and received dose of the 10-week workplace-adapted MBSR program. A benchmark for an acceptable level of reach when using a population-based strategy to deliver a mental health promoting and preventive intervention was not found. However, overall, 75.54% participated in an introductory session, while 45.92% signed up for a 10-week workplace-adapted MBSR course. Based on baseline characteristics, indicating a moderate mental health across study participants, the reach of the intervention is deemed acceptable. Dosage cut-points for MBI-participation have previously been utilized to evaluate the feasibility of MBIs. Hence, a mean value of half of the sessions attended may indicate that the intervention is appropriate, yet in need of further improvement, whereas participation in 66.6% or more may be deemed feasible (Kuyken et al., 2008; Montero-Marin et al., 2020). The median received dose in the present study was well-above these cut-points, and thus, the received dose is deemed acceptable, supporting the feasibility of this workplace-MBI. Moreover, the dose received in this study is in line with that found in a similar study by Kersemaekers et al. (2018) (Kersemaekers et al., 2018).

This workplace-MBI yielded little to no changes in mental health outcomes. Interestingly, this is not in line with results of most previously published research on MBIs in workplace settings (Lomas et al., 2017; Vonderlin et al., 2020). In a systematic review including 153 studies of MBIs in workplace contexts, Lomas et al. (2017) found that the vast majority of the included studies demonstrated positive effects on mental health outcomes, such as stress, anxiety, depression, and well-being (Lomas et al., 2017). The reasons why the same tendencies are not present in this study may be explained by several contextual factors as well

as methodological considerations. Firstly, employees and managers who contributed with questionnaire data in this study had only a small room for mental health improvement at baseline. Therefore, large changes in mental health outcomes would not be expected (Rose et al., 2008). Secondly, the intervention in the present study was an organizational-level intervention delivered using a population-based strategy. Thus, the intervention was not targeted a selected high-risk group but instead delivered to employees and managers representing individuals across the mental health continuum (Rose et al., 2008). The potential changes in mental health outcomes among employees and managers with poorer mental health – and hence, a greater room for improvement - may therefore have been diluted by those individuals with good mental health (Rose et al., 2008). Accordingly, previous research of MBIs in the workplace, with interventions deploying a high-risk strategy, have yielded larger impacts than the tendencies presented in the present study (Huang, Li, Huang, & Tang, 2015). Thus, the first and second potential explanation are closely related. Thirdly, the present study was carried out in the midst of the Covid-19 pandemic, resulting in dramatically altered everyday life circumstances both at work and during leisure time. Across countries and population groups, the Covid-19 pandemic negatively impacted the mental health (Chandola, Kumari, Booker, & Benzeval, 2022; Chiesa, Antony, Wismar, & Rechel, 2021; Guo, Feng, Wang, & van IJzendoorn, 2020). In Denmark, well-being measured using SWEMWBS decreased statistically significantly among the general population from pre-pandemic 2019 to autumn 2020 (mid-pandemic) (Thygesen et al., 2021). Thus, a sustained level of mental health outcomes, as found in this study, may in fact represent a positive outcome.

However, the results of the present study indicated a tendency of a positive change in the EQ – Decentering score, representing skills in detaching oneself from thoughts and feelings. This positive change in decentering is in accordance with mindfulness theory (Shapiro, Carlson,

Astin, & Freedman, 2006). Thus, by engaging in mindfulness as a practice or a state, individuals may experience a “fundamental shift in perspective” of how they relate to thoughts and feelings (Shapiro et al., 2006), that is, a greater ability to observe one’s experiences without being consumed by them. According to Shapiro et al. (2006), this shift may proposedly have a positive influence on well-being (Shapiro et al., 2006). Moreover, decentering has been found to aid in maintaining well-being during adversity (Bernstein et al., 2015; Wang, Garland, & Farb, 2023). Thus, decentering may act as an intermediate outcome that could potentially influence more distal mental health outcomes. As such, the ability to decenter may be a protective mental health skill. This is in line with previously published qualitative results from this multi-method quasi-experimental trial. The qualitative results indicate that this organizational-level workplace-MBI has the potential to positively impact mental health skills, such as enhanced self-care, and present moment awareness enabling altered behavioral patterns during stressful situations (Bonde et al., 2022). Hence, this mental health promoting and preventive MBI may bear greater impact on intermediate outcomes, such as mental health skills, than on more distal mental health outcomes, such as perceived stress and symptoms of depression and anxiety. However, these enhanced mental health skills may protect the participating employees and managers’ future mental health.

Tendencies of change in organizational outcomes varied at 3 months follow-up. As such, the social capital between departments/teams (bridging) increased, whereas the social capital between employees and immediate management decreased, while social capital within teams/departments (bonding), and between employees and overall management were largely unchanged. Additionally, psychological safety also remained largely unchanged at 3 months follow-up. However, at 12 months follow-up, outcomes of social capital and psychological safety all decreased. Yet, the odds of occasionally experiencing negative acts in the workplace reduced statistically significantly from baseline to 3 months follow-up. However,

this protective impact diminished from 3 months to 12 months follow-up. Where previous research has contributed to somewhat consistent evidence of the positive mental health effects of MBIs in workplace settings, less is known of the potential organizational impacts of such interventions (Vonderlin et al., 2020). Still, the majority of research have indicated positive organizational impacts of MBIs (Good et al., 2015; Panditharathne & Chen, 2021; Sajjad & Shahbaz, 2020). The included organizational outcome measures in this study are by definition relational. Hence, workplace social capital, negative acts, and psychological safety are all relational constructs that are affected by human interaction. In the above-mentioned systematic review by Lomas et al. (2017), the authors found no studies reporting either no changes in or worsening of relationships following an MBI delivered in workplace settings (Lomas et al., 2017). Thus, the results from the present study indicating negative tendencies of change in some organizational outcomes are not in line with the majority of the established evidence base. However, the apparent protective impact on negative acts from baseline to 3 months follow-up may potentially be due to improved interpersonal relationships in the workplace. This is in accordance with a recent study of the regulating role of mindfulness in uncivil behavior at work (U.R. Hülshager, van Gils, & Walkowiak, 2021b). In their study, Hülshager et al. (2021) found that high levels of trait mindfulness were associated with low levels of enacted incivility at work (U.R. Hülshager et al., 2021b).

However, the present study was conducted as a quasi-experimental trial with no control group. Hence, the results regarding tendencies of changes from baseline to the two follow-up points may have been influenced by changes in time. As a result of the Covid-19 pandemic, the intervention period was characterized by both national, regional, and local lockdowns, resulting in social distancing and remote work (Fig. 1). Previous research has found that forced remote work during the Covid-19 pandemic may have generated several challenges for the psychosocial work environment (Reznik, Hungerford, Kornhaber, & Cleary, 2022;

Sjöblom, Mäkinieniemi, & Mäkikangas, 2022; P. Smith et al., 2022). For example, working from home has been found to negatively affect the social connectedness within the workplace as personal interactions are either conducted virtually or not at all (Reznik et al., 2022). However, regarding the experience of negative acts in the workplace, remote work might be proposed to act as a protective factor (Bollestad, Amland, & Olsen, 2022). In the current study, baseline data was collected from three out of four companies right *before* either a national lockdown or implementation of Covid-19 restrictions, such as encouragement to work from home. On the other hand, 3 months follow-up data was collected *during* a national lockdown in two out of four companies, while it was collected during a time with fewer restrictions in the remaining two companies. Hence, at baseline the majority of employees and managers were physically present at their respective workplace, while at 3 months follow-up, about half was working remotely. Thus, changes in the frequency of negative acts might be due to fewer social interactions in the workplace at 3 months follow-up compared to baseline. However, previous research indicates, that negative acts, such as workplace bullying, may persist even during remote work (Kompella, 2022). Additionally, the results are in line with previous research that has demonstrated positive impacts of mindfulness on interpersonal relations, such as reduced incivility at work (Good et al., 2015; U.R. Hülshager et al., 2021a; Kay & Skarlicki, 2020; Lomas et al., 2017; Panditharathne & Chen, 2021; Sajjad & Shahbaz, 2020). Therefore, the tendency of change in reduced odds of occasionally experiencing negative acts at 3 months follow-up may not be written off as caused entirely by the lack of interactions within the physical workplace. Moreover, sensitivity analyses indicated that the estimated odds ratio of occasionally experiencing negative acts at 12 months follow-up may be biased towards a potential underestimate of the impact at 12 months follow-up. Hence, according to sensitivity analyses, even if data was assumed to be missing at random, non-responders may have had a lower logodds of occasionally

experiencing negative acts compared to responders (Fig. O2, Online Resources). Therefore, the results of the analysis of 12 months follow-up must be interpreted with due caution.

In the present study, tendencies indicated that especially the social capital between employees and the immediate management worsened both at 3 and 12 months follow-up. A study of the impact of remote work on workplace social capital in Nordic companies concluded that remote work may impact negatively on workplace social capital (Bühning, Randrup, & Jørgensen, 2021). Additionally, a qualitative study found that leading psychologically safe work environments when working remotely, requires extensive and deliberate managerial actions compared to non-remote work (Sjöblom et al., 2022). Thus, if managers fail to, e.g. spend extra time interacting virtually with their employees, this may negatively influence the psychosocial work environment between employees and management. Moreover, in a Portuguese case study, the authors found that worsening of the psychosocial work environment during the Covid-19 pandemic persisted even after two years of living with the pandemic (Gaspar et al., 2023). Thus, the tendencies of change in the psychosocial work environment until 12 months follow-up may possibly be explained by the natural progression of time. Yet, the tendencies of change regarding especially the social capital between employees and management indicated that this workplace-MBI probably did not ameliorate such potential negative impacts on the psychosocial work environment. However, at 3 months follow-up, a tendency to improvements were identified in the bridging social capital, that is, the social capital between departments/teams. This is in accordance with mindfulness theory, that practicing mindfulness may improve relations (Dahl et al., 2020; Kabat-Zinn, 2013, 2018; Lomas et al., 2017), as well as previous research (Good et al., 2015; Kay & Skarlicki, 2020; Panditharathne & Chen, 2021; Sajjad & Shahbaz, 2020). Moreover, a recent qualitative study from this multi-method trial also demonstrated positive impacts in bridging social capital (Bonde et al., 2023). Furthermore, only a small decrease was seen in the

bridging social capital at 12 months follow-up, this being the smallest decrease in the organizational outcome measures at 12 months follow-up. As such, this workplace-MBI may have ameliorated potential negative impacts of the Covid-19 pandemic on the social capital between departments/teams.

Strengths and limitations

This study entails a number of strengths. Firstly, the workplace-MBI was delivered as an organizational-level intervention using a population-based approach to improve not only the mental health of employees and managers, but also to contribute to creating healthier psychosocial work environments. Hence, the participating companies committed to implementing mindfulness as part of their organization, and to ensure that all employees and managers had the opportunity to receive the intervention. Therefore, this intervention was a multi-level intervention, including both individuals and organizations. As described by WHO, mental health and the quality of (work) communities exist in a mutually enhancing relationship (WHO, 2022a). Thus, implementing interventions that promote both mental health as well as the psychosocial work environment may yield even stronger mental health promoting results as opposed to interventions only targeting one of the two. Secondly, this trial was conducted in private workplace settings, whereas previous research has predominantly been carried out in public workplace settings (Janssen et al., 2018; Lomas et al., 2017). Thirdly, the included companies represented workplaces within media, restaurants, production, and IT. Additionally, one of the companies was an international company with divisions across the Globe. Thus, the feasibility and tendencies of change are not limited to one business area or one country. Moreover, the included companies represented businesses, such as restaurants, that were heavily impacted by restrictions during the Covid-19 pandemic, as well as a company undergoing an extensive re-organization resulting in uncertainty among

employees and managers during the trial period. Thus, the findings of this study indicate that the intervention may be feasible even under strained organizational conditions. Lastly, the workplace-adapted MBSR program was systematically developed using best practice guidelines for adapting MBIs (R. S. Crane et al., 2017), and closely followed the curriculum of the original 8-week MBSR program. Finally, the intervention was delivered live online via Zoom. Even though face-to-face delivery are the most common mode of delivery, online formats have gained way during the past decade. In a time of an increasing amount of remote work, investigating such live online formats are in line with developments in everyday work life. Moreover, such online formats have previously been found as effective as in-person delivered MBIs measured on mental health outcomes (Aikens et al., 2014; Bazarko, Cate, Azocar, & Kreitzer, 2013; Querstret, Cropley, & Fife-Schaw, 2018; Wolever et al., 2012). However, less is known of the organizational impacts of online MBIs. Thus, the present study contributes with insights into this budding research field.

This study is also characterized by some limitations. Most notably, the quasi-experimental study design without a control group prohibits the conclusion of intervention effects.

However, the main purpose of this study was to evaluate the feasibility of the intervention in a private workplace setting. Thus, the study design fulfilled the purpose for which, it was intended. However, the evaluation of the secondary purpose, that is, the tendencies of change in mental health and organizational outcome measures, was complicated by the trial's susceptibility to changes in time. Moreover, it was not possible to construct a control group using employees and managers who did not complete a 10-week workplace-adapted MBSR course, as the group of MBSR non-completers who contributed with follow-up data were not representative of the entire group of MBSR non-completers. Thus, the responding MBSR non-completers constituted a highly selected group with pre-existing good mental health (Table O3, Online Resources). Strongly linked to the trial design being susceptible to changes

in time, the intervention was carried out in the midst of the Covid-19 pandemic, resulting in dramatic variations in time. Thus, as described in the Methods section, differences in contextual factors, such as remote work, at especially baseline and 3 months follow-up may have impacted the tendencies of change. However, at 12 months follow-up, restrictions had been lifted. Yet, as described above, the psychosocial work environment may have been negatively affected by the Covid-19 pandemic even after restrictions were lifted (Gaspar et al., 2023). Moreover, there was a large amount of missing data at both the 3 months questionnaire (34.74%) and the 12 months questionnaire (59.62%), thus resulting in response rates of respectively 65.26% and 40.38% within the group of employees and managers who contributed with baseline data. The response rate at 3 months follow-up may be considered acceptable when compared to previous research of mindfulness in workplace contexts (49.8%) (U. R. Hülshager, Alberts, Feinholdt, & Lang, 2013), as well as the average response rate in organizational surveys (52.3%) (Anseel, Lievens, Schollaert, & Choragwicka, 2010). Additionally, according to loss to follow-up analysis at 3 months follow-up, baseline characteristics of responders resembled those of non-responders (Table O1, Online Resources). However, the response rate at 12 months follow-up must be considered low when compared to response rates of the above-mentioned previous research. Moreover, sensitivity analyses of the odds of occasionally experiencing negative acts in the workplace revealed that the estimate at 12 months follow-up may be biased due to non-responders (Fig. O2, Online Resources). In these model-based predictions, imputation was not feasible due to technical limitations in Stata. Hence, the odds ratio of occasionally experiencing negative acts at 12-months must be interpreted cautiously.

Relating to mental health outcomes, these were mostly unchanged from baseline to 3 and 12 months follow-up. However, positive tendencies to improvements in the mental health skill, decentering, were identified. These findings could indicate, that this workplace-MBI may

facilitate improvements in intermediate outcomes, such as skills that protect the mental health, while generating only small to no changes in more distal measures of mental health. Thus, this study would have benefitted from including more measures of such skills. Still, the lack of changes in the distal mental health outcomes may – as previously described – bear witness of an underlying positive tendency, as the general well-being of the Danish population decreased during the intervention period (Thygesen et al., 2021).

Implications for future research

This study indicates that it is feasible to implement an organizational-level workplace-adapted MBI in private workplace settings. However, the impact of the intervention on mental health outcomes and organizational outcomes is uncertain. Future research would benefit from including one or more control groups, potentially in a randomized controlled design. To evaluate the effectiveness of this organizational-level workplace-MBI, effects would have to be evaluated at company-level, and thus, cluster randomization should be conducted with companies representing clusters. This design, however, would require a large amount of companies enrolling in such trial. Moreover, when utilizing MBIs as mental health promoting and preventive interventions, and delivering these using a population-based approach, impacts on distal outcome measures, such as perceived stress, and symptoms of depression and anxiety, might be limited (Rose et al., 2008). Hence, future research may benefit from including more measures of intermediate outcomes, such as decentering, to capture potential changes in protective mental health skills. Such skills may contribute to improved mental health beyond the intervention period. Therefore, by not including measures of mental health skills, such as decentering, interventions may wrongfully be deemed ineffective.

Conclusions

In this trial, an organizational-level, three-step workplace-MBI including a workplace-adapted MBSR course was found feasible. Thus, a generally high degree of participation in the three intervention components were detected. However, the feasibility of the intervention did not translate into positive changes in mental health and the majority of organizational outcomes, as hypothesized. Instead, distal mental health outcomes were largely unchanged at both 3 and 12 months follow-up, while organizational outcomes, such as workplace social capital and psychological safety, demonstrated mixed tendencies at 3 months follow-up, and an overall decline at 12 months follow-up. Still, the odds of occasionally experiencing negative acts in the workplace demonstrated a statistically significant reduction from baseline to 3 months follow-up.

Moreover, the intermediate outcome, EQ-Decentering, was positively impacted at both 3 and 12 months follow-up. This outcome measure represents a skill that may protect individuals' mental health. Thus, the intervention may enable improved mental health skills. This study was a quasi-experimental non-control group trial, and was carried out in the midst of the Covid-19 pandemic. Thus, the tendencies of change in mental health and organizational outcomes were highly susceptible to changes in time, and may have been related to other events than the intervention, including forced remote work.

Ethics approval

This study was performed in accordance with the principles of the Declaration of Helsinki. Approval was provided by the Danish Data Protection Agency (February 13 2020/2016–051-000001/1715).

References

- Aikens, K. A., Astin, J., Pelletier, K. R., Levanovich, K., Baase, C. M., Park, Y. Y., & Bodnar, C. M. (2014). Mindfulness goes to work: impact of an online workplace intervention. *J Occup Environ Med, 56*(7), 721-731.
doi:<https://doi.org/10.1097/jom.0000000000000209>
- Anseel, F., Lievens, F., Schollaert, E., & Choragwicka, B. (2010). Response Rates in Organizational Science, 1995–2008: A Meta-analytic Review and Guidelines for Survey Researchers. *J Bus Psychol, 25*(3), 335-349.
doi:<https://doi.org/10.1007/s10869-010-9157-6>
- Bazarko, D., Cate, R. A., Azocar, F., & Kreitzer, M. J. (2013). The Impact of an Innovative Mindfulness-Based Stress Reduction Program on the Health and Well-Being of Nurses Employed in a Corporate Setting. *J Workplace Behav Health, 28*(2), 107-133.
doi:<https://doi.org/10.1080/15555240.2013.779518>
- Bernstein, A., Hadash, Y., Lichtash, Y., Tanay, G., Shepherd, K., & Fresco, D. M. (2015). Decentering and Related Constructs: A Critical Review and Metacognitive Processes Model. *Perspect Psychol Sci, 10*(5), 599-617.
doi:<https://doi.org/10.1177/1745691615594577>
- Bollestad, V., Amland, J., & Olsen, E. (2022). The pros and cons of remote work in relation to bullying, loneliness and work engagement: A representative study among Norwegian workers during COVID-19. *Front. Psychol., 13*.
doi:<https://doi.org/10.3389/fpsyg.2022.1016368>
- Bonde, E. H., Mikkelsen, E. G., Fjorback, L. O., & Juul, L. (2022). Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention. *Front. Psychol., 13*. doi:<https://doi.org/10.3389/fpsyg.2022.1020454>

- Bonde, E. H., Mikkelsen, E. G., Fjorback, L. O., & Juul, L. (2023). The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis. *Front. Psychol.*, *14*.
doi:<https://doi.org/10.3389/fpsyg.2023.1112907>
- Borg, V., Mateu, N. C., & Clausen, T. (2014). *Udvikling af en ny metode til undersøgelse af social kapital på arbejdspladsen [Development of a new method for studying social capital in the workplace]*. Retrieved from
<https://nfa.dk/da/Forskning/Udgivelse?journalId=8addb238-1424-4241-8a51-2247c0d9d643>
- Bühning, T., Randrup, A. G., & Jørgensen, C. (2021). *Fjernarbejdets betydning for arbejdsmiljøet i Norden: Rapport om reguleringen og betydningen af fjernarbejde for arbejdsmiljøet i de nordiske lande [The impact of remote work on the work environment in the Nordic countries: Report on the regulation and impact of remote work on the work environment in the Nordic countries]*. Retrieved from
<https://oxfordresearch.dk/publications/fjernarbejdets-betydning-for-arbejdsmiljoet-i-norden/>
- Chandola, T., Kumari, M., Booker, C. L., & Benzeval, M. (2022). The mental health impact of COVID-19 and lockdown-related stressors among adults in the UK. *Psychol Med*, *52*(14), 2997-3006. doi:<https://doi.org/10.1017/S0033291720005048>
- Chiesa, V., Antony, G., Wismar, M., & Rechel, B. (2021). COVID-19 pandemic: health impact of staying at home, social distancing and ‘lockdown’ measures—a systematic review of systematic reviews. *J Public Health*, *43*(3), e462-e481.
doi:<https://doi.org/10.1093/pubmed/fdab102>
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *J Health Soc Behav*, *24*(4), 385-396.

- Conway, P. M., Høgh, A., Nabe-Nielsen, K., Grynderup, M. B., Mikkelsen, E. G., Persson, R., . . . Hansen, Å. M. (2018). Optimal Cut-Off Points for the Short-Negative Act Questionnaire and Their Association with Depressive Symptoms and Diagnosis of Depression. *Ann. Work Expo. Health*, 62(3), 281-294.
doi:<https://doi.org/10.1093/annweh/wxx105>
- Crane, R., Bartley, T., Evans, A., Karunavira, Sansom, S., Silverton, S., . . . Octigan, K. (2021). *Mindfulness-based interventions: Teaching assessment criteria*. Retrieved from
- Crane, R. S., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J. M., & Kuyken, W. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychol Med*, 47(6), 990-999. doi:<https://doi.org/10.1017/s0033291716003317>
- Dahl, C. J., Wilson-Mendenhall, C. D., & Davidson, R. J. (2020). The plasticity of well-being: A training-based framework for the cultivation of human flourishing. *Proc Natl Acad Sci U S A*, 117(51), 32197-32206. doi:<https://doi.org/10.1073/pnas.2014859117>
- De Vibe, M., Bjørndal, A., Fattah, S., Dyrdal, G.M., Halland, E. & Tanner-Smith, E.E. (2017). *Mindfulness-based stress reduction (MBSR) for improving health, quality of life and social functioning in adults: a systematic review and meta-analysis*. Retrieved from
- Edmondson, A. (1999). Psychological Safety and Learning Behavior in Work Teams. *Adm Sci Q*, 44(2), 350-383. doi:<https://doi.org/10.2307/2666999>
- Eskildsen, A., Dalgaard, V. L., Nielsen, K. J., Andersen, J. H., Zachariae, R., Olsen, L. R., . . . Christiansen, D. H. (2015). Cross-cultural adaptation and validation of the Danish consensus version of the 10-item Perceived Stress Scale. *Scand J Work Environ Health*, 41(5), 486-490. doi:<https://doi.org/10.5271/sjweh.3510>

- Foundation, C. B., & WA, M. H. (2012). *Perth Charter for the Promotion of Mental Health and Wellbeing*. Paper presented at the Seventh World Conference on the Promotion of Mental Health and the Prevention of Mental and Behavioural Disorders, Perth, Western Australia.
- Fresco, D. M., Moore, M. T., van Dulmen, M. H. M., Segal, Z. V., Ma, S. H., Teasdale, J. D., & Williams, J. M. G. (2007). Initial Psychometric Properties of the Experiences Questionnaire: Validation of a Self-Report Measure of Decentering. *Behav Ther*, 38(3), 234-246. doi:<https://doi.org/10.1016/j.beth.2006.08.003>
- Gaspar, T., Salado, V., do Céu Machado, M., Guedes, F. B., Faia-Correia, M., & Coelho, A. (2023). Impact of COVID-19 on Management, Quality and Satisfaction of Health Organizations: A Case Study in a Portuguese Hospital. *Int J of Environ Res*, 17(1), 21. doi:<https://doi.org/10.1007/s41742-022-00505-7>
- Good, D., Lyddy, C., Glomb, T., Bono, J., Brown, K., Duffy, M., . . . Lazar, S. (2015). Contemplating Mindfulness at Work: An Integrative Review. *J Manage*, 42(1), 114-142. doi:<https://doi.org/10.1177/0149206315617003>
- Guo, J., Feng, X. L., Wang, X. H., & van IJzendoorn, M. H. (2020). Coping with COVID-19: Exposure to COVID-19 and Negative Impact on Livelihood Predict Elevated Mental Health Problems in Chinese Adults. *Int. J. Environ. Res. Public Health*, 17(11), 3857. doi:<https://doi.org/10.3390/ijerph17113857>
- Hansen, A. M., Hogh, A., Garde, A. H., & Persson, R. (2014). Workplace bullying and sleep difficulties: a 2-year follow-up study. *Int Arch Occup Environ Health*, 87(3), 285-294. doi:<https://doi.org/10.1007/s00420-013-0860-2>
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)--a metadata-driven methodology and

- workflow process for providing translational research informatics support. *J Biomed Inform*, 42(2), 377-381. doi:<https://doi.org/10.1016/j.jbi.2008.08.010>
- Hastings, E., Jahanbakhsh, F., Karahalios, K., Marinov, D., & Bailey, B. (2018). Structure or Nurture?: The Effects of Team-Building Activities and Team Composition on Team Outcomes. *Proceedings of the ACM on Human-Computer Interaction*, 2, 1-21. doi:<https://doi.org/10.1145/3274337>
- Huang, S. L., Li, R. H., Huang, F. Y., & Tang, F. C. (2015). The Potential for Mindfulness-Based Intervention in Workplace Mental Health Promotion: Results of a Randomized Controlled Trial. *PLoS One*, 10(9), e0138089. doi:<https://doi.org/10.1371/journal.pone.0138089>
- Hülshager, U. R., Alberts, H. J., Feinholdt, A., & Lang, J. W. (2013). Benefits of mindfulness at work: the role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *J Appl Psychol*, 98(2), 310-325. doi:<https://doi.org/10.1037/a0031313>
- Hülshager, U. R., van Gils, S., & Walkowiak, A. (2021a). The regulating role of mindfulness in enacted workplace incivility: An experience sampling study. *J Appl Psychol*, 106, 1250-1265. doi:<https://doi.org/10.1037/apl0000824>
- Hülshager, U. R., van Gils, S., & Walkowiak, A. (2021b). The regulating role of mindfulness in enacted workplace incivility: An experience sampling study. *Journal of Applied Psychology*, 106, 1250-1265. doi:10.1037/apl0000824
- Janssen, M., Heerkens, Y., Kuijer, W., van der Heijden, B., & Engels, J. (2018). Effects of Mindfulness-Based Stress Reduction on employees' mental health: A systematic review. *PLoS One*, 13(1), e0191332. doi:<https://doi.org/10.1371/journal.pone.0191332>
- Kabat-Zinn, J. (2013). *Full Catastrophe Living: How to cope with stress, pain and illness using mindfulness meditation*. Revised edition: New York: Bantum Books.

- Kabat-Zinn, J. (2018). *Meditation is not what you think*. New York: Hachette Book Group.
- Kay, A. A., & Skarlicki, D. P. (2020). Cultivating a conflict-positive workplace: How mindfulness facilitates constructive conflict management. *Organ Behav Hum Decis Process*, 159, 8-20. doi:<http://dx.doi.org/10.1016/j.obhdp.2020.02.005>
- Kersemaekers, W., Rupperecht, S., Wittmann, M., Tamdjidi, C., Falke, P., Donders, R., . . . Kohls, N. (2018). A workplace mindfulness intervention may be associated with improved psychological well-being and productivity. A preliminary field study in a company setting. *Frontiers in Psychology*, 9, 11. doi:<http://dx.doi.org/10.3389/fpsyg.2018.00195>
- Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *J Psychosom Res*, 78(6), 519-528. doi:<https://doi.org/10.1016/j.jpsychores.2015.03.009>
- Killingsworth, M. A., & Gilbert, D. T. (2010). A Wandering Mind Is an Unhappy Mind. *Science*, 330(6006), 932. doi:<https://doi.org/10.1126/science.1192439>
- Kompella, S. (2022). Persisting Menace: A Case-Based Study of Remote Workplace Bullying in India. *Int J Bullying Prev*, 1-17. doi:<https://doi.org/10.1007/s42380-022-00152-8>
- Koushede, V., Lasgaard, M., Hinrichsen, C., Meilstrup, C., Nielsen, L., Rayce, S. B., . . . Santini, Z. I. (2019). Measuring mental well-being in Denmark: Validation of the original and short version of the Warwick-Edinburgh mental well-being scale (WEMWBS and SWEMWBS) and cross-cultural comparison across four European settings. *Psychiatry Res*, 271, 502-509. doi:<https://doi.org/10.1016/j.psychres.2018.12.003>
- Kuyken, W., Byford, S., Taylor, R. S., Watkins, E., Holden, E., White, K., . . . Teasdale, J. D. (2008). Mindfulness-based cognitive therapy to prevent relapse in recurrent

depression. *J Consult Clin Psychol*, 76(6), 966-978.

doi:<https://doi.org/10.1037/a0013786>

Lee, E. H. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian Nurs Res (Korean Soc Nurs Sci)*, 6(4), 121-127.

doi:<https://doi.org/10.1016/j.anr.2012.08.004>

Lomas, T., Medina, J. C., Ivztan, I., Rupperecht, S., Hart, R., & Eiroa-Orosa, F. J. (2017). The impact of mindfulness on well-being and performance in the workplace: An inclusive systematic review of the empirical literature. *Eur. J. Work. Organ. Psychol.*, 26(4), 492-513. doi:<http://dx.doi.org/10.1080/1359432X.2017.1308924>

Meng, A., Clausen, T., & Borg, V. (2018). The association between team-level social capital and individual-level work engagement: Differences between subtypes of social capital and the impact of intra-team agreement. *Scand J Psychol*, 59(2), 198-205.

doi:<https://doi.org/10.1111/sjop.12435>

Montero-Marin, J., Kuyken, W., Gasi3n, V., Barcel3-Soler, A., Rojas, L., Manrique, A., . . . Campayo, J. G. (2020). Feasibility and Effectiveness of a Workplace-Adapted Mindfulness-Based Programme to Reduce Stress in Workers at a Private Sector Logistics Company: An Exploratory Mixed Methods Study. *Int J Environ Res Public Health*, 17(5). doi:<https://doi.org/10.3390/ijerph17051643>

Ng Fat, L., Scholes, S., Boniface, S., Mindell, J., & Stewart-Brown, S. (2017). Evaluating and establishing national norms for mental wellbeing using the short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS): findings from the Health Survey for England. *Qual Life Res*, 26(5), 1129-1144. doi:<https://doi.org/10.1007/s11136-016-1454-8>

- Panditharathne, P. N. K. W., & Chen, Z. (2021). An Integrative Review on the Research Progress of Mindfulness and Its Implications at the Workplace. *Sustainability*, 13(24). doi:<https://doi.org/10.3390/su132413852>
- Querstret, D., Copley, M., & Fife-Schaw, C. (2018). The Effects of an Online Mindfulness Intervention on Perceived Stress, Depression and Anxiety in a Non-clinical Sample: A Randomised Waitlist Control Trial. *Mindfulness*, 9(6), 1825-1836. doi:<https://doi.org/10.1007/s12671-018-0925-0>
- Reznik, J., Hungerford, C., Kornhaber, R., & Cleary, M. (2022). Home-Based Work and Ergonomics: Physical and Psychosocial Considerations. *Issues Ment Health Nurs*, 43(10), 975-979. doi:<https://doi.org/10.1080/01612840.2021.1875276>
- Rose, G., Khaw, K., & Marmot, M. (2008). *Rose's Strategy on Preventive Medicine*. New York: Oxford University Press.
- Rugulies, R., Martin, M. H., Garde, A. H., Persson, R., & Albertsen, K. (2012). Deadlines at work and sleep quality. Cross-sectional and longitudinal findings among Danish knowledge workers. *Am J Ind Med*, 55(3), 260-269. doi:<https://doi.org/10.1002/ajim.21022>
- Sajjad, A., & Shahbaz, W. (2020). Mindfulness and social sustainability: An integrative review. *Soc Indic Res*. doi:<https://doi.org/10.1007/s11205-020-02297-9>
- Santorelli, S. (2014). Mindfulness-Based Stress Reduction (MBSR): Standards of Practice. Retrieved from https://mindfulness.au.dk/fileadmin/mindfulness.au.dk/Artikler/Santorelli_mbsr_standards_of_practice_2014.pdf
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *J Clin Psychol*, 62(3), 373-386. doi:<https://doi.org/10.1002/jclp.20237>

- Sjöblom, K., Mäkinen, J. P., & Mäkikangas, A. (2022). "I Was Given Three Marks and Told to Buy a Porsche"-Supervisors' Experiences of Leading Psychosocial Safety Climate and Team Psychological Safety in a Remote Academic Setting. *Int J Environ Res Public Health*, 19(19). doi:<https://doi.org/10.3390/ijerph191912016>
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., . . . Moore, L. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *Bmj*, 374, n2061. doi:<https://doi.org/10.1136/bmj.n2061>
- Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med*, 15(3), 194-200. doi:<https://doi.org/10.1080/10705500802222972>
- Smith, P., Oudyk, J., Cedillo, L., Inouye, K., Potter, G., & Mustard, C. (2022). The psychosocial work environment among educators during the COVID-19 pandemic. *Occup Med (Lond)*, 72(7), 439-445. doi:<https://doi.org/10.1093/occmed/kqac050>
- Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., & Weich, S. (2009). Internal construct validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): a Rasch analysis using data from the Scottish Health Education Population Survey. *Health Qual Life Outcomes*, 7(1), 15. doi:<https://doi.org/10.1186/1477-7525-7-15>
- Strand, B. H., Dalgard, O. S., Tambs, K., & Rognerud, M. (2003). Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry*, 57(2), 113-118. doi:<https://doi.org/10.1080/08039480310000932>

- Tambs, K., & Moum, T. (1993). How well can a few questionnaire items indicate anxiety and depression? *Acta Psychiatr Scand*, 87(5), 364-367. doi:<https://doi.org/10.1111/j.1600-0447.1993.tb03388.x>
- Thygesen, L. C., Møller, S. P., Ersbøll, A. K., Santini, Z. I., Nielsen, M. B. D., Grønbaek, M. K., & Ekholm, O. (2021). Decreasing mental well-being during the COVID-19 pandemic: A longitudinal study among Danes before and during the pandemic. *J Psychiatr Res*, 144, 151-157. doi:<https://doi.org/10.1016/j.jpsychires.2021.09.035>
- Vago, D., & David, S. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): a framework for understanding the neurobiological mechanisms of mindfulness. *Front Hum Neurosci*, 6. doi:<https://doi.org/10.3389/fnhum.2012.00296>
- van Agteren, J., Iasiello, M., Lo, L., Bartholomaeus, J., Kopsaftis, Z., Carey, M., & Kyrios, M. (2021). A systematic review and meta-analysis of psychological interventions to improve mental wellbeing. *Nat Hum Behav*, 5(5), 631-652. doi:<https://doi.org/10.1038/s41562-021-01093-w>
- Vonderlin, R., Biermann, M., Bohus, M., & Lyssenko, L. (2020). Mindfulness-Based Programs in the Workplace: a Meta-Analysis of Randomized Controlled Trials. *Mindfulness*, 11(7), 1579-1598. doi:<https://doi.org/10.1007/s12671-020-01328-3>
- Wang, Y., Garland, E. L., & Farb, N. A. S. (2023). An experimental test of the mindfulness-to-meaning theory: Casual pathways between decentering, reappraisal, and well-being. *Emotion*. doi:<https://doi.org/10.1037/emo0001252>
- WHO. (2018). *Fact sheet on sustainable development goals: health targets - Mental Health*.
- WHO. (2021). *Comprehensive mental health action plan 2013–2030* (Licence: CC BY-NC-SA 3.0 IGO.). Retrieved from
- WHO. (2022a). *WHO guidelines on mental health at work*. Retrieved from

WHO. (2022b). *World mental health report: transforming mental health for all*. Retrieved from

Windle, G., Bennett, K. M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health Qual Life Outcomes, 9*, 8.

doi:<https://doi.org/10.1186/1477-7525-9-8>

Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: a randomized controlled trial. *J Occup Health Psychol, 17*(2), 246-258.

doi:<https://doi.org/10.1037/a0027278>

Tables

Table 1: Baseline characteristics		
	Included (n = 213)	Missing data, n (%)
Socio demographics		
Sex, n (%)		3 (1.41)
Men	103 (48.36)	NA
Women	107 (50.23)	NA
Age, mean (SD), year	41.74 (10.61)	1 (0.47)
Living with a partner, n (%)	152 (71.36)	2 (0.94)
Living with children, n (%)	116 (54.46)	2 (0.94)
Highest level of education, n (%)		3 (1.41)
Elementary school	11 (5.16)	NA
High school	22 (10.33)	NA
Vocational education	28 (13.15)	NA
Short continuing education (1-2 years)	39 (18.31)	NA
Longer continuing education (>3 years)	50 (23.47)	NA
Higher education (≥ 5 years)	55 (25.82)	NA
Other	5 (2.35)	NA
Current job position, n (%)		1 (0.47)
Unskilled worker	30 (14.08)	NA
Skilled worker/trained specialist	124 (58.22)	NA
Manager, middle manager, or company owner	44 (20.66)	NA
Intern/apprentice	4 (1.88)	NA
Other	10 (4.69)	NA
Self-reported mental health outcomes		
PSS, mean (SD)	14.44 (5.94)	5 (2.35)
SCL-5, mean (SD)	1.71 (0.55)	8 (3.76)
BRS, mean (SD)	4.45 (0.84)	6 (2.82)
SWEMWBS, mean (SD)	23.10 (2.99)	6 (2.82)
EQ – Decentering, mean (SD)	38.15 (6.91)	12 (5.63)
DSI, mean (SD)	3.86 (0.84)	2 (0.94)
AWI, mean (SD)	3.30 (0.94)	3 (1.41)
Organizational outcomes		
Social capital, mean (SD)		NA
<i>Bonding</i>	73.27 (14.78)	4 (1.88)
<i>Bridging</i>	62.84 (16.84)	6 (2.82)
<i>Linking – immediate management</i>	72.00 (17.86)	9 (4.23)
<i>Linking – overall management</i>	67.00 (15.92)	6 (2.82)
Team psychological safety, mean (SD)	39.31 (6.28)	7 (3.29)
S-NAQ-score >12, n (%)	53 (25.24)	3 (1.41)

Abbreviations: AWI: Awakening Index, BRS: Brief Resilience Scale, DSI: Disturbed Sleep Index, EQ: Experiences Questionnaire, n: number, NA: not applicable, PSS: Perceived Stress Scale, SCL: Symptom Checklist-5, SD: standard deviation, S-NAQ: Short Negative Acts Questionnaire, SWEMWBS: Short Warwick-Edinburgh Mental Wellbeing Scale

Table 2: Reach of the intervention components

Introductory session		
	Eligible, n	Participated, n (%)
Company 1	13	12 (92.31)
Company 2	43	18 (41.86)
Company 3	146	88 (60.27)
Company 4	166	160 (96.39)
Total	368	278 (75.54)
10-week workplace-adapted MBSR course		
	Eligible, n	Participated, n (%)
Company 1	13	13 (100.00)
Company 2	43	14 (32.56)
Company 3	146	66 (45.21)
Company 4	166	76 (45.78)
Total	368	169 (45.92)
Implementation workshop		
	Participation status	
Company 1	Did not participate	
Company 2	Participated	
Company 3	Participated	
Company 4	Participated	

n: number, MBSR: mindfulness-based stress reduction

Table 3: Dose received of the 10-week workplace-adapted MBSR course

Participants who completed a workplace-adapted MBSR course		
	Participants, n	Median sessions attended, q50 (q25; q75)
Company 1	13	9.0 (8.0; 10.0)
Company 2	10	9.0 (8.0; 10.0)
Company 3	52	8.0 (7.0; 9.0)
Company 4	65	9.0 (8.0; 10.0)
Total	140	9.0 (8.0; 9.0)
Participants who dropped out of a workplace-adapted MBSR course		
	Participants, n	Median sessions attended, q50 (q25; q75)
Company 1	0	NA
Company 2	4	2.5 (1.5; 3.5)
Company 3	14	1.5 (0.0; 2.0)
Company 4	11	1.0 (0.0; 3.0)
Total	29	1.0 (1.0; 3.0)
Total, including drop-out and completing participants		
	Participants, n	Median sessions attended, q50 (q25; q75)
Company 1	13	9.0 (8.0; 10.0)
Company 2	14	8.0 (4.0; 9.0)
Company 3	66	7.5 (5.0; 9.0)
Company 4	76	9.0 (7.0; 10.0)
Total companies, n (%)	169	8.0 (6.0; 9.0)

n: number, MBSR: mindfulness-based stress reduction, q: quartile

Table 4: Changes in self-reported mental health 3 and 12 months following the workplace-MBI including a 10-week workplace-adapted MBSR course

Measure	Respondents (n)	Change from baseline, mean (95% CI) ^a	<i>P</i> value
PSS^b			
Baseline	208	NA	NA
3 months	132	-0.77 (-1.86 to 0.31)	0.16
12 months	84	0.20 (-1.12 to 1.51)	0.77
SCL-5^b			
Baseline	205	NA	NA
3 months	137	0.03 (-0.07 to 0.12)	0.59
12 months	85	0.03 (-0.08 to 0.15)	0.59
BRS^c			
Baseline	207	NA	NA
3 months	132	0.02 (-0.11 to 0.14)	0.78
12 months	84	0.04 (-0.11 to 0.19)	0.59
SWEMWBS^d			
Baseline	207	NA	NA
3 months	136	0.38 (-0.35 to 1.10)	0.31
12 months	83	0.18 (-0.66 to 1.02)	0.68
EQ – decentering^e			
Baseline	201	NA	NA
3 months	133	1.15 (-0.03 to 2.33)	0.06
12 months	84	1.46 (0.02 to 2.89)	0.05
DSI^f			
Baseline	211	NA	NA
3 months	139	-0.02 (-0.16 to 0.12)	0.81
12 months	85	-0.02 (-0.19 to 0.16)	0.85
AWI^g			
Baseline	210	NA	NA
3 months	139	0.15 (-0.02 to 0.31)	0.08
12 months	85	0.03 (-0.16 to 0.23)	0.72

a: Adjusted for systematic effects of: time, sex, age, cohabitation status (living with or without a partner), education, job type, company, and random effect of course.

b: measure of self-reported perceived stress. Higher values reflect higher perceived stress levels.

c: measure of self-reported symptoms of anxiety and depression. Higher values reflect more symptoms of anxiety and depression.

d: measure of self-reported well-being. Higher values reflect higher levels of well-being.

e: measure of individuals' ability to be aware in the present moment and observe both internal and external conditions with a kind and accepting attitude. Higher values reflect greater abilities.

f: measure of experiences of disturbed sleep. Higher values indicate lower levels of disturbed sleep.

g: measure of self-reported problems with awakening from sleep. Higher values indicate less problems.

Abbreviations: AWI: Awakening Index, BRS: Brief Resilience Scale, CI: confidence interval, DSI: Disturbed Sleep Index, EQ: Experiences Questionnaire, MBI: mindfulness-based intervention, MBSR: mindfulness-based stress reduction, n: number, NA: not applicable, PSS: Perceived Stress Scale, SCL-5: Symptom Checklist-5, SWEMWBS: Short Warwick-Edinburgh Mental Wellbeing Scale

Table 5: Changes in self-reported social capital and psychological safety 3 and 12 months following the workplace-MBI including a 10-week workplace-adapted MBSR course

Measure	Respondents (n)	Change from baseline, mean (95% CI) ^a	<i>P</i> value
Social capital^b			
<i>Bonding</i>			
Baseline	209	NA	NA
3 months	135	0.25 (-2.75 to 3.25)	0.87
12 months	85	-2.73 (-6.25 to 0.80)	0.13
<i>Bridging</i>			
Baseline	207	NA	NA
3 months	134	1.17 (-2.16 to 4.50)	0.49
12 months	84	-0.64 (-4.40 to 3.13)	0.74
<i>Linking - immediate management</i>			
Baseline	204	NA	NA
3 months	139	-1.91 (-5.22 to 1.40)	0.26
12 months	83	-8.77 (-12.86 to -4.68)	<0.01
<i>Linking – management overall</i>			
Baseline	207	NA	NA
3 months	135	0.18 (-3.96 to 4.32)	0.93
12 months	84	-3.09 (-7.64 to 1.46)	0.18
Psychological safety^c			
Baseline	206	NA	NA
3 months	139	0.08 (-1.27 to 1.43)	0.91
12 months	81	-1.54 (-3.18 to 0.09)	0.06

a: Adjusted for systematic effects of: time, sex, age, cohabitation status (living with or without a partner), education, job type, company, and random effect of course.

b: measure of an organization’s networks, social trust and norms that facilitates, for example, cooperation in the organization.

c: measure of the level of safety individuals experience within a team in relation to interpersonal risk-taking, such as suggesting new ways of doing things.

d: measure of the level of negative acts, such as workplace bullying, in the organization.

Abbreviations: CI: confidence interval, MBI: mindfulness-based intervention, MBSR: mindfulness-based stress reduction, n: number, NA: not applicable.

Table 6: Odds ratios of occasional experience of negative acts 3 and 12 months following the workplace-MBI including a 10-week workplace-adapted MBSR course

Measure	Respondents (n)	Odds ratios, mean (95% CI) ^a	<i>P</i> value
S-NAQ^b			
Baseline	210	NA	NA
3 months	139	0.28 (0.12 to 0.68)	<0.01
12 months	86	0.63 (0.25 to 1.60)	0.33

a: Adjusted for systematic effects of: time, sex, age, education, job type, cohabitation status (living with or without a partner), and company.

b: a measure of the frequency of experiencing negative acts, such as having information withheld from you. Here, dichotomized into never or very seldom experience of negative acts, and occasional experience of negative acts.

Abbreviations: CI: confidence interval, MBI: mindfulness-based intervention, MBSR: mindfulness-based stress reduction, n: number, NA: not applicable, S-NAQ: Short Negative Acts Questionnaire

Online Resources

Title: An organizational-level mindfulness-based intervention in private workplace settings: is it feasible, and what are the mental health and organizational impacts?

Journal: Mindfulness

Content of Online Resources:

Figure O1: Program theory of the three-step mindfulness-based workplace-intervention

Table O1: Loss to follow-up post intervention among all employees and managers

Table O2: Questionnaire contributions on the three data collection time points; total and grouped by completion of a 10-week workplace-adapted MBSR course

Table O3: Loss to follow-up post intervention among employees and managers who **did not** complete a 10-week workplace-adapted MBSR course (participated in >4 sessions)

Table O4: Sensitivity analysis of self-reported mental health outcomes post intervention and at 12 months; including both participating and non-participating employees and managers

Table O5: Sensitivity analysis of self-reported organizational factors post intervention and at 12 months; including both participating and non-participating employees and managers

Figure O2: Fitted logodds of occasionally experiencing negative acts if contributing with questionnaire data or not at baseline, 3 months, and 12 months follow-up.

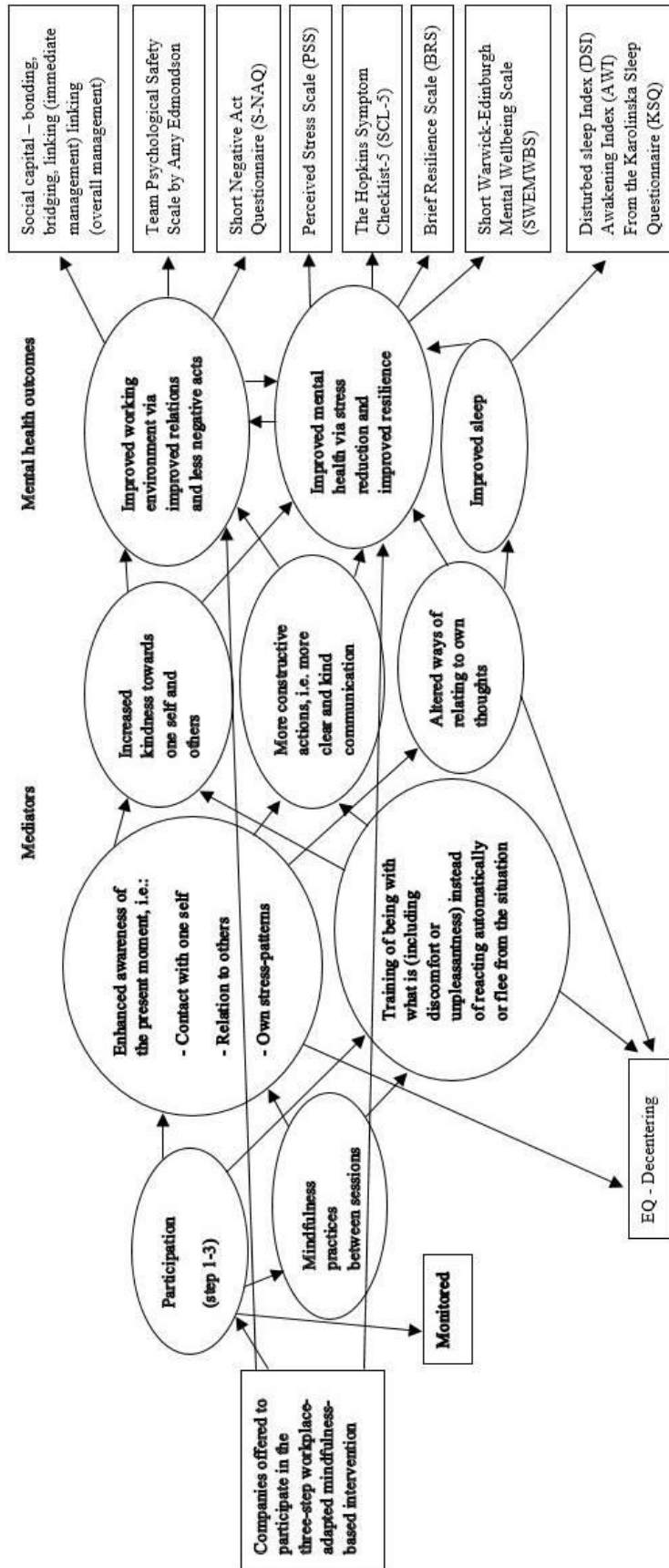


Fig O1: Program theory of the three-step mindfulness-based workplace-intervention

Table O1: Loss to follow-up at 3 months follow-up among all employees and managers

	Included	Lost to follow-up	<i>P</i> value
Socio demographics			
Total	n = 139	n = 74	
Sex, n (%)			
Men	63 (45.65)	40 (55.56)	0.17
Women	75 (54.35)	32 (44.44)	
Age, mean (SD), year	42.55 (0.93)	40.19 (1.16)	0.12
Living with a partner, n (%)	98 (70.50)	54 (75.00)	0.49
Living with children, n (%)	75 (53.96)	41 (56.94)	0.68
Highest level of education, n (%)			
Elementary school	5 (3.60)	6 (8.45)	0.37
High school	16 (11.51)	6 (8.45)	
Vocational education	20 (14.39)	8 (11.27)	
Short continuing education (1-2 years)	21 (15.11)	18 (25.35)	
Longer continuing education (>3 years)	35 (25.18)	15 (21.13)	
Higher education (≥5 years)	39 (28.06)	16 (22.54)	
Other	3 (2.16)	2 (2.82)	
Current job position			
Unskilled worker	14 (10.07)	16 (21.92)	0.18
Skilled worker/trained specialist	84 (60.43)	40 (54.79)	
Manager, middle manager, or company owner	32 (23.02)	12 (16.44)	
Intern/apprentice	3 (2.16)	1 (1.37)	
Other	6 (4.32)	4 (5.48)	
Self-reported mental health			
PSS, mean (SD)	14.05 (0.49)	15.20 (0.74)	0.19
SCL-5, mean (SD)	1.72 (0.05)	1.69 (0.07)	0.74
BRS, mean (SD)	4.51 (0.07)	4.35 (0.09)	0.19
SWEMWBS, mean (SD)	23.10 (0.26)	23.10 (0.36)	>0.99
EQ – Decentering, mean (SD)	38.23 (0.57)	38.01 (0.92)	0.84
DSI, mean (SD)	3.88 (0.07)	3.84 (0.11)	0.71
AWI, mean (SD)	3.32 (0.08)	3.27 (0.11)	0.75
Organizational factors			
Social capital, mean (SD)			
<i>Bonding</i>	73.60 (1.27)	72.65 (1.72)	0.66
<i>Bridging</i>	62.28 (1.43)	63.89 (2.04)	0.51
<i>Linking – immediate management</i>	72.10 (1.51)	71.82 (2.22)	0.92
<i>Linking – top management</i>	66.62 (1.32)	67.71 (2.00)	0.64
S-NAQ-score >12, n (%)	33 (24.09)	20 (27.40)	0.60
Team psychological safety, mean (SD)	39.48 (0.56)	38.97 (0.69)	0.58

Abbreviations: AWI: Awakening Index, BRS: Brief Resilience Scale, DSI: Disturbed Sleep Index, EQ: Experiences Questionnaire, n: number, NA: not applicable, PSS: Perceived Stress Scale, SCL: Symptom Checklist-5, SD: standard deviation, S-NAQ: Short Negative Acts Questionnaire, SWEMWBS: Short Warwick-Edinburgh Mental Wellbeing Scale

Table O2: Questionnaire contributions on the three data collection time points; total and grouped by completion of a 10-week workplace-adapted MBSR course

	Total		Completers (4-10 sessions)		Non-completers (≤ 3 sessions)	
	n	%	n	%	n	%
Baseline	213	NA	126	NA	87	NA
3 months	139	65.26	109	86.51	30	34.48
12 months	85	39.91	63	50.00	22	25.29

Abbreviations: MBSR: Mindfulness-based Stress Reduction, n: number

Table O3: Loss to follow-up at 3 months follow-up among employees and managers who **did not** complete a 10-week workplace-adapted MBSR course (participated in >4 sessions)

	Included	Lost to follow-up	<i>P</i> value
Socio demographics			
Total	n = 30	n = 57	
Sex, n (%)			
Men	20 (66.67)	33 (60.00)	0.54
Women	10 (33.33)	22 (40.00)	
Age, mean (SD), year	39.33 (13.38)	39.05 (9.38)	0.91
Living with a partner, n (%)	23 (76.67)	39 (70.91)	0.57
Living with children, n (%)	15 (50.00)	30 (54.55)	0.69
Highest level of education, n (%)			
Elementary school	3 (10.00)	6 (11.11)	0.77
High school	2 (6.67)	6 (11.11)	
Vocational education	5 (16.67)	7 (12.96)	
Short continuing education (1-2 years)	4 (13.33)	12 (22.22)	
Longer continuing education (>3 years)	10 (33.33)	10 (18.52)	
Higher education (≥5 years)	5 (16.67)	11 (20.37)	
Other	1 (3.33)	2 (3.70)	
Current job position			
Unskilled worker	6 (20.00)	14 (25.00)	0.93
Skilled worker/trained specialist	17 (56.67)	33 (58.93)	
Manager, middle manager, or company owner	5 (16.67)	7 (12.50)	
Intern/apprentice	1 (3.33)	1 (1.79)	
Other	1 (3.33)	1 (1.79)	
Self-reported mental health			
PSS, mean (SD)	13.21 (6.51)	15.54 (5.63)	0.09
SCL-5, mean (SD)	1.67 (0.08)	1.69 (0.55)	0.90
BRS, mean (SD)	4.70 (0.68)	4.31 (0.83)	0.03
SWEMWBS, mean (SD)	23.26 (3.05)	22.95 (2.78)	0.64
EQ – Decentering, mean (SD)	41.43 (6.27)	37.81 (7.43)	0.03
DSI, mean (SD)	4.19 (0.68)	3.78 (0.97)	0.05
AWI, mean (SD)	3.41 (0.97)	3.34 (0.96)	0.74
Organizational factors			
Social capital, mean (SD)			
<i>Bonding</i>	73.18 (15.33)	72.68 (14.79)	0.88
<i>Bridging</i>	64.80 (17.73)	65.91 (17.93)	0.79
<i>Linking – immediate management</i>	71.55 (16.71)	72.84 (19.45)	0.76
<i>Linking – top management</i>	66.81 (17.21)	69.09 (17.69)	0.57
S-NAQ-score >12, n (%)	8 (27.60)	14 (25.00)	0.80
Team psychological safety, mean (SD)	39.31 (6.54)	38.48 (5.79)	0.55

Abbreviations: AWI: Awakening Index, BRS: Brief Resilience Scale, DSI: Disturbed Sleep Index, EQ: Experiences Questionnaire, n: number, NA: not applicable, PSS: Perceived Stress Scale, SCL: Symptom Checklist-5, SD: standard deviation, S-NAQ: Short Negative Acts Questionnaire, SWEMWBS: Short Warwick-Edinburgh Mental Wellbeing Scale

Table O4: Sensitivity analysis of self-reported mental health outcomes post intervention and at 12 months; including all employees and managers

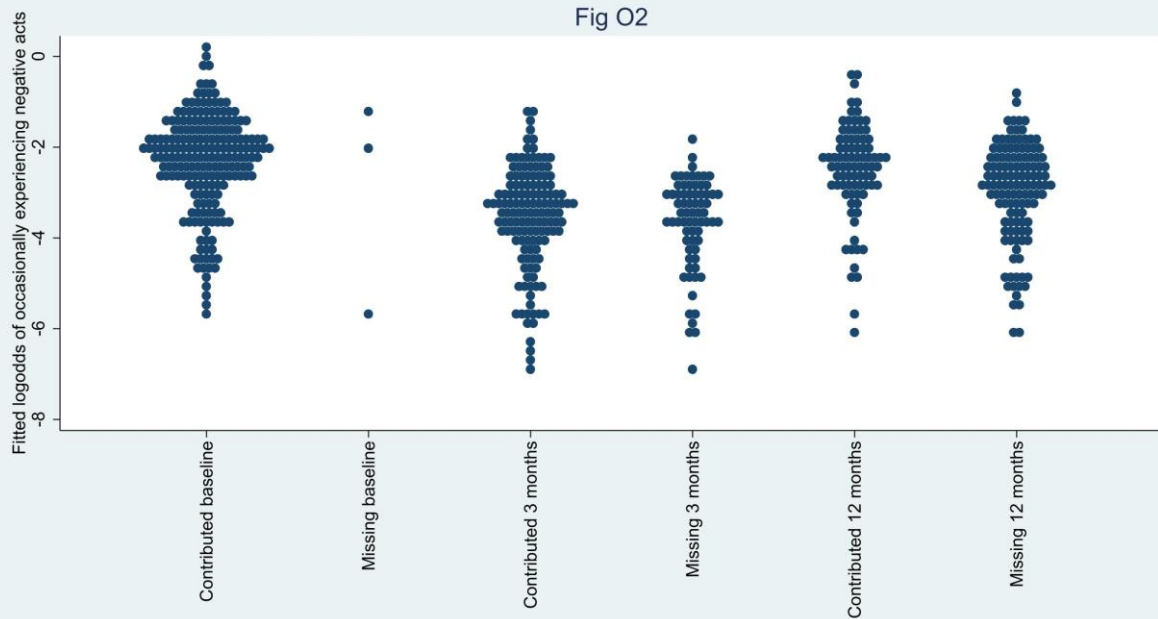
	Adjusted change estimate	95% CI	<i>P</i> value
+0.2*SD			
PSS, mean			
3 months	-0.53	-1.46 to 0.40	0.26
12 months	0.79	-0.14 to 1.72	0.10
SCL-5, mean			
3 months	0.05	-0.03 to 0.13	0.22
12 months	0.09	0.01 to 0.17	0.02
BRS, mean			
3 months	0.05	-0.07 to 0.17	0.42
12 months	0.14	0.03 to 0.27	0.01
SWEMWBS, mean			
3 months	0.49	-0.03 to 1.01	0.07
12 months	0.57	0.05 to 1.09	0.03
EQ – Decentering, mean			
3 months	1.34	0.31 to 2.37	0.01
12 months	2.31	1.28 to 3.34	>0.001
DSI, mean			
3 months	0.01	-0.11 to 0.14	0.84
12 months	0.10	-0.03 to 0.22	0.12
AWI, mean			
3 months	0.21	0.08 to 0.34	0.002
12 months	0.15	0.01 to 0.28	0.03
-0.2*SD			
PSS, mean			
3 months	-1.07	-2.01 to -0.13	0.03
12 months	-0.52	-1.46 to 0.42	0.28
SCL-5, mean			
3 months	-0.01	-0.07 to 0.09	0.88
12 months	-0.03	-0.11 to 0.05	0.52
BRS, mean			
3 months	-0.03	-0.15 to 0.09	0.62
12 months	-0.03	-0.15 to 0.08	0.58
SWEMWBS, mean			
3 months	0.22	-0.30 to 0.74	0.40
12 months	-0.14	-0.66 to 0.38	0.59
EQ – Decentering, mean			
3 months	0.71	-0.33 to 1.74	0.18
12 months	0.79	-0.24 to 1.83	0.13
DSI, mean			
3 months	-0.05	-0.17 to 0.07	0.42
12 months	-0.08	-0.21 to 0.04	0.19
AWI, mean			
3 months	0.14	0.01 to 0.27	0.04
12 months	-0.05	-0.18 to 0.08	0.42

Abbreviations: AWI: Awakening Index, BRS: Brief Resilience Scale, CI: confidence interval, DSI: Disturbed Sleep Index, EQ: Experiences Questionnaire, PSS: Perceived Stress Scale, SCL-5: Symptom Checklist-5, SD: standard deviation, SWEMWBS: Short Warwick-Edinburgh Mental Wellbeing Scale

Table O5: Sensitivity analysis of self-reported organizational factors post intervention and at 12 months; including both participating and non-participating employees and managers

	Adjusted change estimate	95% CI	P value
+0.2*SD			
Social capital, mean			
<i>Bonding</i>			
3 months	0.72	-1.62 to 3.06	0.55
12 months	-1.50	-3.84 to 0.84	0.21
<i>Bridging</i>			
3 months	1.92	-0.57 to 4.41	0.13
12 months	1.14	-1.35 to 3.63	0.37
<i>Linking – immediate management</i>			
3 months	-1.27	-4.14 to 1.60	0.39
12 months	-6.57	-9.44 to -3.70	>0.001
<i>Linking – management overall</i>			
3 months	0.40	-2.57 to 3.38	0.79
12 months	-1.72	-4.69 to 1.26	0.26
Team psychological safety, mean			
3 months	0.19	-0.86 to 1.24	0.73
12 months	-0.90	-1.95 to 0.14	0.09
-0.2*SD			
Social capital, mean			
<i>Bonding</i>			
3 months	-0.56	-2.95 to 1.83	0.65
12 months	-4.68	-7.07 to -2.29	>0.001
<i>Bridging</i>			
3 months	0.53	-1.93 to 2.99	0.67
12 months	-2.18	-4.65 to 0.28	0.08
<i>Linking – immediate management</i>			
3 months	-2.68	-5.53 to 0.16	0.07
12 months	-10.65	-13.49 to -7.80	>0.001
<i>Linking – management overall</i>			
3 months	-0.87	-3.81 to 2.08	0.56
12 months	-5.05	-7.99 to -2.10	0.001
Team psychological safety, mean			
3 months	-0.28	-1.33 to 0.77	0.60
12 months	-2.27	-3.31 to -1.22	>0.001

Abbreviations: CI: confidence interval, SD: standard deviation



Contribution status on S-NAQ data, grouped by the three data collection points
Fig O2: Fitted logodds for contributed S-NAQ data and missing S-NAQ data at baseline, 3 months and 12 months follow-up

APPENDIX

Appendix 1 includes an English version of the workplace-adapted 10-week MBSR course delivered live online in the research project “Implementation of modified Mindfulness-based stress reduction in private Companies”. Appendix 2 comprises the pre-intervention interview guides utilized for data collection in Study 2 and Study 3, while Appendix 3 includes the post-intervention interview guides used for data collection in Study 2 and 3.

APPENDIX 1: CURRICULUM FOR THE 10-WEEK WORKPLACE-ADAPTED MBSR PROGRAM

Session	Content	Key learning points	Home practice
<p>Session 1: What is mindfulness? “Forming a group contract” (Orientation/parts of session 1 in the original MBSR curriculum)</p>	<p>Welcome, introduction, and orientation (15 minutes)</p> <p>Standing yoga and AOB-meditation (15 minutes)</p> <p>Dialogue: What is mindfulness (15 minutes)</p> <p>Rules (15 minutes)</p> <p>Body scan (15 minutes)</p> <p>Closing remarks (15 minutes)</p>	<p>“Mindfulness is the awareness arising through paying attention on purpose in the present moment, non-judgmentally, in the service of self-understanding, wisdom, and compassion” (Kabat-Zinn).</p> <p>Together, we are going to train our awareness by noticing where the attention is. We all have six senses (taste, sight, hearing, touch, smell, and thinking)</p> <p>We are going to practice feeling the body while not striving towards a specific state/goal.</p>	<p>Audio guided body scan 15 minutes at least three days a week.</p> <p>Participants are also invited to try doing a body scan every day, or alternatively, body scan of 30 or 45 minutes.</p>
<p>Session 2: “Why am I here?” (Session 1 in the original MBSR curriculum)</p>	<p>Welcome (15 minutes)</p> <p>Body scan (15 minutes)</p> <p>Sharing of direct experiences (first in groups followed by plenary sharing) (10 minutes)</p> <p>“Why am I here”-meditation (15 minutes)</p> <p>Dialogue (in groups followed by plenary sharing) (25 minutes)</p> <p>Standing yoga and AOB (10-15 minutes)</p> <p>Closing remarks (3-5 minutes)</p>	<p>We always have an intention, regardless of what we are doing. It is important to be aware of these intentions.</p> <p>Mindfulness is being with things as they are, and being able to cope with these in a desirable way.</p>	<p>Audio guided body scan 15 minutes at least three times a week.</p> <p>Participants are also invited to try doing a body scan every day, or alternatively, body scan of 30 or 45 minutes.</p> <p>Choose one daily activity, such as tooth brushing, and offer your full attention to that activity every day.</p> <p>Occasionally, spend five minutes focusing on the breath while sitting still (without audio guide).</p>

			Try solving the attached assignment with the nine dots. Notice how you approach the assignment.
<p>Session 3: Perception (Session 2 in the original MBSR curriculum)</p>	<p>Welcome (5 minutes)</p> <p>Body scan (15 minutes)</p> <p>Sharing of direct experiences (in groups followed by plenary sharing) (20-25 minutes)</p> <p>Perception (15-20 minutes)</p> <p>AOB (15 minutes)</p> <p>The Raisin Exercise (10-15 minutes)</p> <p>Closing remarks (2 minutes)</p>	<p>We all experience the world through our personal lens. How we perceive things (or do not) influences the ways in which we react or respond.</p> <p>Often times, we draw conclusions or habitually view the world in a certain way due to being unaware.</p> <p>We can practice being curious of how we view and engage in our life, or try noticing what we are not seeing by be awareness on purpose.</p>	<p>Audio guided body scan 15 minutes at least three times a week.</p> <p>Participants are also invited to try doing a body scan every day, or alternatively, body scan of 30 or 45 minutes.</p> <p>Choose one daily activity, such as tooth brushing, and offer your full attention to that activity every day.</p> <p>Occasionally, spend 10 minutes focusing on the breath while sitting still (without audio guide).</p> <p>Fill out the attached scheme of pleasant experiences.</p>
<p>Session 4: Pleasant experiences – remember to enjoy the good things in life (Session 3 in the original MBSR curriculum)</p>	<p>Welcome (10 minutes)</p> <p>AOB (10 minutes)</p> <p>Lying yoga (20 minutes)</p> <p>Sitting meditation focusing on a pleasant experience (10 minutes)</p> <p>Sharing experiences (in groups followed by plenary sharing) (20 minutes)</p> <p>Closing remarks and poem (e.g. “Coconut” by Paul Hostovsky) (10 minutes)</p>	<p>Pleasant experiences are often related to a feeling of connectedness to others, one self, or nature; and present-moment awareness.</p> <p>Even in times of crisis, we can notice pleasant experiences by being aware.</p> <p>The build-in negativity bias; we are not programmed to notice what is pleasant. Thus, we need to train this ability.</p>	<p>Audio guided body scan 15 minutes at least three times a week.</p> <p>Participants are also invited to try doing a body scan every day, or alternatively, body scan of 30 or 45 minutes.</p> <p>Choose one daily activity, such as tooth brushing, and offer your full attention to that activity every day.</p> <p>Occasionally, spend 10 minutes focusing on the breath while sitting still (without audio guide).</p>

			Fill out the attached scheme of unpleasant experiences.
<p>Session 5: Unpleasant experiences – also a part of life (Session 4 in the original MBSR curriculum)</p>	<p>Welcome (10 minutes)</p> <p>Standing yoga (15 minutes)</p> <p>AOB and awareness of the body (Attention on the fact that we have a choice when experiencing bodily discomfort – changing position or being with unpleasantness).</p> <p>Brief seated yoga stretches (5 minutes)</p> <p>Sitting meditation focusing on an unpleasant experience (10 minutes)</p> <p>Sharing experiences (in groups followed by plenary sharing) (20 minutes)</p> <p>Closing remarks and poem (e.g. Guesthouse by Rumi) (15 minutes)</p>	<p>Unpleasant experiences is an inevitable part of life.</p> <p>By training our awareness and ability to be with unpleasantness, we can improve how we cope with stress and adversity.</p> <p>During unpleasantness or plain discomfort, our natural response is to distance us from this experience. Our bodily stress response kicks in (fight, flight, or freeze).</p> <p>This stress response is important in situations of real danger.</p> <p>However, we often misperceive unpleasantness as danger. Overly self-critical thoughts may enhance and sustain stress and discomfort. We might even blame others.</p> <p>Often, we add an extra layer of discomfort to the inevitable unpleasant experience. Therefore, we train our ability to be with the unpleasantness that is outside of our control. This practice may facilitate awareness of when the bodily stress response is activated, so to allow for a more conscious response.</p>	<p>Audio guided yoga (brief or longer) or body scan (15, 30, or 45 minutes) at least 3 days a week. Switch between the exercises.</p> <p>Participants are invited to practice more than three times a week. Practice is proportional to the effect.</p> <p>Occasionally, spend 10 minutes focusing on the breath while sitting still (without audio guide).</p> <p>Be aware of automatic stress reactions and stress related behavior, without trying to change these.</p>

<p>Session 6: Stress. Responding instead of reacting (Session 5 in the original MBSR curriculum)</p>	<p>Welcome (5 minutes)</p> <p>Standing yoga (10 minutes)</p> <p>Sitting meditation focusing on the breath, body, thoughts, and open awareness (30 minutes)</p> <p>Sharing and a dialogue about stress (in groups followed by plenary sharing) (35 minutes)</p> <p>Closing remarks and poem (e.g. "Autobiography in Five Short Chapters" by Portia Nelson) (10 minutes)</p>	<p>We are currently practicing something that is not natural to us; experiencing unpleasant experiences when the bodily stress response is activated with a non-judgmental attitude.</p> <p>By engaging in this practice we can gain a deeper understanding of our self and out behavioral patterns, enabling change.</p> <p>We are in the midst of training our mental health and mental capacities.</p> <p>Mental health is not always having things as we want. Mental health is about being able to be in life as it is and respond with a clear mind and a warm heart.</p> <p>As WHO describes: 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 (WHO).</p>	<p>Audio guided sitting meditation (15 or 30 minutes). Do at least one audio guided body scan or yoga between meditations.</p> <p>Fill out the scheme for difficult communication.</p> <p>Bring awareness to reactive moments og try to respond with a greater presence, kindness, and creativity during formal exercises as well as in everyday life.</p> <p>Remember that the breath may be used as an anchor to the present moment, and a way to elevate the awareness, enabling conscious decisions.</p> <p>Remember, the goal of meditation is not to experience pleasantness. Rather, it is to notice what is, and offer this a non-judgmental, accepting, and kind awareness.</p>
<p>Session 7: Communication (Session 6 in the original MBSR curriculum)</p>	<p>Welcome (5 minutes)</p> <p>Standing yoga (10 minutes)</p> <p>Sitting meditation focusing on the breath, body, thoughts, and open awareness (30 minutes)</p>	<p>Communication is difficult, and may activate the bodily stress response.</p> <p>Aggressive-aggressive communication: Fight to win. Attacks verbally without listening to the other person.</p>	<p>Audio guided sitting meditation (15 or 30 minutes). Do at least one audio guided body scan or yoga between meditations.</p> <p>Notice what goes into your body. Where does it come from? How much? Why? Reactions and</p>

	<p>Sharing experiences (in groups followed by plenary sharing)</p> <p>Meditation with attention to difficult communication (5 minutes)</p> <p>Communication exercise (two and two) (12 minutes): Each gets three minutes to tell about a difficult communication, WITHOUT the other interrupting. Share: - What made it difficult? - What did you want from the other person? - What did you get? - What did the other person want? - What did they get? - How do you feel/think now?</p> <p>Closing remarks, possibly a poem, e.g. "Out beyond Ideas of wrongdoing and rightdoing" by Rumi (10 minutes)</p>	<p>Passive-aggressive: avoiding confrontation by not saying what one feels and thinks (flight/freeze). Pleases, apologizes, and takes blame.</p> <p>Aggressive-assertive: One is able to express one's rights without violating others'. Listening to one self and others. Conscious (mindful) response. Awareness is a prerequisite for clear communication and listening to others.</p>	<p>effects. Not just food but all you sense (television, internet surfing, cellphone use, etc.)</p> <p>Notice if you are mindful in your everyday life.</p>
<p>Session 8: Silent retreat-session (7-hour retreat day in the original MBSR curriculum)</p>	<p>Welcome (5 minutes)</p> <p>Lying yoga (30 minutes)</p> <p>Lying body scan (20 minutes)</p> <p>Sitting meditation, possibly Mountain meditation (20 minutes)</p> <p>Sharing experiences (in groups followed by plenary sharing) (10 minutes)</p> <p>Closing remarks (5 minutes)</p>	<p>Being in one's own company can be difficult. We all have preferences and patterns, and our immediate response is to follow these.</p> <p>We are in the process of getting to know ourselves better. We are practicing noticing life as it is, both in times of pleasantness, unpleasantness, and when neutral.</p>	<p>Audio guided sitting meditation (15 or 30 minutes). Do at least one audio guided body scan or yoga between meditations. The audio guides may be used as frequent as one wishes.</p> <p>Participants are encouraged to combine the audio guides, e.g. doing yoga before meditation.</p> <p>Are you implementing mindfulness in your</p>

			everyday life? Have you noticed any patterns?
<p>Session 9: Change – Integrating mindfulness (Session 7 in the original MBSR curriculum)</p>	<p>Welcome (5 minutes)</p> <p>Patterns (5-10 minutes)</p> <p>Standing yoga (15 minutes)</p> <p>Body scan (10 minutes)</p> <p>Sitting meditation (15 minutes)</p> <p>Meditation focusing on patterns (5 minutes)</p> <p>Sharing experiences (in groups followed by plenary sharing) (15 minutes)</p> <p>Meditation “what do you want to let go of?” followed by a round where all participants state what they want to let go of (one word or one sentence) (15 minutes)</p> <p>Closing remarks (5 minutes)</p>	<p>We all have habitual reaction patterns, e.g. getting angry when we are scared.</p> <p>Most of us tend to engage in mind wandering, planning, worrying, and self-criticism, draining us of energy and depriving us of experiencing the present moment.</p> <p>The first step towards change is noticing our habitual patterns with a kind and accepting awareness.</p>	<p>Participants are free to choose between sitting meditation, body scan, or yoga. Practice is encouraged at least three times a week.</p>
<p>Session 10: Completing the program – what’s next? (Session 8 in the original MBSR curriculum)</p>	<p>Welcome (10 minutes)</p> <p>Body scan, standing yoga, and sitting meditation (45 minutes)</p> <p>Plenary sharing focusing on what the participants have become aware of during the program (20 minutes)</p> <p>How to maintain practice? (15 minutes)</p> <p>Closing remarks</p>	<p>Continuing mindfulness practice following the program can be challenging, and requires discipline. It may be helpful seeking inspiration from books or movies, or practicing together in a group.</p>	
<p>Abbreviations: AOB: Awareness of Breath, MBSR: Mindfulness-based Stress Reduction</p>			

APPENDIX 2: PRE-INTERVENTION INTERVIEW GUIDES UTILIZED IN STUDY 2 AND STUDY 3

Interview guide for pre-intervention employee focus groups

Theme 1: Thoughts related to mindfulness

First, I will ask a few questions about mindfulness.

- If I say “mindfulness”, what comes to mind?
- Have you heard of mindfulness before? (What have you heard -*short*)
- Have any of you tried practicing mindfulness?
- If you have tried practicing mindfulness, how was it?

Theme 2: Information and thoughts about the project

- Prior to this interview, did you receive any information about the project? - What kind of information did you receive?
- Who made the decision that your company should participate in this project?
- Have you discussed the project or talked about it with your supervisor?
- What did you talk about /discuss?
- Did you talk about the project among colleagues? (If yes), what did you talk about?
- As employees, were you involved in the decision to participate in the project?
- Have you given any thoughts as to your own participation?
- Sometimes when employees hear management say, “We’ll do this” (e.g. participate in a project) they may think to themselves “doing this will be difficult in our company”. Does this ring a bell?
- Do you think that using mindfulness is something that fits well with your company?

If yes: what is it about mindfulness that you think fits well with your company?

If no: what is it about mindfulness that wouldn’t fit well your company?

- Have you reflected on why management thinks that using mindfulness in your company would be a good idea?
- What do you think could be the biggest barrier to implementing mindfulness in your company?

Theme 3: Stress

The purpose of this interview is, as I said, to get an impression of your company, how you do things and what you focus on as a company.

We would like to know more about the situations where you as employees can experience pressure or stress. Also, we would like to know how much your company focuses on situations or circumstances that may cause pressure, frustrations or poor well-being. OK?

- When I use the expression “to be under pressure” – what does that mean to you?
- Which situations or circumstances would typical lead to people feeling under pressure?
- Did the Covid-19-situation result in you, or your co-workers, feeling more under pressure than prior to the pandemic?
- At what time during the pandemic, did you feel most under pressure? Can you describe the circumstances?
- How do you feel now? The same, less or more under pressure?
- What made the difference?

I will now introduce another expression - stress

- So, when I then use the expression “stress” – what does it mean to you?
- Have you talked about stress amongst colleagues? What did you talk about?
- In your experience, is stress something that your supervisors focus on?
- Is it your impression that a lot of people feel stressed or under pressure in your company – or on the contrary that very few people feel stressed and under pressure?

Theme 4: Coping with stress/overload

The questions I will now pose concern your experiences with stress or being under pressure and the situations which may lead to this.

- Do any of you sometimes feel stressed or overloaded?
- Do any of you often feel stressed or overloaded?
- Can you describe how you feel when you experience stress or feel under pressure?
- Can your colleagues tell when you are stressed or under pressure? How?
- When you are stressed or feel under pressure, does it (sometimes) affect your work performance? (*Give examples*)
- If you feel stressed or under pressure, could this affect the way you work together?

People may react very differently when stressed or feeling under pressure. We would like to ask some questions regarding how you deal with such situations.

- When you feel stressed, what do you do? How do you deal with it? (Prompts: Do you try to focus on it – for example by talking about it or asking for help? Would any of you tend to keep your feelings to yourselves?)
- In stressful situations, people sometimes think: “I’ll just forget that – or “I’ll put it aside”. Is that something you recognize?
- Have you experienced colleagues or supervisors who have been stressed or under pressure?
- Do you do something when you see a colleague or supervisor who is pressure or stressed?
- Do you know if anybody at your workplace have had to go on sick leave due to stress?

Theme 5: Prioritization of well-being in the workplace

I will now ask some questions about your company’s focus on well-being

- In your company, would you say that people are generally aware of how other people are doing?
- Do you feel that your company prioritizes employee well-being? In what way does it show? Can you give any examples?
- If you don’t think that your company prioritizes employee well-being, in what way does it show? Can you give any examples?
- Do you feel that your immediate supervisor prioritizes your well-being?
- If so, in what way does it show? Can you give any *examples*?

- If you don't think that he or she prioritizes your well-being, in what way does it show? Can you give any *examples*?
- Do you feel that you can approach your immediate supervisor if you feel stressed, under pressure or if you face other challenges?
- Any of you who have tried approaching your supervisor concerning work-related problems such as stress? How did he or she react?
- What came out of it?
- Have you had any kind of company initiatives aimed at increasing employee well-being?

Theme 6: Collaboration within the company

- How would you characterize working relationships in your company – do you collaborate well or are there sometimes problems?
- Which situations typically create problems?
- In situations where working relationships are challenged, what do you do? Would you be able to talk to your immediate supervisor about such situations?
- Do you sometimes experience disagreements among colleagues?
- Are you able to talk about such disagreements?
- When you disagree about something, what do you typically do?
- If you disagree with your supervisor about something, do you feel that you can talk to him or her about it?
- If you've disagreed with your supervisor, did you talk to him or her about it? How was it received?

Theme 7: Communication and tone

- How would you describe the tone at your workplace?
- We know from other workplaces that the tone may turn harsher in stressful work situations. (E.g. OR, emergency rooms, restaurants etc.)
- Could that happen at your workplace – someone speaking in a harsh tone? Have any of you experienced, or witnessed this?

- Would it be OK to comment on a harsh or demeaning tone, at your workplace? In which situations would it be OK? Situations where it wouldn't be OK?
- Would you yourselves comment on a harsh tone? Why not? Why?
- Do you have examples of you or others commenting on a harsh tone?

Theme 8: Feedback culture within the company

- In your workplace – are you good at praising each other for a job well done?
- Would it be OK for you as employees to suggest new ways of doing things?
- If something needs to be corrected – or needs to be criticized, how is that done?
- If any of you receive criticism, how do you typically react?
- In your experience, how do your supervisors react when they receive criticism?
- If someone disagrees with how things are done – what happens?
- What happens if somebody makes a mistake?

Theme 9: Expectations regarding one's own and the organization's participation in the project

Before we end the interview, I will ask a few questions concerning your expectations for the project. I'm interested in hearing about positive as well as negative expectations – if you have any?

- At this time, have you made a decision as to whether you will participate in the mindfulness program or not?
- Those of you who will participate, what do you expect to get out of it?
- Those of you who won't participate, do you have any thoughts about the project and what it might lead to in your company?
- What are the requisites for the project to have positive effects (at your workplace)?
- Anything else you would like to add?

Interview guide for pre-intervention manager focus groups

Theme 1: Thoughts related to mindfulness

First, I will ask a few questions about mindfulness.

- If I say "mindfulness", what comes to mind?
- Have you heard of mindfulness before? (What have you heard -*short*)
- Have any of you tried practicing mindfulness?
- If you've tried practicing mindfulness how was it?

Theme 2: Information and thoughts about the project

- Prior to this interview, did you receive any information about the project? –
- What kind of information did you receive?
- Did you discuss the project amongst yourselves? If yes, what did you talk about/discuss?
- Who made the decision to participate in this project as a company? (ask about employee involvement if it isn't mentioned).
- Did any of you discuss the project with the employees? If yes, what did you talk about/discuss?
- How did the employees react to the project? What did they say?
- Did any of the employees express concerns with regards to their own participation in the project?
- How did you respond to these concerns?
- Do you think the employees may have other concerns or worries related to the project? (than the ones you've heard of?)

When companies participate in projects, a typical concern may be related to time constraints.

- Could time be one of your concerns?
- Would you think that the employee would worry about the time they have to use?
- In your opinion, what might be the biggest barrier for your own participating in the mindfulness sessions?

- What would be the biggest barrier for the employees?
- Do you think that using mindfulness fits well with your company?
If yes: what is it about mindfulness that you think fits well with your company?
If no: what is it about mindfulness that wouldn't fit well with your company?

Theme 3: Stress

The purpose of this interview, as I said, is to get an impression of your company, how you do things and what you focus on as a company.

We would like to know more about the situations where you as supervisors experience pressure or stress. Also, we would like to know how much your company focuses on situations or circumstances that may cause pressure, frustrations or poor well-being. OK?

- When I use the expression “to be under pressure” – what does that mean to you?
- Which situations or circumstances would typical lead to people feeling under pressure?
- Did the Covid-19-situation result in you, or your co-workers, experiencing more pressure than prior to the pandemic?
- At what time during the pandemic, did you feel most under pressure? Can you describe the circumstances?
- How do you feel now? The same, less or more under pressure?
- What made the difference?

I will now introduce another expression - stress

- So, when I then use the expression “stress” – what does it mean to you?
- Have you talked about stress amongst supervisors? What did you talk about?
- Is stress something that you as supervisors focus on?
- Is it your impression that a lot of people feel stressed or under pressure in your company – or on the contrary that very few people feel stressed and under pressure?

Theme 4: Coping with stress/overload

The questions I will now pose concern your experiences with stress or being under pressure and the situations which can lead to this.

- Do any of you sometimes feel stressed or overloaded?
- Do any of you often feel stressed or overloaded?
- Can you describe how you feel when you experience stress or feel under pressure?
- Can your colleagues tell when you are stressed or under pressure? How?
- When you are stressed or feel under pressure, does it sometimes affect your work performance? (*Give examples*)
- If you feel stressed or under pressure, could this affect the way you work together?

People may react very differently when stressed or feeling under pressure. We would like to ask some questions regarding how you deal with such situations.

- When you feel stressed, what do you do? How do you deal with it?
- Do you try to focus on it – for example by talking about it or asking for help?
- Would any of you tend to keep your feelings to yourselves?
- In stressful situations, people sometimes think: “I’ll just forget that – or “I’ll put it aside”. Is that something you recognize?
- Have you experienced colleagues or employees who’ve been stressed or under pressure?
- Do you do something when you see a colleague or employee who is under pressure or stressed?
- Do you know if anybody at your workplace have had to go on sick leave due to stress?

Theme 5: Prioritization of well-being in the workplace

I will now ask some questions on your company’s focus on well-being.

- In your company, would you say that people are generally aware of how other people are doing?
- Do you feel that your company prioritizes the well-being of employees? In what way does it show?
- Do you feel that your company prioritizes the well-being of supervisors/managers? In what way does it show?
- Have you had any kind of company initiatives aimed at increasing employee well-being?

- If you don't think that your company prioritizes employee or supervisor well-being, in what way does it show? Can you give any examples?
- Do you feel that you can approach your immediate supervisor if you're not feeling well or something is not working out for you?
- Do you think the employees feel, that they can approach you if they are under pressure or experience other challenges? Do they?

Theme 6: Collaboration within the company

- How would you characterize working relationships in your company – do you collaborate well or are there sometimes problems?
- Which situations typically create problems?
- In situations where working relationships are challenged, what do you do? (Do collaborate with other supervisors?)
- How would you characterize working relationships in your company?
- At your workplace, do the employees sometimes disagree on something?
- If yes: When employees disagree on something how do you typically deal with it as supervisors?
- Do you sometimes experience disagreement among supervisors?
- If yes: Are you able to talk about such disagreements?
- How do you manage disagreements among supervisors?

Theme 7: Communication and tone

- How would you describe the tone at your workplace?

We know from other workplaces that the tone may turn harsher in stressful work situations. (E.g. OR, emergency rooms, restaurants etc.)

- Could that happen at your workplace – someone speaking in a harsh tone? Have any of you experienced, or witnessed this?
- Would it be OK to comment on a harsh, or demeaning tone, at your workplace? In which situations would it be OK? Situations where it wouldn't be OK?
- Would you yourselves comment on a harsh tone? Why not? Why?

- Do you have examples of you or others commenting on a harsh tone?

Theme 8: Feedback culture within the company

- In your workplace – are you good at praising each other for a job well done?
- Would it be OK for you to suggest new ways of doing things to your supervisor?
- If something needs to be corrected – or needs to be criticized, how is that done?
- If any of you receive criticism, how do you typically react?
- In your experience, how do your supervisors react when they receive criticism?
- If someone disagree with how things are done – what happens?
- What happens if somebody makes a mistake?

Theme 9: Expectations regarding one's own and the organization's participation in the project

Before we end the interview, I will ask a few questions concerning your expectations for the project. I'm interested in hearing about positive as well as negative expectations – if you have any?

- At this time, have you made a decision as to whether you will participate in the mindfulness program or not?
- Those of you who will participate, what do you expect to get out of it?
- Those of you who won't participate, do you have any thoughts about the project and what it might lead to in your company?
- What are the requisites for the project to have positive effects (at your workplace)?
- Anything else you would like to add?

APPENDIX 3: POST-INTERVENTION INTERVIEW GUIDES UTILIZED IN STUDY 2 AND STUDY 3

Interview guide for post-intervention employee focus groups (MBSR participants)

Theme 1: Experiences of participating in the intervention

We will begin with a very general question:

- How did you experience participating in the 10-weeks mindfulness course?
- Anything about the course you think was especially good? – give examples
- Anything about the course you think could have been better? – give example

Before the mindfulness course started a few employees had some knowledge about mindfulness, while others didn't. We would like to know whether people now know more about what mindfulness is.

So, I will ask the question;

- If a friend asked you to explain what mindfulness is – what would you say?

We know from experience that one's motivation to attend and perform the exercises can fluctuate during a mindfulness course.

- If you think back to the first couple of sessions. Do you remember them?
- What did you experience during the first sessions? (*I wasn't present, but I know that you focused on breathing, that you tried some brief mindfulness exercises, and started to practice being more aware of bodily sensations*).

The mindfulness course first focused on pleasant events. In the fifth session, this focus shifted to being aware of unpleasant events.

- How did you experience the shift in focus from pleasant to unpleasant events?
- Was sharing pleasant events different from sharing unpleasant events?
If yes, in what way?
- How did you experience sharing both pleasant and unpleasant events with your colleagues?
- How do you think your colleagues experienced this mutual sharing of pleasant and unpleasant events?

Theme 2: Abilities to be in the present moment and notice bodily sensations

- Having now participated in the course, do you feel that you have learned something or acquired new skills? Can you give examples?
- Any specific situations, where you noticed, that you had learned something new? What new insights did you notice?

Part of mindfulness is to be aware in the present moment.

- Would you say that you are more aware in the present moment now, than prior to the course, or is it the same as before?
- Do you sometimes notice that you are *not* aware in the present moment? If yes, do you notice that more often now, than before or is it the same?

During the mindfulness course, participants practiced being in states of unpleasantness and stress with kindness and acceptance of the present state of mind.

- When you feel discomfort, or feel stressed or under pressure, how does that feel?
- Is that the same as before the mindfulness course, or has anything changed in that respect?
- In situations where you experience something unpleasant, feel stressed, or under pressure; what do you do? (Potential prompts: *Are you curious? Do you hurry on to something else?*)
- In your opinion, are you able to be in unpleasant feelings or feelings of being under pressure for a longer time now than before or is it the same?
- Earlier, we asked if you feel that you've learned something new from participating in the mindfulness course. You said...

Sometimes participants in such a mindfulness course notice themselves that they've changed. Other times, people around us are the first ones to notice potential changes.

- Has anyone commented on any changes that they've noticed in your behavior since the mindfulness course started or after it ended?
- Who noticed these changes?
- What did they say?
- Did it resonate with your own experience?
- Do you feel that practicing mindfulness has affected your life in one or more ways? If yes, how?

- Do you feel that practicing mindfulness has affected the way you do your job? If yes, how?

Theme 3: Stress and behaviour during stress

- During a mindfulness course, some people become more aware of bodily sensations of stress and pressure. Others don't. Is that something you recognize or is it the same as before?
- Do you feel that you've become more aware of how you react to feelings of stress and pressure?
- If yes, what have you become more aware of?

It can be difficult to express one's thoughts and feelings during stressful situations.

- Do you feel that it is easier for you now to express your thoughts and feelings relating to stress than it was prior to the course? The reasons for asking you *this question is that some people develop this ability during a mindfulness course.*

Theme 4: Interpersonal relations

- In your opinion, are you now more aware of how your colleagues and managers are doing than you were prior to the mindfulness course? For example, if they seem stressed or under pressure? Or it is the same as before?
- Do you feel that mindfulness has increased mutual sharing of how you are doing at your workplace? Give examples.
- Do you feel that mindfulness has increased mutual sharing of thoughts on work-related matters at your workplace? Give examples.
- Do you feel that sharing pleasant and unpleasant experiences during the course has affected your relationship with your colleagues? This could for example be in relation to how well you get along.
Are you able to put into words how it has affected your relation?
- Do you feel the mindfulness course has affected the way you work together in your company? If yes, how?
What has changed?
Do you have any specific examples of situations, where you noticed that the way you work together was different from before?
- When practicing mindfulness, we may also become more aware of the fact that each person may perceive things differently from others. Do you feel that you have become more aware of such individual differences in perspectives?
If yes, have you used this insight in a specific situation? Which situation?

- In your opinion, have you become more aware of how other people communicate with you or with each other?
If yes, what have you noticed?
- In your opinion, how is the tone in the company now? Is it the same, or have you noticed any changes? If yes, what kind of changes?
- Has there been any other matters, for example the covid-19 situation, which you feel have affected the tone between employees in the company?

Many of you are working from home and have been doing so for quite a while. As a result, much of the internal communication is digital.

- Having completed the mindfulness course, do you feel that you are more aware of how you or others (colleagues, managers, business associates), communicate digitally? For example, via e-mail or text-messages, (give examples).
- Have you experienced a change in how you communicate internally in [company name] from before the mindfulness course to now?
- Have you noticed any changes in the way you or others communicate with each other at virtual meetings or is it the same as before the mindfulness course?

Regarding collaboration:

- How is that now? Is it the same as before the course?
- If you have noticed changes, do you have any examples of specific situations, where you noticed a change?
- What do you think caused these changes? /what may have contributed to the lack of change?
- Do you know if your immediate manager participated in a mindfulness course?
- If your immediate manager participated, have you noticed any changes in his or her behavior after the mindfulness course started? (which changes)
- If yes, are you able to give any examples of specific situations where you noticed this change?
- Having asked you about the course's possible positive effects, we would like to know if you have experienced any negative effects on working relationships among colleagues or between employees and managers?

Theme 5: Feedback culture and prioritizing well-being

Do you feel that you have become more aware of stress and pressure here in [company name] or is it the same as before?

- If yes/no, what have you noticed specifically?
- Praising or padding each other on the back for a job well done – do you do that more now than before the mindfulness course, or is it the same as before?
- If you praise each other more, can you tell us about any specific situations where this happens?
- Since the course started, have you noticed any changes in how you or other people give or receive criticism?
- If yes: have you given any thoughts as to why these changes relating to giving and receiving criticism have come about?

Theme 6: How the intervention is being narrated in the organization

Participants talk about a mindfulness course in many ways. Some might say “Oh no... not mindfulness today. I am not up for it”. Others may exclaim, “I can’t wait for my one and a half hours of mindfulness”.

- Do you remember if you or any of your colleagues have commented on the course?
- What did you/they say?
- Do you feel there has been any changes, or developments, in how people talked about the course during the 10 weeks - and maybe even after the course ended?
- Have you talked about the mindfulness course to anyone outside of work?
- What have you said?

Theme 7: Facilitating and inhibiting factors for engagement

Here at the end of the interview, I will focus on factors that may influence the implementation or effect of a mindfulness course

- In your own opinion, how committed were you to the mindfulness course?
- Did anything affect your commitment engagement in a positive way?
- Did anything affect your commitment in a negative way?
- Did you experience any differences in participants’ degree of commitment?

- During the course, did you ever think, "I am too busy, I have too much on my plate today. I will not make it for today's mindfulness session"?
- Have you tried having that thought and then still deciding to participate?
- If yes, what made you participate anyway?
- Did you manage to participate in the weekly sessions and to do the recommended homework?
- In case you found it difficult to take the time to attend or do the homework, what made it difficult to allow the time?
- During the course and afterwards, how much time a week would you say you've been practicing mindfulness?
- Did you feel that participation in the mindfulness course was voluntary, or did you feel pressured to sign up for the course?
- How has that affected your level of engagement in the mindfulness course?
- Looking back, do you feel that you received sufficient and correct information about the project prior to its start?
- If no, what kind of information would have been relevant and nice to have had?
- Did the internal communication about the project influence your attitude towards the mindfulness course?
- Do you feel that HR or management has supported this project? (Do you have any examples?)
- Have you heard any managers talk about the mindfulness course? If yes, what did they say?
- In your opinion, did you feel that the attitude towards the course in [company name] has been mainly positive or mainly negative?
- What was your experience of the mindfulness teacher?
- Did you read the e-mails, the mindfulness teacher sent after each session? Why/why not?
- What was your experience participating in the mindfulness sessions live online via Zoom?
- How did you experience being guided in yoga and meditation practices via Zoom?
- You've now tried mindfulness. In your opinion, how well does mindfulness fit with your company's culture and practices?
- Have you talked about this with colleagues or superiors?
- If yes, what did you talk about?

- Some participants may continue to practice mindfulness after the course has ended. Do you expect to do that?
- What might prevent you from practicing?
- If you intend to keep on practicing mindfulness what would help you maintain practice?

Theme 8: Wishes for the future implementation of mindfulness

- We would like to know whether you would appreciate a further implementation of mindfulness in [company name]?
- If yes, in your opinion, what would it require for mindfulness to be used in your company?
- What would be the most important thing to take into account if mindfulness were to be implemented further in your company?
- Is there anything you would like to add?

Interview guide for post-intervention manager focus groups (MBSR participants)

Theme 1: Experiences of participating in the intervention

We will begin with a very general question:

- How did you experience participating in the 10-weeks mindfulness course?
- Anything about the course you think was especially good? – give examples
- Anything about the course you think could have been better? – give examples

Before the mindfulness course started a few employees had some knowledge about mindfulness, while others didn't. We would like to know whether people now know more about what mindfulness is.

So, I will ask the question;

- If a friend asked you to explain what mindfulness is – what would you say?
- If you think back to the first couple of sessions. Do you remember them?
- What did you experience during the first sessions? (*I wasn't present, but I know that you focused on breathing, that you tried some brief mindfulness exercises, and started to practice being more aware of bodily sensations*).

The mindfulness course first focused on pleasant events. In the fifth session, this focus shifted to being aware of unpleasant events.

- How did you experience the shift in focus from pleasant to unpleasant events?
- Was sharing pleasant events different from sharing unpleasant events?
- If yes, in what way?
- How did you experience sharing both pleasant and unpleasant events with your colleagues?
- How do you think your fellow managers experienced this mutual sharing of pleasant and unpleasant events?
- How do you think your employees experienced this mutual sharing?
- In your opinion, did the presence of both managers and employees in some groups influence people's sharing of either pleasant or unpleasant events?
- In your experience, did the presence of both managers and employees in some groups influence the sessions in other ways?

Theme 2: Abilities to be in the present moment and notice bodily sensations

- Having now participated in the course, do you feel that you have learned something or acquired new skills?
- If yes: What did you learn?
- Any specific situations, where you noticed, that you had learned something new?
- What new insights did you notice?

Part of mindfulness is to be aware in the present moment.

- Would you say that you are more aware in the present moment now, than prior to the course, or is it the same as before?
- Do you sometimes notice that you are *not* aware in the present moment?
- If yes, do you notice that more often now, than before or is it the same?

During the mindfulness course, you have practiced being in states of unpleasantness and stress with kindness and acceptance of the present state of mind.

- When you feel discomfort, or feel stressed or under pressure, how does that feel?
- Is that the same as before the mindfulness course, or has anything changed in that respect?
- In situations where you experience something unpleasant, feel stressed or under pressure; what do you do? (*Are you curious? Do you hurry on to something else?*)
- In your opinion, are you able to be in unpleasant feelings or feelings of being under pressure for a longer time now than before or is it the same?
- Earlier, we asked if you feel that you've learned something new from participating in the mindfulness course. You said...

Sometimes participants in such a mindfulness course notice themselves that they've changed. Other times, people around us are the first ones to notice potential changes.

- Has anyone commented on any changes that they've noticed in your behavior since the mindfulness course started or after it ended?
- Who noticed these changes?
- What did they say?
- Did it resonate with your own experience?
- Do you feel that practicing mindfulness has affected your life in one or more ways? If yes, how?
- Do you feel that practicing mindfulness has affected the way you do your job? If yes, how? (examples: performing and planning of work tasks)

Theme 3: Stress and behaviour during stress

- During a mindfulness course, some people become more aware of bodily sensations of stress and pressure. Others don't. Is that something you recognize or is it the same as before?
- Do you feel that you've become more aware of how you react to feelings of stress and pressure?

If yes, what reactions have you become aware of?

Sometimes, it's difficult to express one's thoughts and feelings during stressful situations.

- Do you feel that it is easier for you now to express your thoughts and feelings relating to stress or pressure than it was prior to the course? The reasons for asking you *this question is that some people develop this ability during a mindfulness course.*

Theme 4: Interpersonal relations

- In your opinion, are you now more aware of how your colleagues and employees are doing than you were prior to the mindfulness course? For example, if they seem stressed or under pressure? Or it is the same as before?
- Do you feel that mindfulness has increased mutual sharing of how you are doing at your workplace? Give examples.
- Do you feel that mindfulness has increased mutual sharing of thoughts on work-related matters at your workplace? Give examples.
- Do you feel that sharing pleasant and unpleasant experiences during the course has affected your relationship with your colleagues? This could for example be in relation to how well you get along.
- Are you able to put into words how it has affected your relation?
- Do you feel the mindfulness course has affected the way you work together in your company? If yes, how?
- What has changed?

Do you have any specific examples of situations, where you noticed that the way you work together was different from before?

- When practicing mindfulness, we may also become more aware of the fact that each person may perceive things differently from others. Do you feel that you have become more aware of such individual differences in perspectives?

If yes, have you used this insight in a specific situation? Which situation?

- Do you feel that you as managers have become more aware of how your employees are doing? For example, if they are feeling stressed or pressured.
- Do you feel that your participation in the mindfulness course has affected your relationship with your subordinates? If yes, how?
- In your opinion, have you become more aware of how other people communicate with you or with each other or is it the same as before?
- If changed, what have you noticed?
- In your opinion, how is the tone in the company now? Is it the same, or have you noticed any changes? If yes, what kind of changes?
- Has there been any other matters, for example the covid-19 situation, which you feel have affected the tone between employees in the company?

Many of you are working from home and have been doing so for quite a while. As a result, much of the internal communication is digital.

- Having completed the mindfulness course, do you feel that you are more aware of how you or others (fellow managers, employees, business associates), communicate digitally? For example, via e-mail or Teams, (give examples).
- Have you experienced a change in how you communicate internally from before the mindfulness course to now? Maybe you have noticed a slightly different tone in e-mails, or that you e-mail or call your colleagues more often than before?
- Have you noticed any changes in the way you or others communicate with each other at virtual meetings or is it the same as before the mindfulness course?

Regarding collaboration:

- How is that now? Is it the same as before the course?
- If you have noticed changes, do you have any examples of specific situations, where you noticed a change?
- What do you think caused these changes? /what may have contributed to the lack of change?
- Having asked you about the course's possible positive effects, we would like to know if you have experienced any negative effects on working relationships amongst colleagues or between employees and managers?

Theme 5: Feedback culture and prioritization of well-being

- Do you feel that you have become more aware of stress and pressure here in [company name]?

- If yes/no, what have you noticed specifically?
- Praising or padding each other on the back for a job well done – do you do that more now than before the mindfulness course, or is it the same as before?
- If you praise each other more, can you tell us about any specific situations where this happens?
- Since the course started, have you noticed any changes in how you or other people give or receive criticism?
- Have you given any thoughts as to why these changes relating to giving and receiving criticism have come about?

Theme 6: How the intervention is being narrated in the organization

Participants talk about a mindfulness course in many ways. Some might say “Oh no... not mindfulness today. I am not up for it”. Others may exclaim, “I can’t wait for my one and a half hours of mindfulness”.

- Do you remember if you or any of your colleagues have commented on the course?
- What did you/they say?
- Do you feel there has been any changes, or developments, in how people talked about the course during the 10 weeks - and maybe even after the course ended?
- Have you talked about the mindfulness course to anyone outside of work?
- What have you said?

Theme 7: Facilitating and inhibiting factors for engagement

- In your own opinion, how committed were you to the mindfulness course?
- Did anything affect your commitment in a positive way?
- Did anything affect your commitment in a negative way?
- Did you experience any differences in participants' degree of commitment?
- During the course, did you ever think, “I am too busy, I have too much on my plate today. I will not make it for today’s mindfulness session”?
- Have you tried having that thought and then still deciding to participate?
- If yes, what made you participate anyway?
- Did you manage to participate in the weekly sessions and to do the recommended homework?

- In case you found it difficult to take the time to attend or do the homework, what made it difficult to allow the time?
- During the course and afterwards, how much time a week would you say you've been practicing mindfulness?
- In your opinion, is there anything we could have done differently to ensure a higher sign-up-rate to the 10-weeks mindfulness course among employees as well as managers?
- Looking back, do you feel that you received sufficient and correct information about the project prior to its start?
- If no, what kind of information would have been relevant and nice to have had?
- Have you heard any employees or fellow managers talk about the mindfulness course? If yes, what did they say?
- In your opinion, did you feel that the attitude towards the course in Getting has been mainly positive or mainly negative?
- What was your experience of the mindfulness teacher?
- Did you read the emails, the mindfulness teacher sent after each session? Why/why not?
- What was your experience participating in the mindfulness sessions live online via Zoom?
- How did you experience being guided in yoga and meditation practices via Zoom?
- You've now tried mindfulness. In your opinion, how well does mindfulness fit with your company's culture and practices?
- Have you talked about this with your fellow managers?
- If yes, what did you talk about?
- Some participants may continue to practice mindfulness after the course has ended. Do you expect to do that?
- What might prevent you from practicing?
- If you intend to keep on practicing mindfulness what would help you maintain practice?

Theme 8: Wishes for the future implementation of mindfulness

- We would like to know whether you would appreciate further implementation of mindfulness in [company name]?
- If yes, in your opinion, what would it require for mindfulness to be used in your company?

- What would be the most important thing to take into account if mindfulness were to be implemented further in your company?
- Is there anything you would like to add?

Interview guide used for post-intervention interviews of MBSR non-participants

Theme 1: Attitudes towards the project

For starters, have you heard about the mindfulness project before this interview?

- Can you recall what you thought of the project the first time you heard about it?
- What do you think about it now? Is it the same or has something changed?

Theme 2: Choice of non-participation

You all chose not to participate in the 10-weeks mindfulness course.

- Have you thought about why you chose not to sign up for the course?
- Did either of you talk with some of your colleagues or maybe your immediate manager before deciding not to participate?
- If yes, what did you talk about?
- Before the mindfulness course commenced, how was the general attitude towards the project, when you talked about it among colleagues? Did you get the impression that people were mainly positive or mainly negative?
- Do you think this attitude contributed to some people choosing to participate – or not to participate? (give examples)
- Did any of your immediate colleagues participate in the mindfulness course?
- If yes, why do you think they wanted to participate in the mindfulness sessions?
- If no, in your opinion, why do you think they chose not to participate?
- Aside from your immediate colleagues, do you have any thoughts as to why other people from [company name] chose to participate?
- Are you still happy with the choice you made of not participating in the sessions?

Theme 3: Diffusion of mindfulness competencies

Employees and managers from [company name] have participated in the mindfulness course.

- Previously, we asked you if any of your immediate colleagues participated in the sessions. You said...
- Did any of them talk to you about the sessions? What did they say?

Theme 4: Experienced changes

- People who practice mindfulness may sometimes change. The change may be small or more profound. Some become more aware of how they talk to others and therefore change the way they talk to colleagues. Others talk about becoming more relaxed and prioritizing family life more than before. And some people do not experience any changes after practicing mindfulness.
- Have you noticed any changes in the behavior of colleagues who participated in the course?
- If yes, what did you notice?
- Do you have anything to add?

Declaration of co-authorship concerning article for PhD dissertations

Full name of the PhD student: Emilie Hasager Bonde

This declaration concerns the following article/manuscript:

Title:	The effectiveness of mindfulness-based stress reduction for school teachers: a cluster-randomized controlled trial
Authors:	Bonde, E.H., Fjorback, L.O., Frydenberg, M., Juul, L

The article/manuscript is: Published Accepted Submitted In preparation

If published, state full reference: Bonde, E.H., Fjorback, L.O., Frydenberg, M., Juul, L. The effectiveness of mindfulness-based stress reduction for school teachers: a cluster-randomized controlled trial. Eur J Public Health. 2022 Apr 1;32(2):246-253. doi: 10.1093/eurpub/ckab223

If accepted or submitted, state journal:

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No Yes If yes, give details:

Your contribution

Please rate (A-F) your contribution to the elements of this article/manuscript, **and** elaborate on your rating in the free text section below.

- A. Has essentially done all the work (>90%)
- B. Has done most of the work (67-90 %)
- C. Has contributed considerably (34-66 %)
- D. Has contributed (10-33 %)
- E. No or little contribution (<10%)
- F. N/A

Category of contribution	Extent (A-F)
The conception or design of the work:	C
<i>Free text description of PhD student's contribution (mandatory)</i> Juul, L. and Fjorback, L.O. designed the study. Bonde, E.H. and Juul, L. chose the focus of the study.	
The acquisition, analysis, or interpretation of data:	C
<i>Free text description of PhD student's contribution (mandatory)</i> Juul, L. led the data acquisition. Bonde, E.H. conducted data management and preparation, while Frydenberg, M. performed most of the analysis along with Juul, L, while Bonde, E.H. conducted most of the supplementary analyses. Bonde, E.H. interpreted the data in collaboration with Juul, L.	
Drafting the manuscript:	A
<i>Free text description of PhD student's contribution (mandatory)</i> The manuscript was drafted by Bonde, E.H. All co-authors contributed with comments and corrections. Bonde, E.H. revised the manuscript, and the final version was approved by all authors.	
Submission process including revisions:	A

Free text description of PhD student's contribution (mandatory)

Bonde, E.H. submitted the manuscript to the European Journal of Public Health. Moreover, Bonde, E.H. was the corresponding author, responsible of conducting revisions following peer review, re-submission, and proof reading. The final re-submitted manuscript was approved by all co-authors prior to re-submission.

Signatures of first- and last author, and main supervisor

Date	Name	Signature
26.06.2023	Emilie Hasager Bonde	<i>Emilie Hasager Bonde</i>
26.06.2023	Lise Juul	<i>Lise Juul</i>

Date: 26.06.2023

Emilie Hasager Bonde
Signature of the PhD student

Declaration of co-authorship concerning article for PhD dissertations

Full name of the PhD student: Emilie Hasager Bonde

This declaration concerns the following article/manuscript:

Title:	Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention
Authors:	Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L.

The article/manuscript is: Published Accepted Submitted In preparation

If published, state full reference: Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L. Impacting employees' and managers' mental health skills using a workplace-adapted mindfulness-based intervention. *Front Psychol.* 2022 Dec 6;13:1020454. doi: 10.3389/fpsyg.2022.1020454

If accepted or submitted, state journal:

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No Yes If yes, give details:

Your contribution

Please rate (A-F) your contribution to the elements of this article/manuscript, **and** elaborate on your rating in the free text section below.

- A. Has essentially done all the work (>90%)
- B. Has done most of the work (67-90 %)
- C. Has contributed considerably (34-66 %)
- D. Has contributed (10-33 %)
- E. No or little contribution (<10%)
- F. N/A

Category of contribution	Extent (A-F)
The conception or design of the work:	C
<i>Free text description of PhD student's contribution (mandatory)</i> Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., and Juul, L. conceived the study design.	
The acquisition, analysis, or interpretation of data:	B
<i>Free text description of PhD student's contribution (mandatory)</i> Bonde, E.H. and Mikkelsen, E.G. acquired the qualitative focus group data. Bonde, E.H. performed verbatim transcription of audio recordings. Bonde, E.H. analyzed and interpreted the data in collaboration with Mikkelsen, E.G. Interpretations were discussed with all co-authors.	
Drafting the manuscript:	A
<i>Free text description of PhD student's contribution (mandatory)</i> Bonde, E.H. drafted the manuscript. Bonde, E.H. and Mikkelsen, E.G. performed forward- and back-translation of citations from Danish focus group transcriptions. All co-authors contributed with comments. Bonde, E.H. drafted the final manuscript, which was approved by all co-authors.	

Submission process including revisions:	A
<p><i>Free text description of PhD student's contribution (mandatory)</i> Bonde, E.H. submitted the first manuscript to Frontiers in Psychology. Following peer-review, Bonde, E.H. revised the manuscript, and proof-read the accepted manuscript. Before re-submission, the final manuscript was approved by all co-authors.</p>	

Signatures of first- and last author, and main supervisor

Date	Name	Signature
26.06.2023	Emilie Hasager Bonde	<i>Emilie Hasager Bonde</i>
26.06.2023	Lise Juul	<i>Lise Juul</i>

Date: 26.06.2023

Emilie Hasager Bonde

 Signature of the PhD student

Declaration of co-authorship concerning article for PhD dissertations

Full name of the PhD student: Emilie Hasager Bonde

This declaration concerns the following article/manuscript:

Title:	The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis
Authors:	Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L.

The article/manuscript is: Published Accepted Submitted In preparation

If published, state full reference: Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L. The impact of an organizational-level mindfulness-based intervention on workplace social capital and psychological safety: A qualitative content analysis. *Front Psychol.* 2023 Mar 7;14:1112907. doi: 10.3389/fpsyg.2023.1112907

If accepted or submitted, state journal:

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No Yes If yes, give details:

Your contribution

Please rate (A-F) your contribution to the elements of this article/manuscript, **and** elaborate on your rating in the free text section below.

- A. Has essentially done all the work (>90%)
- B. Has done most of the work (67-90 %)
- C. Has contributed considerably (34-66 %)
- D. Has contributed (10-33 %)
- E. No or little contribution (<10%)
- F. N/A

Category of contribution	Extent (A-F)
The conception or design of the work:	C
<i>Free text description of PhD student's contribution (mandatory)</i>	
The study design was conceived by Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., and Juul, L.	
The acquisition, analysis, or interpretation of data:	B
<i>Free text description of PhD student's contribution (mandatory)</i>	
Focus group data was collected by Bonde, E.H. and Mikkelsen, E.G. Bonde, E.H. conducted verbatim transcription of the data. Data was analyzed and interpreted by Bonde, E.H. in collaboration with Mikkelsen, E.G. All co-authors discussed the interpretations.	
Drafting the manuscript:	A
<i>Free text description of PhD student's contribution (mandatory)</i>	
Bonde, E.H. drafted the manuscript. Forward- and back-translation of Danish citations was performed by Bonde, E.H. and Mikkelsen, E.G. Before submission, all co-authors contributed with comments and corrections. Bonde, E.H. drafted the final manuscript. All co-authors approved the final manuscript.	

Submission process including revisions:	A
<p><i>Free text description of PhD student's contribution (mandatory)</i> Bonde, E.H. submitted the manuscript to Frontiers in Psychology. Upon peer-review, Bonde, E.H. conducted revisions to the original manuscript. All co-authors approved the revised manuscript prior to re-submission. Bonde, E.H. re-submitted the final version of the manuscript, and performed proof-reading of the accepted manuscript.</p>	

Signatures of first- and last author, and main supervisor

Date	Name	Signature
26.06.2023	Emilie Hasager Bonde	<i>Emilie Hasager Bonde</i>
26.06.2023	Lise Juul	<i>Lise Juul</i>

Date: 26.06.2023

Emilie Hasager Bonde

 Signature of the PhD student

Declaration of co-authorship concerning article for PhD dissertations

Full name of the PhD student: Emilie Hasager Bonde

This declaration concerns the following article/manuscript:

Title:	An organizational-level mindfulness-based intervention in private workplace settings - is it feasible and what are the mental health and organizational impacts?
Authors:	Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., Juul, L.

The article/manuscript is: Published Accepted Submitted In preparation

If published, state full reference:

If accepted or submitted, state journal: Mindfulness

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No Yes If yes, give details:

Your contribution

Please rate (A-F) your contribution to the elements of this article/manuscript, **and** elaborate on your rating in the free text section below.

- A. Has essentially done all the work (>90%)
- B. Has done most of the work (67-90 %)
- C. Has contributed considerably (34-66 %)
- D. Has contributed (10-33 %)
- E. No or little contribution (<10%)
- F. N/A

Category of contribution	Extent (A-F)
The conception or design of the work:	C
<i>Free text description of PhD student's contribution (mandatory)</i> The study was conceived by Bonde, E.H., Mikkelsen, E.G., Fjorback, L.O., and Juul, L.	
The acquisition, analysis, or interpretation of data:	C
<i>Free text description of PhD student's contribution (mandatory)</i> Bonde, E.H. acquired data in collaboration with Juul, L. Juul, L. performed the majority of analyses, while Bonde, E.H. performed some supplemental analyses. Data was interpreted in a collaboration between Bonde, E.H. and Juul, L. Interpretations were discussed with Fjorback, L.O. and Mikkelsen, E.G.	
Drafting the manuscript:	A
<i>Free text description of PhD student's contribution (mandatory)</i> The manuscript was drafted by Bonde, E.H. Comments and corrections were provided by all co-authors. Bonde, E.H. revised the manuscript prior to submission. The final submitted manuscript was approved by all co-authors.	
Submission process including revisions:	A

Free text description of PhD student's contribution (mandatory)

Bonde, E.H. submitted the manuscript to the journal "Mindfulness". As the corresponding author, Bonde, E.H. will be responsible for performing potential revisions as well as resubmission following peer-review.

Signatures of first- and last author, and main supervisor

Date	Name	Signature
26.06.2023	Emilie Hasager Bonde	<i>Emilie Hasager Bonde</i>
26.06.2023	Lise Juul	<i>Lise Juul</i>

Date: 26.06.2023

Emilie Hasager Bonde

Signature of the PhD student

DANISH CENTER FOR MINDFULNESS



AARHUS UNIVERSITY