

Mindfulness-Based Stress Reduction for Elementary School Teachers

Exploring feasibility
and effectiveness

Bernadette Lensen



Behavioural
Science
Institute

**Mindfulness-Based Stress Reduction for
Elementary School Teachers**

Exploring feasibility and effectiveness

Johanna Huiberdina Lensen



Rotterdamse Vereniging voor Katholiek Onderwijs

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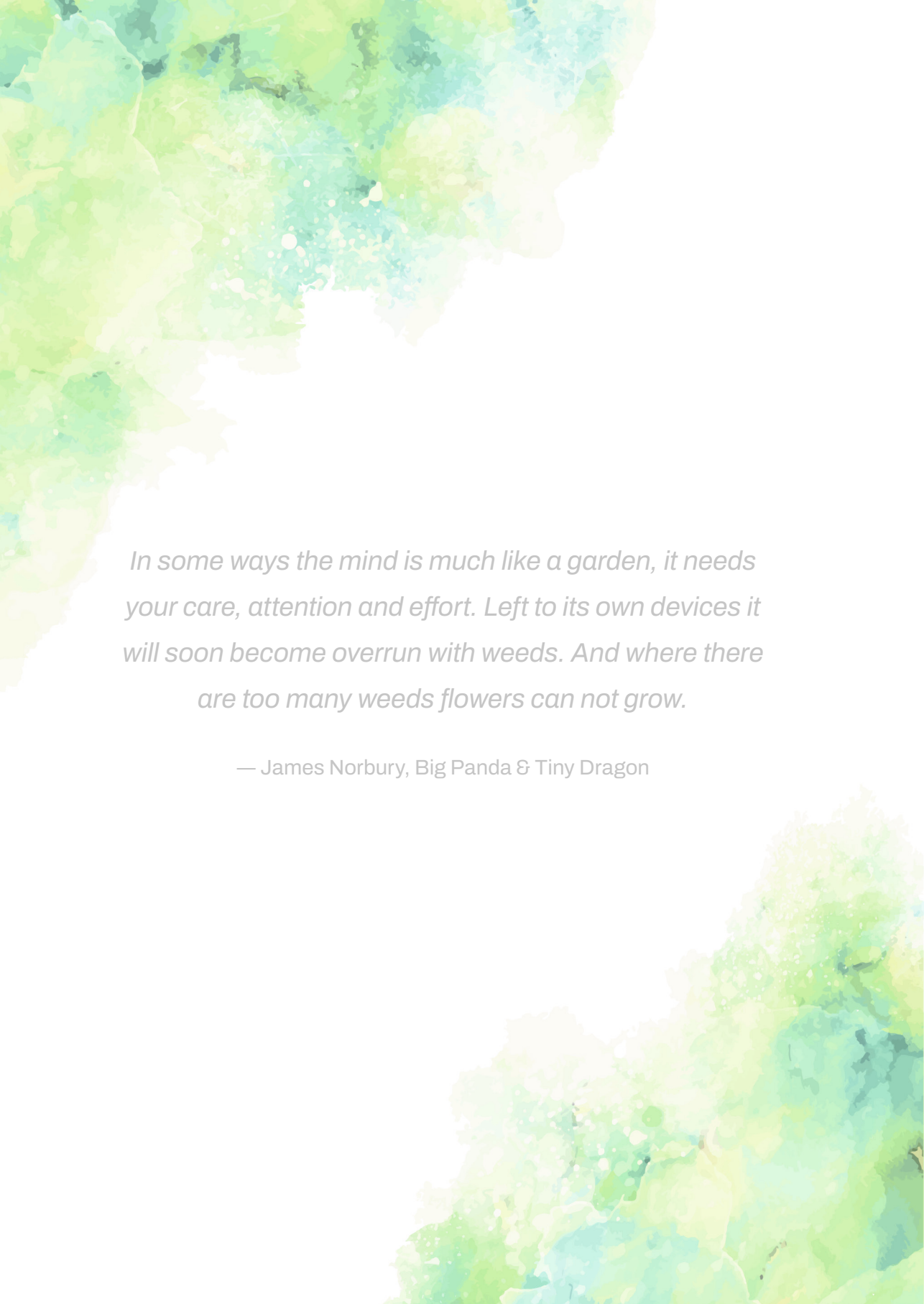
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In some ways the mind is much like a garden, it needs your care, attention and effort. Left to its own devices it will soon become overrun with weeds. And where there are too many weeds flowers can not grow.

— James Norbury, Big Panda & Tiny Dragon

Chapter 1

General Introduction

GENERAL INTRODUCTION

In the first part of this introduction, I describe a series of observations that raised questions, followed by a theoretical and empirical underpinning of the questions discussed.

With over three decades of experience in primary education, primarily in disadvantaged areas, of which 15 years as principal of an elementary school serving 700 pupils with a dedicated team of 80, I have witnessed a wide array of societal and educational developments that may increase teachers' stress. An observation which has motivated me to study this topic further.

The evolving landscape of a complex society has firmly entrenched itself in all aspects of primary education. An example of this is the rapid succession of digital advancements. Another is the noticeable rise in complex social themes such as diversity and inclusion, equal opportunities, environmental consciousness, and media education—each now integral to the elementary school curriculum. Moreover, educators must navigate shifting government and municipality regulations, such as the increased attention given to the consequences of growing poverty in families and the introduction of acts like the Appropriate Education Act (Primary Education Act, n.d.). This act aims to guarantee that all children, regardless of disabilities or learning and behavioral challenges, have access to education alongside their peers in regular schools. This necessitates increased differentiation in teaching methods and heightened specialization among teachers (Van Den Berg, 2020). In addition, society places greater emphasis on results and performance, heightening expectations of pupils and parents. Furthermore, the perception of the elementary school teaching profession has deteriorated, leading to a decline in social esteem for these educators (Algemene Onderwijsbond, 2020). This trend coincides with a growing teacher shortage, further straining those working in the field. Among other things, these developments have contributed to the stress that can be experienced in schools (Peeters et al., 2022).

In addition to above mentioned societal pressures, I have also noted aspects that are more specific to the teachers themselves that may contribute to their stress levels. For instance, combining intensive days with pupils with non-lesson hours dedicated to preparation and meetings presents a significant challenge, especially since there has been a marked increase in administrative tasks as well (De Weerd et al., 2017).

Additionally, I've noticed an increase in the range of challenges that pupils present, including the nuances of their behavior and a more intricate interplay of various issues they face. For instance, pupils today might exhibit a wider range of behaviors stemming from diverse backgrounds, experiences, and individual circumstances, such as socio-economic factors, mental health concerns, or learning disabilities. These complexities

not only pose challenges for pupils themselves but also present significant hurdles for teachers in effectively addressing their diverse needs and providing appropriate support, which is also confirmed by the Algemene Onderwijsbond (2020).

I have personally witnessed the impact the above mentioned developments had on the well-being of teachers in primary education, confirmed by a notable increase in teacher absenteeism (Statistics Netherlands, 2022). This has led me to ponder: 'How can we take care of pupils while also ensuring the welfare of our teachers?'. Acknowledging that I cannot transform the education system, I have sought insights from scientific research that could initially contribute to reducing stress and enhancing teacher well-being in primary education which might indirectly also improve the caretaking of pupils. In my view, effective education begins with teachers who feel comfortable and possess the necessary skills to navigate the daily demands of teaching in a healthy manner.

I came across promising research on mindfulness-based interventions in schools, primarily from the US and the UK (Abenavoli et al., 2013; Jennings et al., 2011; Roeser et al., 2012). These interventions generally target pupils or a mixed teacher population across primary, secondary, and higher education. Surprisingly, there has not yet been any research in this domain in the Netherlands. Therefore, I sought training in Mindfulness-Based Stress Reduction (MBSR), and earned my certification as an MBSR and Mindfulness-based Cognitive Therapy mindfulness-teacher at the Radboud University Medical Center. This positively impacted both my professional and personal life and prompted me to explore the potential for implementing a standard MBSR intervention for education professionals. The board of the Rotterdam Association for Catholic Education (RVKO), overseeing 67 elementary schools ($n= 21.000$ pupils, $n= 2400$ professionals) supported my plans, so I started to teach the MBSR training to professionals in primary education. The overwhelmingly positive feedback led us to ponder how we might objectively demonstrate and understand the specific benefits of these practices, which inspired a pilot-study (Lensen et al., 2022) in collaboration with Radboud University -Behavioral science Institute, the Radboud University Medical Center- Center for Mindfulness, and the Trimbos Institute. And this subsequently paved the way for a larger-scale randomized controlled trial.

Stress among teachers a growing concern

Teaching is acknowledged as one of the most demanding professions, often accompanied by significant work-related stress (Lomas et al., 2017; Agyapong et al., 2022; OECD, 2020). This stress is concerning for multiple reasons. First, it can undermine teachers' well-being, encompassing their mental, emotional, and physical health, potentially leading to burnout, fatigue, and other health issues (Travers, 2017; de Carvalho, 2021). Second, stress can impede teachers' performance and self-efficacy, negatively affecting the quality of the classroom climate, instructional strategies, and the provision of quality education, which may, in turn, influence student outcomes (Chong & Kong, 2012; Meristo

This shifted the perspective from a Buddhist moral system to an ethically secularized mindfulness accessible to all (Hanley et al., 2016). Post-2000, mindfulness research evolved into the evaluation of a psychological intervention for enhanced well-being (Hanley et al., 2016). This era also witnessed the increase of Randomized Controlled Trials (RCTs) in the mindfulness research community (Lee et al., 2021).

Mindfulness is characterized as “the awareness that arises through purposeful, nonjudgmental attention to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p.145). The original MBSR-program, developed by Kabat-Zinn (2013) is a group-based intervention consisting of eight weekly sessions of two hours and one day of silent practice. The program consists of three primary components: (1) formal and informal meditation exercises, such as sitting meditation and yoga; (2) dialogue and (3) psychoeducation about stress and stress responses. Participants are encouraged to practice mindfulness at home for at least 35 minutes each day during the entire course of MBSR. The core of MBSR involves cultivating mindfulness skills, allowing participants to direct their attention to the present moment through the development of an observing stance towards their thoughts, feelings, and behaviors. This practice improves the capacity to identify habitual reaction patterns, empowering individuals to make conscious choices. Participants develop the ability to respond with reduced reactivity to negative thoughts and emotions (Fanning et al., 2018; Rad et al., 2023, Gilbert & Waltz, 2010). While MBSR initially focused on stress and pain management, it has evolved over time and is now applied in a much broader context. Today, MBSR is used not only for stress reduction but also to prevent well-being. MBSR is based in science and contemporary approaches managing mental and physical health and supporting well-being; it is suitable for delivery in mainstream public institutions across a range of settings and cultures; and is maximally accessible to people with diverse values and religious affiliations (Crane et al., 2017).

Mindfulness-Based Interventions for teachers

Research on Mindfulness-Based Interventions (MBIs) for teachers has expanded over the last two decades (Jennings, 2017). However, a significant research gap exists in studies specifically addressing elementary school teachers (Jennings, 2017). A limited number of RCTs, infrequent preregistration of study protocols, and rare follow-up assessments characterize the current state of research in this context. Elementary school teachers, who engage daily with their pupils, cultivate stronger pupil-teacher relationships and experience a stronger emotional involvement in teaching compared to teachers in secondary or higher education (Statistics Netherlands, 2020). Therefore, elementary school teachers may experience more profound effects from MBIs. For example in the experienced quality of pupil-teacher relationship and the quality of the classroom climate, which in turn is related to the teachers' experienced stress (Collie et al., 2017; Corbin et al., 2019; Jennings et al., 2017; Lomas et al., 2017). Furthermore, while most studies on MBIs in education were conducted in the United States, European educational systems, where

elementary school teachers primarily teach children aged 4 to 12, remain comparatively understudied.

Standard MBSR versus tailored Mindfulness-Based Interventions (MBIs)

Most studies on mindfulness for teachers examine MBIs that are adapted to the educational field and, therefore, differ in terms of content and duration from the standard MBSR program as described earlier. According to Crane and colleagues (2016), MBIs emphasize systematic and sustained training in formal and informal mindfulness meditation practices for both mindfulness-teachers and participants. These interventions are rooted in mindfulness, integrating core curriculum elements with adapted ones, tailored to specific contexts and populations. Program variations in structure, length, and delivery can be adjusted to suit the population and context. The meta-analysis of 29 studies by Klingbeil and Renshaw (2018) evaluated teacher interventions in which training mindfulness skills was the primary therapeutic component. There was a large variety in duration (from 2 to 36 weeks) and dosage (from 2 to 75 hours) of the MBIs and the interventions could also differ in content. In addition to mindfulness skills, an intervention could also place more emphasis on, for example, self-compassion or emotion-regulating skills (Jennings et al., 2017; Roeser et al., 2013).

Furthermore, working with and researching adapted MBIs prompts an exploration into how the effects of these tailored interventions in educational settings differ from standard MBSR programs. The current evidence presents a mixed picture. For example, the Cultivating Awareness Resilience in Education (CARE) intervention, despite being highly tailored, did not consistently enhance teacher self-efficacy across multiple studies (Jennings et al., 2011, 2013). In contrast, Mindfulness-Based Wellness Education (MBWE), with only minor adjustments for teachers, demonstrated significant improvements in self-efficacy (Poulin et al., 2008). These discrepancies in outcomes highlight the importance of considering the nuances in the design of mindfulness programs, as variations in customization may impact their effectiveness and reported outcomes. As the evidence base continues to expand, it becomes imperative to pinpoint the specific components of MBIs that are most efficacious for teachers. Thus, while MBIs are often tailored to the educational field, the inconsistency in results raises questions about the necessity of such adjustments. This is particularly relevant given evidence from the medical context suggesting that standard programs like Mindfulness-Based Cognitive Therapy or MBSR may outperform tailored MBIs (Cillessen et al., 2019). In addition, a standard program is easier to implement.

In search of evidence

Numerous studies collectively support the positive effects of Mindfulness-Based Interventions (MBIs) in teachers. Klingbeil and Renshaw's (2018) meta-analysis of 29 studies, encompassing various MBIs such as MBSR, Stress Management and Relaxation Techniques-in-education (SMART), CARE and Cultivating Emotional Balance Training, revealed positive impacts on teachers' occupational stress and burnout, mindfulness

skills (i.e. observing, describing, acting with awareness, non-judgement and non-reactivity) and psychological well-being. Also, small effects were found on pupil-teacher relationship and modest effects on classroom climate quality. The duration and dosage of MBIs varied widely, with effects ranging from small to medium. Another systematic review by Hwang and colleagues (2017), which included only 9 out of 19 studies that overlapped with those reviewed by Klingbeil and Renshaw (2018) and also incorporated qualitative research, found large effects on perceived stress and mindfulness skills, moderate effects on self-compassion, and small effects on teacher self-efficacy. A meta-analysis of mindfulness training on teacher well-being by Zarate et al. (2019), which included 18 control-trial studies, 16 of which were from the meta-analysis by Klingbeil and Renshaw (2018) involved a total of 1,001 in-service teachers using mindfulness as a primary intervention. The analysis suggests that mindfulness has statistically significant positive outcomes, including increases in teacher mindfulness and decreases in stress. The small to moderate overall effects of mindfulness practices for teachers are consistent with the findings of Klingbeil and Renshaw (2018).

While these overview studies show promising effects, it is noteworthy that they primarily include studies from the USA, involving a mixed teacher population. The recent study of De Carvalho and colleagues (2021) stands out as one of the few European RCTs, focusing specifically on elementary school teachers in Portugal. This study reported increased well-being, mindfulness skills, emotional regulation, and self-efficacy in the intervention group. However, only short-term benefits for the classroom climate were observed.

Mechanisms of Change

To understand why an intervention generates effects, it is not enough to only focus on direct outcomes. Only a few studies report the mechanisms of change in MBI program outcomes (Emerson et al., 2017). Understanding the working mechanisms and essential elements of mindfulness interventions is crucial for comprehending the effectiveness of MBSR programs. This knowledge will facilitate the development of more effective MBSR programs for teachers in the future. Both Schlusser and colleagues (2016) and Taylor and colleagues (2016) suggested that increased emotion regulation efficacy may serve as a potential mediator in stress reduction as a consequence of MBSR. A systematic review and narrative synthesis by Emerson and colleagues (2017) was conducted on 13 samples of quantitative and qualitative studies that reported the effects of MBIs on symptoms of stress, emotion regulation, and self-efficacy in teachers of children aged 5–18 years. They concluded that MBIs, including SMART, CARE, and adapted MBSR, improved mindfulness skills, emotion regulation, and self-compassion. Regarding intermediate effects on stress reduction, they concluded that MBIs showed the strongest promise for enhancing teacher emotion regulation. According to Emerson and colleagues (2017), research on MBIs often includes the measurement of trait mindfulness and self-compassion as indicators of cognitive changes that may lead to broader changes, such as decreased stress.

Theoretical Framework

The MBSR intervention is expected to enhance teachers' mindfulness skills (Jennings et al., 2017) and foster self-compassion (Roeser et al., 2022). This, in turn, is expected to promote improved emotion regulation by teachers (Jennings et al., 2017; Roeser et al., 2022; Tang et al., 2015), leading to a reduction in perceived stress and an increase in emotional, psychological, and social well-being (Querstret et al., 2020; Jennings et al., 2017; Roeser et al., 2022). However, these concepts partly overlap, suggesting that the changes are likely to occur not sequentially but rather simultaneously. Past MBSR interventions among teachers have demonstrated an increase in teachers' self-efficacy (Emmerson et al., 2017). This enhanced self-efficacy, is anticipated to contribute to improved pupil-teacher relationships and a higher classroom climate quality (Robertson & Dunsmuir, 2013; Meristo & Eisenschmidt, 2014; Chong & Kong, 2012). For a visual representation of the proposed theory of change, please refer to Figure 1.

Qualitative Research on the effects of Mindfulness-Based Interventions

Although quantitative studies on the effectiveness of MBIs in education provide important insights, none of these studies tell us about how elementary school teachers *experience* participating in standard MBSR and the possible relation between participating in MBSR and their personal functioning, their professional functioning and their classroom climate quality. In contrast, qualitative methods provide rich descriptions, enhancing understanding of both events and their context. These methods broaden perspectives, helping to identify patterns and distinctions among variables. It raises the question "Can we test the above model using qualitative research?". Qualitative research goes beyond description, moving inquiry toward more meaningful explanations (Sofaer, 1999). Therefore, by using a qualitative design we can examine how teachers in elementary schools experience the effects of standard MBSR on their personal and professional functioning and on the classroom climate quality .

As an emerging area, there are only a handful of qualitative studies available for review. Information presented in the review of Hwang and colleagues (2017) containing quantitative and qualitative research therefore, contains the context and effects of mindfulness-based interventions generated by studies that did not meet all quality indicators as stated in their study. Of the five qualitative studies, two provided an account of trustworthiness in their findings. Hwang et al. (2017) conducted a secondary analysis of qualitative studies exploring in-service teachers' experiences with mindfulness. This analysis offered potential explanations for the effects of mindfulness interventions observed in primary quantitative studies. Mindfulness practices strategically helped teachers cope with stress, fostering improved awareness over time. This heightened awareness was linked to reduced stress levels, enabling skillful and reflective responses in challenging situations. Positive impacts were noted in emotion regulation and the use of positive language, resulting in enhanced teacher performance. Teachers' improved coping with stress was associated with increased attunement to students' needs and

the development of compassion and kindness towards themselves and others. The cultivation of self-awareness, social awareness, self-management, and compassion were identified as instrumental factors in improving relationships and teaching practices. A subset of three qualitative studies from the systematic review and narrative synthesis by Emerson and colleagues (2017) generally yield results similar to the research of Hwang and colleagues (2017). They further contribute to these findings by emphasizing that teachers consistently integrate mindfulness into their personal lives, resulting in improved self-care.

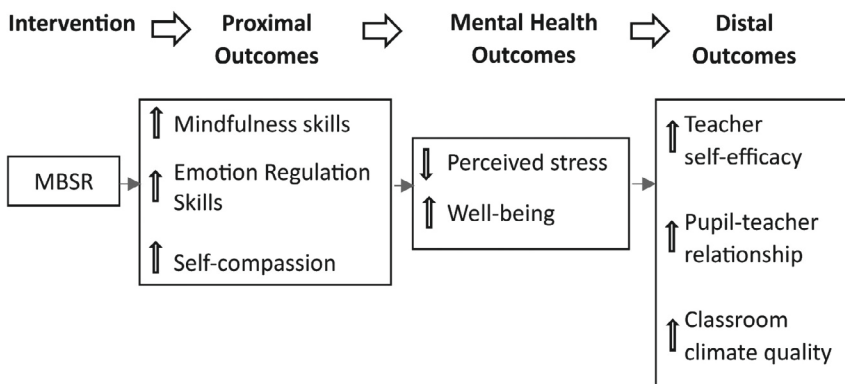


Figure 1. Theory of change

Conclusion

In conclusion, numerous studies on MBIs for teachers have shown promising effects on teachers' perceived stress. Additionally, there are encouraging indications of improvements in teachers' well-being, self-efficacy, perceived pupil-teacher relationships, and classroom climate quality. However, the current state of research is characterized by limited RCTs, infrequent preregistration of study protocols, small sample sizes, and rare follow-up assessments (Hwang et al., 2017; Klingbeil and Renshaw, 2018; Zarate et al., 2019).

Moreover, the majority of studies investigating mindfulness for teachers focus on MBIs specifically tailored to the educational context. Consequently, these interventions often differ in terms of content and duration from the standard MBSR program. It is essential to note that the majority of these studies were conducted in the USA or outside Europe and encompassed a mixed teacher population. Considering the concerning trend of increased perceived stress levels among Dutch elementary school teachers and the associated negative consequences, there is a need for stress-reducing interventions within Dutch primary education. The already existing and readily accessible standard MBSR could potentially contribute positively to this. Furthermore, gaining a clearer understanding of

the working mechanisms of MBSR and teacher experiences could add value to future interventions.

This thesis

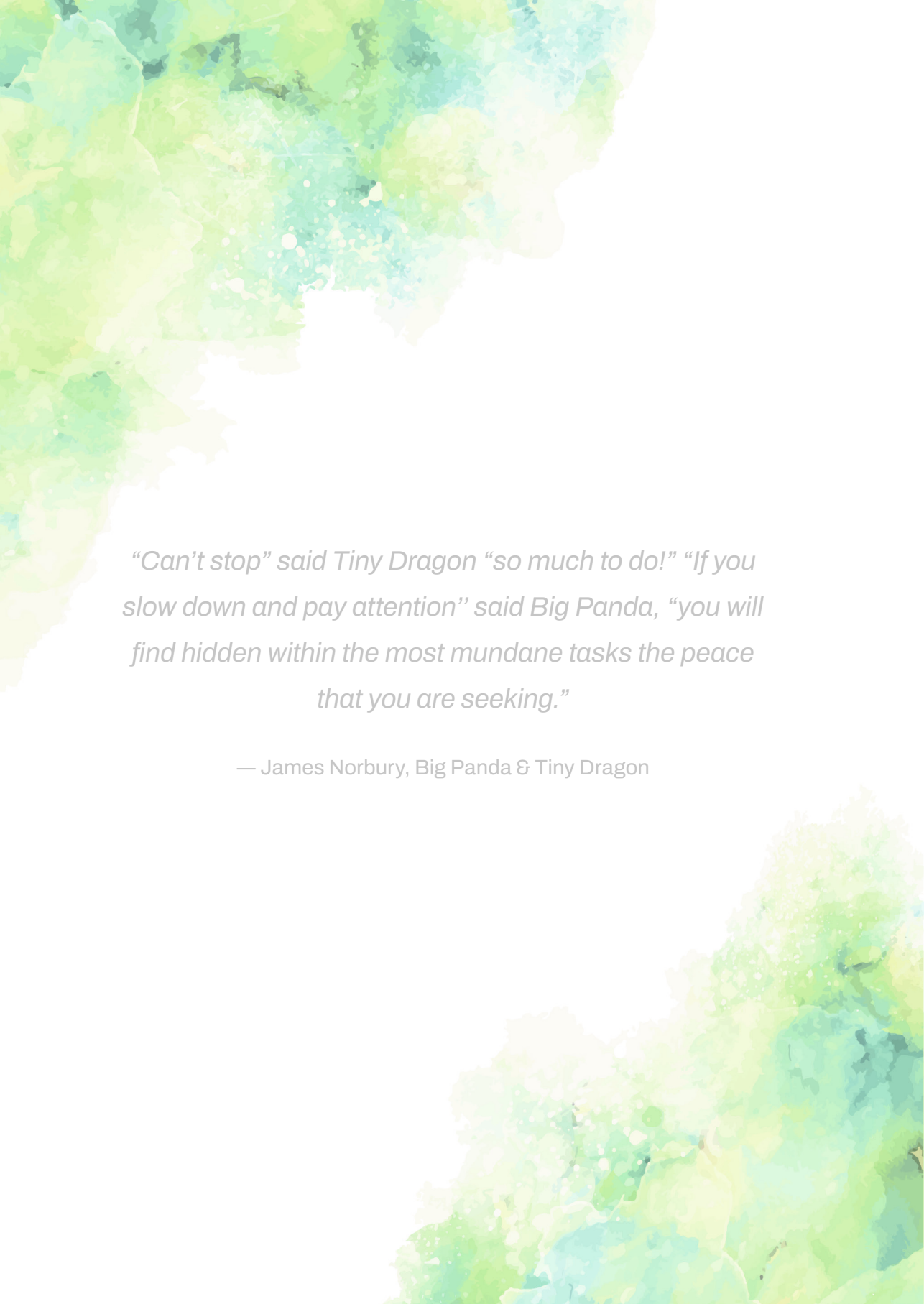
Aim

The primary aim of this thesis was to investigate the effectiveness of a standard MBSR program in reducing perceived stress among teachers in Dutch primary education. The secondary aim was to examine the effects of MBSR on teachers' mental health, teacher skills, the pupil-teacher relationship and the perceived quality of the classroom climate. The third aim was to gain deeper insights into the demographic or individual characteristics that are most conducive to the optimal effectiveness of the MBSR program. Additionally, we aimed to investigate possible mediators that influence treatment outcomes, encompassing mindfulness skills, self-compassion, and emotion regulation skills. Due to the absence of similar research in the Netherlands, we conducted a preliminary uncontrolled pilot study on the effects of standard MBSR on elementary school teachers in Rotterdam establishing a solid foundation for a well-conducted RCT. The subsequent superiority RCT, comparing MBSR to a waiting list control condition with a 3-month follow-up, was conducted with elementary school teachers in a large urban area. Additionally, in-depth qualitative interviews were conducted to explore the personal experiences of teachers, further revealing underlying mechanisms.

Outline

Chapter 2 describes an uncontrolled pilot study comprising 71 elementary school teachers. The research questions in this chapter are: Does the MBSR-training reduce the perceived stress of teachers in primary schools? Does the MBSR-training improve mindfulness skills, self-compassion and mental health of the teachers? Is standard MBSR feasible to offer in this setting, and what is its provisional effectiveness? **Chapter 3** describes the design and protocol of Mindfulness-Based Stress Reduction as an intervention for elementary school teachers. This chapter provides a comprehensive overview of both the randomized controlled trial and qualitative study. It furnishes detailed information on various methodological aspects of the trial, encompassing its design, eligibility criteria, study procedure, sample size calculation, research questions, outcome measures, and statistical analyses. Answering important questions it elucidates the study's objectives and the anticipated impact of its findings, particularly concerning the effects of MBSR training on elementary school teachers' perceived stress, mental health, mindfulness skills, self-compassion, emotion regulation, self-efficacy, as well as their perceived pupil-teacher relationship and classroom climate quality. **Chapter 4** presents the results of the main RCT ($n = 146$ teachers) and answers the following research questions: Does participation in a standard MBSR training lead to a decrease in perceived stress and an enhancement in well-being among elementary school teachers? To what degree do mindfulness skills, emotion regulation, and self-compassion serve

as secondary proximal outcomes in the context of MBSR training? To what degree do teacher self-efficacy and their perceived pupil-teacher relationship and classroom climate quality serve as secondary distal outcomes in the context of MBSR training? Are the effects of the MBSR training moderated by factors such as past or present psychological problems, school weight, years of teaching experience, and age? **Chapter 5** describes the possible mediating processes underlying the effectiveness of the standard MBSR program on elementary school teachers. The research question in this chapter is: To what extent do mindfulness skills, self-compassion, emotion regulation, and teacher self-efficacy serve as possible mediators that explain the effects of the MBSR program on perceived outcomes? **Chapter 6** describes an explorative qualitative study ($n = 46$). The research question in this chapter is: How do elementary school teachers perceive the impact of a standard eight-week MBSR program on their personal functioning, professional functioning, pupil-teacher relationship and classroom climate quality? **Chapter 7** provides a summary of the main findings, followed by a general discussion of the results in the context of the current literature. It addresses the strengths and limitations of the research project, providing directions and implications for future research.



“Can’t stop” said Tiny Dragon “so much to do!” “If you slow down and pay attention” said Big Panda, “you will find hidden within the most mundane tasks the peace that you are seeking.”

— James Norbury, Big Panda & Tiny Dragon

Chapter 2

Mindfulness-Based Stress Reduction intervention for elementary school teachers: a pilot study

This chapter is based on

Lensen, J. H., Stoltz, S. E. M. J., Scholte, R. H. J., Speckens, A. E. M., and Kleinjan, M. (2022). Mindfulness-Based Stress Reductie interventie voor leerkrachten in het basisonderwijs: Een pilotstudie. Orthopedagogiek: Onderzoek en Praktijk, (Sint-Niklaas: Gompel & Svacina), 36–48.

ABSTRACT

In primary education, more than half of all teachers experience a heavy workload which is often accompanied by detrimental health consequences. Compared to other professions, both the rate of sick leave and the chance of developing mental health problems are overrepresented among elementary school teachers. Despite the strong need to reduce the experience of stress among elementary school teachers, research on stress reduction in this particular population is relatively scarce. Previous studies in the general population have shown that practicing mindfulness significantly reduces stress. The present pilot study examined whether completing an 8-week Mindfulness-Based Stress Reduction (MBSR) training by elementary school teachers was associated with decreased levels of perceived stress, and improvements in mental health, mindfulness skills and self-compassion. It was also examined for whom the MBSR training could be most effective. The total research sample consisted of 71 elementary school teachers. Questionnaires were administered immediately before and after the training. Analyses revealed a significant reduction of perceived stress as well as significant increases in mental, emotional and social well-being, and in mindfulness skills and self-compassion, after completing the MBSR training. We also found indications that the training might exert a larger effect on a) teachers who have had, or currently have, symptoms of mental health problems, and/or, b) teachers who worked in schools with more complex pupil populations. The results of this pilot study provide the first indications that elementary school teachers do benefit from MBSR training. Additional research with a larger sample size and a stronger design with a control group included is needed to obtain more clarity about the potential of MBSR training as an intervention to reduce levels of stress and to ameliorate mental health problems among elementary school teachers.

INTRODUCTION

In recent years, the profession of elementary school teaching has come under increasing pressure. According to Grinsven et al. (2016), 56% of teachers indicate that they are experiencing an unacceptably high workload. This pressure encompasses not only the substantial number of tasks but also the emotional demands inherent in the work (Jennings, 2017). The ability of a teacher to manage this emotional burden is directly linked to the level of stress they experience. Roeser et al. (2013) conducted research involving 113 elementary and secondary school teachers in Canada and the United States, revealing that the capacity of teachers to cope with stress and regulate their emotions significantly impacts their mental health. The study established a correlation between these factors and feelings of anxiety, depression, exhaustion, and burnout. According to the Transactional Model of Stress and Coping proposed by Lazarus (1991), the intensity of an emotion is determined by how one interprets a stressor along with their ability to regulate emotions. Consequently, prolonged exposure to negative emotions triggered by external stressors contributes to feelings of stress (Roffey, 2012).

The stress experienced by teachers can result in failure or premature departure from the profession. This is evidenced by a significant percentage of absenteeism and burnout symptoms among elementary school teachers (Algemene Onderwijsbond, 2020). Additionally, statistics show that one in five of the starting teachers leave the education sector within five years, while one in eight teachers actively seek employment outside of education. The primary reasons cited for this trend are workload and the associated stress levels (TNO/Statistics Netherlands, 2015; TNO, 2019). Furthermore, the World Health Organization (WHO, 2011) has made a concerning prediction that stress will become the number one health hazard by 2030. Consequently, there is an urgent need to explore sustainable interventions aimed at reducing stress in the education sector.

Consequences of stress

Persistent stress among teachers has negative consequences for their mental health and overall well-being (Roeser et al., 2013). Additionally, stress can adversely affect cognitive and social functioning, such as reduced (working) memory function, impaired planning abilities, and quicker loss of self-control (Arnsten, 2009). Since these effects can manifest in stressful educational settings, they can detrimentally impact the skills required for effective teaching and classroom management (Meiklejohn et al., 2012). Furthermore, stress not only affects teachers' well-being and skills but also their relationships with pupils. A review study by Spilt et al. (2011), which summarized the findings of 99 studies from international literature across primary and secondary education, indicates that teacher stress negatively influences the pupil-teacher relationship, and vice versa. A poor pupil-teacher relationship indirectly affects the mental health and well-being of the teacher as well (Collie et al., 2017). It leads to undesirable pupil behaviors, lack of motivation, and decreasing academic performance (Roffey, 2012; Spilt et al., 2011), which

in turn can increase the stress experienced by teachers (Jennings et al., 2017). Given the advisory and supportive role played by internal and external educational psychologists in assisting elementary school teachers, it is crucial to disseminate newly acquired insights into stress prevention. This is especially important as it not only positively impacts teacher functioning but can also have ripple effects on the pupil-teacher relationship and pupil performance.

Reducing stress

Although there is a significant need in the workplace to mitigate the stress experienced by teachers, there has been minimal worldwide research conducted on ways to reduce stress specifically among elementary school teachers. A meta-analysis of 65 independent studies on teacher stress experience, of which only 17 pertained to elementary school teachers, suggests that improved emotion regulation can be key to stress reduction (Jennings et al., 2017). Skills such as insight into one's own emotions and thoughts, and the ability to effectively regulate these emotions and thoughts during teaching, contribute to reducing experienced stress. Teachers who possess these skills are better equipped to develop supportive relationships with their pupils, experience more positive emotions, exhibit greater mental resilience, and achieve higher levels of job satisfaction.

Mindfulness-Based Stress Reduction (MBSR)

A promising method to improve emotion regulation and reduce experienced stress is Mindfulness-Based Stress Reduction (MBSR), developed by Jon Kabat-Zinn (2013). He defines mindfulness as "being attentive in a special way: being consciously present in the here and now, without judgment." Mindfulness can contribute to stress reduction by enhancing insight into thought patterns, fostering emotional awareness, and facilitating emotion regulation (Meiklejohn et al., 2012). A meta-analysis of 29 studies involving healthy adults demonstrates that participation in a mindfulness intervention significantly decreases stress perception and has a moderate effect on reducing depressive and anxiety symptoms, as well as improving quality of life (Khoury et al., 2015). The results of a meta-analysis involving more than 12,000 individuals with disorder-specific symptoms in psychiatry, such as depression, support the notion that mindfulness-based interventions are as effective as other evidence-based psychological and psychiatric treatments (Goldberg et al., 2018). Additionally, other studies have shown promising effects on worrying, attention, emotion regulation, personal performance, and empathy (Meiklejohn et al., 2012). An overview article by Tang et al. (2015) further confirms the positive effect on emotion regulation. Specifically, participants in an eight-week MBSR training exhibited an increase in gray matter density in the hippocampus compared to the control group, an area associated with emotion regulation. Furthermore, participants reported reduced emotional reactivity to unpleasant situations, decreased psychological reactivity, and quicker recovery to emotional stability following a stress response.

Mindfulness among elementary school teachers

To date, hardly any international research has been conducted into the effectiveness of mindfulness among elementary school teachers. Research in this field in the Netherlands is completely lacking. The research by Jennings et al. (2017) among 224 American k-5 teachers (similar to primary education) is the largest research to date. The research shows promising results. Compared to the control group, the intervention group shows significant reduction in experienced stress, perceived time pressure and an improvement in mindfulness and emotion regulation through self-reporting. In addition, the teachers in the intervention group indicate that they experience more self-awareness (96%), an improvement in mental health and well-being (88%) and less work stress (66%). They also report coping more effectively and compassionately with the behavior of their pupils (86%). Previous studies, in which a mix of teachers from various forms of education participated, reveal similar findings (Roeser, 2016; Roeser et al., 2012; Skinner & Beers 2016). For example, it appears that when teachers can use mindfulness skills, they are better able to estimate and respond to emotionally provocative situations in the classroom. This reduces the stress experienced and improves mental well-being.

Investing in sustainable stress reduction for elementary school teachers is necessary, particularly due to the negative consequences of persistent stress. In the absence of such research in the Netherlands, we conducted an initial pilot study to investigate the effects of an MBSR training aimed at reducing stress experienced by 71 elementary school teachers. Following the training, it was anticipated that teachers would experience reduced stress levels and improvements in mindfulness skills, self-compassion, and mental health. Since elementary school teachers comprise a diverse group, some teachers may derive greater benefits from the MBSR intervention than others. For instance, teachers at urban schools often encounter more stress due to working with complex pupil populations compared to teachers in rural areas (Ouellette et al., 2018). Therefore, teachers working with more complex pupil populations might derive greater benefits from the intervention. Additionally, it's possible that teachers who have experienced psychological issues or currently experience psychological complaints may also benefit more from the MBSR training (Goldberg et al., 2018).

METHODS

Procedure

Teachers who were interested and met the following criteria were able to register via an online system at a teacher training college (Pabo) in Rotterdam:

- a) teaching at least two days in the same group between the start of the school year and the end of MBSR training.

- b) not have previously completed mindfulness-based training totaling more than 4 hours.

An intake interview was conducted with all teachers by the MBSR trainer. The pilot was divided into four starting periods spread across two school years, allowing teachers to begin training in September 2017 and 2018, as well as March 2018 and 2019. During the online registration process, teachers were asked to provide the name of their school, enabling linkage to the school's socioeconomic status (SES) weight. This weight percentage is publicly available and can be obtained free of charge. Subsequently, it was found that 73% of teachers taught at schools with less than 17% pupils with low SES weight, while 27% taught at schools with more than 17% pupils with a low SES weight. During the telephone intake interview, participants were asked about their current psychological well-being and whether they had experienced psychological complaints in the preceding period.

Participants

As depicted in Table 1, 71 teachers from 23 different schools in Rotterdam and the surrounding area participated in the study (M age = 40.7 years; SD = 11.4). They were enrolled between September 2017 and March 2019. The participants' teaching experience in primary education ranged from 1 to 40 years (M work experience = 14.9 years; SD = 10.5). For this study, we examined the average percentage of school weight¹ among elementary schools in the municipality of Rotterdam, which remained at 17% throughout the study period.

Table 1. Characteristics of the total research group

	Percentage (n =71)
Male	4
Female	96
Psychological complaints	
Not have (had) psychological complaints	48
Current and/or past psychological complaints	52
Work place/weighted pupils ²	
< 17% weighted pupils in school	73
≥ 17% weighted pupils in school	27

Teachers' work experience ranges from 1 year to 40 years ($M = 14.9$; $SD = 10.5$).

Intervention

The intervention involves MBSR based on the program developed by Kabat-Zinn (2013). It consists of a group training with 6-15 participants, comprising eight weekly two-hour sessions and a silent day. The training includes psychoeducation, interactive exercises, as well as various forms of meditation and yoga (see Table 2). The trainer was a certified category-1 trainer, trained at the Radboudumc Center for Mindfulness and affiliated with the Association Mindfulness-based Trainers Netherlands and Flanders. The following outcome measures were addressed:

Measurements

Perceived Stress: Perceived Stress Scale (PSS, Cronbach's $\alpha = .83-.90$; 10 items; 5-point Likert scale ranging from 1 "never" to 5 "very common") (Cohen et al., 1983). This questionnaire assesses the overall stress level experienced in the past month, capturing perceptions of unpredictability, uncontrollability, and overload in life. Sample questions include: "In the last month, how often have you felt upset by something happening unexpectedly?" and "Have you felt nervous and stressed?".

Mindfulness skills: Five Facet Mindfulness Questionnaire Short Form (FFMQ-SF, Cronbach's $\alpha = .85-.86$; 24 items; 5-point Likert scale ranging from 1 "never or very rarely true" to 5 "very often or always true") (Baer et al., 2008). This questionnaire assesses five mindfulness skills associated with mental health: observing, describing, acting with awareness, non-judging, and non-reactivity. It consists of statements such as: "It's hard for me to find the words to describe what I'm thinking" and "I find it difficult to stay focused on what's happening in the present moment".

Self-compassion: Self-Compassion Scale-Short Form (SCS-SF, Cronbach's $\alpha = .82-.84$; 12 items; 7-point Likert scale ranging from 1 "almost never" to 7 "almost always")

(Neff & Vonk, 2009). This questionnaire assesses the level of self-compassion, which is associated with mental health. Respondents rate each statement on a scale, with items including: “If I fail at something important to me, I become consumed by feelings of inadequacy” and “I try to be understanding and patient toward aspects of my personality I don’t like.”

Mental Health: Mental Health Continuum-Short Form (MHC-SF, Cronbach’s $\alpha = .88-.89$; 14 items; 6-point Likert scale ranging from 1 “never” to 6 “every day”) (Lamers et al., 2011). This questionnaire assesses the emotional well-being, social well-being, and psychological well-being of the teacher. Sample questions include: “In the past month, how often did you feel that your life has a sense of direction or meaning to it?” and “In the past month, how often did you feel that you had warm and trusting relationships with others?”.

Analysis strategy

For the analysis, descriptive statistics were first calculated for the research group. Additionally, correlations were computed between all descriptive data and outcome measures to provide insight into the univariate relationships between variables. Paired t-tests were conducted to assess differences in perceived stress, mindfulness skills, self-compassion, and mental health between pre- and post-measurements. To compare elementary school teachers with and without psychological complaints, as well as those working in schools with pupil-weights below 17% or above-average pupil weights, repeated measures ANOVA was employed. This analysis included one between-participants factor (subgroup) and one within-participants factor (time; pre-post), aiming to determine whether the intervention yielded more favorable outcomes for certain groups of teachers. Of the 71 teachers, 3 did not complete the questionnaire after the intervention due to absence from the final meeting, where the last data collection occurred. Although this dropout rate was very low, chi-square tests and t-tests were conducted to examine whether there was selective dropout. Results indicated selective dropout occurred. All analyses were performed using SPSS (version 27).

RESULTS

Descriptive Data

Firstly, the descriptive characteristics of the teachers were examined (see Table 1). The majority of the teachers were women, with just over half reporting current and/or past psychological complaints. Additionally, about a quarter of elementary school teachers taught at schools with a pupil weight of 17% or more. Nearly half of the teachers (47%) reported no current or past mental health issues. Furthermore, it was found that 4% of teachers experienced mental health problems for the first time at the time of intake, while 22% had experienced psychological problems both at intake and in the past.

Table 2 Content MBSR program

Theme of session	Mindfulness exercises	(Psycho-)education
1. Automatic pilot	<ul style="list-style-type: none"> – Raisin exercise – Bodyscan 	<ul style="list-style-type: none"> – Introduction mindfulness – Contrast between attention and the automatic pilot
2. Observe clearly	<ul style="list-style-type: none"> – Bodyscan – Sitting meditation with focus on breath 	<ul style="list-style-type: none"> – Imagery exercise to demonstrate relationship between thoughts and feelings – Seeing exercise to: a) demonstrate the difference between observation and interpretation, b) to discuss dealing with sensory input
3. To do- to be	<ul style="list-style-type: none"> – Sitting meditation with focus on breath, body and sounds – Floor yoga practices – 3-minutes breathing space 	<ul style="list-style-type: none"> – Exploration of pleasant events with attention for the interrelatedness of feelings, thoughts and bodily sensations
4. Staying present	<ul style="list-style-type: none"> – Sitting meditation with focus on breath, body, sounds, thoughts, feelings and choiceless awareness – Standing yoga practices – 3-minutes breathing space 	<ul style="list-style-type: none"> – Exploration of unpleasant events with attention for the interrelatedness of feelings, thoughts and bodily sensations – Initial exploration of standard reactions to stress
5. Stress respons versus Stress reaction	<ul style="list-style-type: none"> – Sitting meditation with focus on breath, body, sounds, thoughts and feelings – Floor yoga practices – 3-minutes breathing space 	<ul style="list-style-type: none"> – Reflection on intention of participating – Psychoeducation about reacting versus responding in stressful situations
6. Mindful communication	<ul style="list-style-type: none"> – Standing yoga practices – Sitting meditation with focus on breath, body, sounds, thoughts, feelings and choiceless awareness – 3-minutes breathing space 	<ul style="list-style-type: none"> – Exercise in mindful listening and speaking – Nonverbal communication exercise
Silent day	<ul style="list-style-type: none"> – Varying meditation exercises – Silent lunch and tea break 	
7. Work-life balance	<ul style="list-style-type: none"> – Bodyscan/yoga practices – Sitting meditation with focus on breath, body, sounds, thoughts, feelings and choiceless awareness – 3-minutes breathing space 	<ul style="list-style-type: none"> – Exercise on taking care of yourself by examining how to improve balance in life

Table 2 Content MBSR program (continued)

Theme of session	Mindfulness exercises	(Psycho-)education
8. The rest of your life	<ul style="list-style-type: none"> – Bodyscan – Sitting meditation with focus on breath, body, sounds, thoughts, feelings and choiceless awareness – 3-minutes breathing space 	<ul style="list-style-type: none"> – Sitting meditation with focus on breath, body, sounds, thoughts, feelings and choiceless awareness – 3-minutes breathing space

Additionally, 25% of the participating teachers had only experienced psychological problems in the past. Due to the limited sample size of subgroups, the analysis was categorized as follows: no psychological complaints (48%) versus current and/or past psychological complaints (52%).

Spearman and Pearson correlations

The analysis of both parametric (Pearson) and non-parametric (Spearman) correlations (see Table 3) revealed that age positively correlates with both mindfulness skills and self-compassion. Furthermore, having (had) psychological complaints is significantly associated with experienced stress, self-compassion, and mental health. Specifically, having (had) psychological complaints is linked to higher levels of perceived stress, lower levels of self-compassion, and poorer mental health. Additionally, school weight correlates positively with both age and years of experience, indicating that older and more experienced teachers may be more likely to teach at schools with 17% or more pupil weight.

Differences between pre- and post-measurements

The T-values and the average scores on the outcome measures for the pre- and post-measurement are presented in Table 4. Paired t-tests indicated a significant decrease in experienced stress (PSS). Furthermore, there was a significant increase in mindfulness skills, including observing, describing, acting consciously, not judging, and being non-reactive (FFMQ). Additionally, there was a significant increase in self-compassion (SCS) and mental health (MHC).

Table 3. Correlations

Variables	1	2	3	4	5	6	7	8
1. Age	–							
2. Years of experience	.819*	–						
3. Psychological complaints	-.061	-.120	–					
4. Pupil weight	.333**	.328**	.105	–				
5. PSS T1 (stress)	-.162	-.164	.260*	.090	–			
6. FFMQ T1 (mindfulness)	.340**	.346**	.093	.055	-.545**	–		
7. SCS T1 (self-compassion)	.374**	.350**	-.298*	-.024	-.663**	.612**	–	
8. MHC T1 (mental health)	.040	.089	-.319*	-.068	-.531**	.334**	.535**	–

*Spearman correlations have been requested for ordinal variables. Pearson correlations have been requested for continuous variables. $p < 0.01$ * $p < 0.05$*

Table 4. Averages pre- and post-measurement

Scales	Pre-MBSR		Post-MBSR		Significance
	M	SD	M	SD	
Perceived Stress Scale	2.71	.72	2.27	.47	($t [66] = 5.62, p < .001$)
Five Facet Mindfulness Questionnaire	3.09	.42	3.51	.37	($t [62] = -9.366, p < .001$)
Self Compassion Scale	3.74	1.03	4.93	.81	($t [60] = -6.425, p < .001$)
Mental Health Continuum	3.13	.77	3.64	.64	($t [67] = -7.489, p < .001$)

Differences between groups of teachers

To assess whether the intervention had varying effects on different groups of teachers, a repeated measures ANOVA was conducted with experienced stress as the primary outcome measure. Initially, the analysis revealed a marginally significant difference ($p = .06$) between teachers who had experienced psychological complaints in the past and those who had not. Specifically, teachers who had psychological complaints at the start of the training or in the past showed greater differences between pre- and post-measurements. Similarly, a marginally significant difference was observed between teachers who worked in schools with weight-pupils $< 17\%$ and those in schools with above-average weight-pupils. Notably, teachers in schools with $\geq 17\%$ weight-pupils exhibited a more pronounced decrease in experienced stress between the first and second measurement points ($p = .093$).

DISCUSSION

The aim of this pilot study was to investigate the effectiveness of the eight-week MBSR training for elementary school teachers to reduce perceived stress and improve mindfulness skills, self-compassion and mental health. In addition, it was also investigated whether certain teachers might benefit more from the MBSR training. The results of this pilot study showed that participating in the MBSR intervention resulted in a significant decrease in perceived stress. In addition, there appeared to be an increase in both mindfulness skills and self-compassion, which is in line with previous research, which indicates that mindfulness training helps build self-compassion and self-acceptance (Kuyken et al., 2010; Sedighimornani et al., 2019).

Additionally, there was a significant increase in mental health between the pre- and post-measurement, aligning with the findings of Jennings et al. (2017). Their research, like ours, not only indicates a significant reduction in perceived stress but also demonstrates improvements in the mental health and well-being of teachers.

The results suggest that MBSR training is effective in reducing perceived stress among elementary school teachers in the Netherlands. With some caution, it can be inferred from this study that the training probably may have a more positive impact on teachers who start the training and have experienced psychological complaints in the years prior, as well as on teachers working with a more complex pupil population. This latter finding is consistent with the study by Jennings et al. (2011), which demonstrated significant improvements in mindfulness skills application and time pressure management among elementary school teachers in city center schools, characterized by 'high-risk settings', compared to teachers in rural areas.

Limitations of the study

The current study provided some preliminary insights for follow-up research, but it also had limitations. Although the study population was relatively large for a pilot study, the results should still be interpreted cautiously. For instance, due to the limited power of the subgroups, we chose to combine current complaints and past complaints into the variable 'psychological complaints', whereas ideally, these would be analyzed separately. Additionally, the absence of a control group makes it unclear whether the observed effects are solely attributable to the intervention or could be influenced by natural progression or regression to the mean. Furthermore, the 'self-selection bias' may have influenced the results. It is possible that teachers interested in mindfulness or those experiencing stress were more inclined to participate, potentially affecting the observed effects. Follow-up research, such as a Randomized Controlled Trial (RCT) or repeated single case studies, could help address this issue. Additionally, the lack of follow-up assessments prevents us from assessing the long-term sustainability of the training's effects. The regional scope of the study also limits the generalizability of the results to the broader profession. Lastly,

relying solely on self-reporting questionnaires may have resulted in socially desirable responses. Future research could benefit from incorporating observations and qualitative methods to provide a more comprehensive understanding.

Based on the results of this pilot study, participating MBSR training could potentially contribute positively to reducing perceived stress, enhancing mindfulness skills, self-compassion, and mental health among elementary school teachers. A future RCT is warranted to further validate the effectiveness of MBSR training in reducing perceived stress among elementary school teachers.

Recommendations for the future

Many school organizations seek ways to alleviate teachers' perceived stress and reduce absenteeism without compromising teaching quality, education standards, or pupil performance. This research could pave the way for further investigation into whether the broader implementation of MBSR within the education sector could be a viable solution to this concerning trend. While this research primarily focuses on teachers, the benefits of MBSR may extend to other professionals working in educational settings. Internal and external educational psychologists, for instance, are tasked with providing support and guidance to teachers in schools. Implementing MBSR training could be one of the recommendations. Although this study did not investigate the positive correlation between teacher well-being and aspects such as the quality of the pupil-teacher relationship, the classroom climate, and pupil performance, it provides grounds for further exploration. This could also be of interest to educational psychologists. Lastly, it is crucial that when addressing stress, we consider not only the individual but also the system in which the teacher operates, including the educational organization, the education system itself, and society.

Notes

¹The term 'school weight' refers to the percentage of pupils considered at risk of educational disadvantage. During this study, a pupil's weight was determined based on the educational level of their parents.

²The percentage of weighted pupils in the schools where participating teachers worked ranged from 0% to 65%. Given that teachers from both city center schools and schools in the outskirts of the municipality of Rotterdam took part, and considering the limited power of this pilot study, the average percentage of weighted pupils in the area (17% per school) was used as the baseline for categorizing teachers. Teachers were classified as either having less than 17% or equal to or greater than 17% weighted pupils for analysis purposes.



*“The greatest illusion,” said the mole, “is that life
should be perfect.”*

Charlie Mackesy, *The Boy, the Mole, the Fox and the Horse*

Chapter 3

Study protocol Mindfulness-Based Stress Reduction Intervention for Elementary School Teachers: A mixed method study

Chapter based on

*Lensen, J. H., Stoltz, S. E. M. J., Kleinjan, M., Speckens, A. E. M., Kraiss, J. T., & Scholte, R. H. J. (2021). Mindfulness-based stress reduction intervention for elementary school teachers: a mixed method study. *Trials*, 22, 1-10.*

ABSTRACT

Background: In the Netherlands, more than half of the teachers working in primary education experience high levels of work stress. Compared to other professions, teachers are more likely to drop out from work and develop mental illnesses. Almost one in five even choose a new profession within five years after starting as a teacher. This indicates an urgent need for interventions to reduce stress levels in teachers. However, few evidence-based effective interventions targeting stress and work-related problems in the primary educational system are available.

Aim: In the current paper we describe the protocol for a randomized controlled study (RCT) comparing an 8-week Mindfulness-Based Stress Reduction (MBSR) with a wait list control condition in elementary school teachers. We hypothesize that teachers who participate in the MBSR program will report less stress (primary outcome) than those in the control group at post-test and at 3-months follow-up. We also expect a decrease in teachers' absenteeism and improvements of mental health, teacher skills, classroom climate quality, and the pupil-teacher relationship (secondary outcomes). Finally, we hypothesize that self-compassion, mindfulness skills and emotion regulation skills could mediate effects.

Methods/design: A mixed-method study will be conducted among $N=155$ Dutch elementary school teachers (grade 1 to 6). The quantitative study will be an RCT, in which teachers will be randomly allocated to the MBSR or waiting list control condition. Trial participants will not be made actively aware of their condition. The data analysts will be blinded. Online questionnaires will be sent to teachers before and after the MBSR program, and at 3-month follow-up. Information about absenteeism will be collected. In the qualitative part of the study we will interview teachers to examine their perceived effects of MBSR on their teaching skills, the classroom climate quality and the pupil-teacher relationship.

Discussion: This protocol paper describes a mixed-method study design with an RCT and a qualitative evaluation to evaluate an MBSR program on perceived stress among elementary school teachers. If the MBSR program proves to be effective, it could be implemented as a program to reduce stress and improve mental health and teaching outcomes in elementary school teachers.

BACKGROUND

In recent years, teachers in primary education report increasing levels of work pressure. For more than half of the teachers (i.e. 56%) in the Netherlands, this work pressure is unacceptably high (Grinsven, 2016). This pressure is not only related to the quantity of work, but also to the emotional demands of the work (Jennings, 2017). According to the Transactional Model of Stress and Coping (Lazarus, 1991) experienced stress is the result of the interpretation of a stressor and the capacity to regulate emotions. The continued experience of negative emotions in reaction to external stressors can cause feelings of stress (Roffey, 2012). Continuing high levels of stress can, in turn, lead to absenteeism or premature outflow from the profession in which the stress is experienced. In the Netherlands this is reflected in a high percentage of absenteeism and burnout symptoms in elementary school teachers (Statistics Netherlands, 2017). Furthermore, figures show that of all starting teachers, one in five leave the educational system within 5 years. One in eight teachers is actively searching for employment outside the educational field. Work pressure and related stress are specified as the most important reason (TNO/Statistics Netherlands, 2015).

Continued stress in teachers leads to adverse effects on their mental health and well-being. Roffey (2012) conducted research in six Australian schools and showed that the extent to which teachers can cope with stress and regulate their emotions influences both cognitive and social performances. Stress and coping with stress also affect so-called teacher skills: skills needed to be capable of delivering high quality education and establishing effective class management (Meiklejohn et al., 2012). A review by Spilt, Koomen and Thijs (2011), in which results of 99 studies have been analysed, showed that stress in teachers had a negative impact on the pupil-teacher relationship. In turn, a poor pupil-teacher relationship had both direct and indirect adverse effects on the teacher's mental health and well-being (Collie et al., 2017). It also led to misbehaviour, lack of motivation and diminishing achievements in pupils (Spilt et al., 2011; Roffey, 2012), which may also contribute to perceived teachers' stress (Jennings, 2017).

Even though there seems a great need for alleviating stress in teachers, studies exploring ways to do so in elementary schools are limited (Jennings, 2017). A meta-analysis of 65 independent studies on teachers' stress showed that improved emotion regulation could be the key to stress reduction (Jennings, 2017). Only 17 of these studies concerned elementary school teachers. However, research shows that elementary school teachers are emotionally more involved in their teaching than teachers in higher education (Statistics Netherlands, 2020). Unlike teachers in higher education, elementary school teachers teach their pupils for 5 days a week. Skills such as insight into their own emotions and thoughts and the capacity to regulate these effectively while teaching, might contribute to reduction of perceived stress. Teachers who possess these skills are better

able to build supporting relationships with their pupils, experience more positive emotions, possess more mental resilience and experience more job satisfaction (Jennings, 2017).

Besides the influence of teachers' experienced stress on their own well-being and functioning as a teacher, this stress may ultimately affect their pupils as well. Briner and Dewberry (2007) have found indications that the level of well-being of the teacher affected the classroom climate. A physically and socially safe classroom climate is a necessary condition for pupils to be able to learn, and classroom climate directly affects the well-being and performance of pupils (Fan et al., 2011; Hamre & Pianta, 2005). In addition to the development of didactic and organizational qualities, the development of a good pedagogical relationship with pupils is therefore of great importance (Roffey, 2012). Providing teachers with means to alleviate stress and improve their mental health and well-being is thus not only in the interest of teachers themselves, but also in the interest of their pupils.

Mindfulness Based Stress Reduction (MBSR)

A promising method to improve emotion regulation and reduce stress symptoms is Mindfulness Based Stress Reduction (MBSR) as developed by Jon Kabat-Zinn (2004). Kabat-Zinn defines mindfulness as 'Being aware in a special way: be consciously present in the here and now, without judgment'. Mindfulness can contribute to reducing stress by gaining insight in behavioural patterns, creating emotional awareness and develop regulation of emotions.

A meta-analysis of 29 studies on effectiveness of mindfulness interventions in healthy adults showed reduction of experienced stress, depressive and anxiety symptoms and improvements of quality of life (Khoury, 2015). The results of a review and meta-analysis including over 12.000 people with psychiatric disorders such as depression, demonstrated that mindfulness-based interventions were as effective as other evidence-based treatments including cognitive behavioural therapy and anti-depressant medication (Goldberg et al., 2018). An article by Tang et al. (2015) specifically confirmed the positive effect on the regulation of emotions. Other studies showed promising effects of MBSR on worrying, regulation of attention and emotions, personal achievements and empathy (Meikljohn et al., 2012).

Although there are promising effects of mindfulness on stress and mental health in diverse populations, only few studies have been conducted to date on the effectiveness of mindfulness in elementary school teachers. Most of these studies have been conducted in the USA. European studies are generally lacking, and no studies on this subject have been conducted in the Netherlands.

Jennings and colleagues' research (2017) in 224 American K-5 grade teachers is the largest RCT to date that examines the effectiveness of a mindfulness-based intervention

(MBI) for teachers in primary education. In contrast to the control group, the intervention group displayed significant reduction of stress and perceived time pressure. In addition, teachers in the intervention group reported an improvement of mental health and well-being. They experienced more self-awareness, mindfulness (i.e., observing without judgement) and better regulation of emotions. They reported to be able to deal with their pupils' behaviour more effectively and more compassionately. This is reflected in the fact that 91% of the teachers in Jennings' study reported to be more capable of starting and maintaining a supporting relationship with their pupils. The study by Jennings and colleagues delivers the most compelling evidence so far that MBIs can contribute positively to stress experience, mental health, executive functions, teacher skills, the classroom climate quality and the pupil-teacher relationship in elementary school teachers.

Earlier studies in teachers from various forms of education (Roeser, 2016; Roeser, et al., 2012; Skinner & Beers, 2016) showed that when teachers can deploy mindfulness skills, they were more capable of assessing emotionally provoking situations in the classroom and reacting adequately. This resulted in less stress and more mental well-being. This way, mindfulness skills positively affected the interaction with pupils and the pupil-teacher relationship.

Because of the lack of studies outside the USA, we conducted an uncontrolled pilot study to examine the potential of an MBSR program within 71 elementary school teachers. After the training, participants showed a significant reduction of perceived stress (PSS, Perceived Stress Scale) and improvements of psychological, emotional and social well-being (MHC-SF, Mental Health Continuum-Short Form). In addition, the pilot study showed a significant increase in both mindfulness skills (FFMQ-SF, The Five Facet Mindfulness Questionnaire Short Form) as well as self-compassion (SCS-SF, Self-Compassion Scale-short Form), both of which are related to mental health. In addition, we tested several potential moderators and found indications for possible moderating effects of school weight and current or past psychological problems on the impact of the MBSR program. Because of these promising results we will test the effectiveness of MBSR in Dutch elementary school teachers on larger scale including a control group by conducting an RCT.

Aims of the trial

The primary aim of this study is to investigate the effectiveness of MBSR in contrast to a wait list control condition in reducing perceived stress in elementary school teachers. The secondary aim is to examine the effects of MBSR on: a) absenteeism of teachers, b) teachers' mental health, c) teacher skills, d) teachers' experienced classroom climate quality and pupil-teacher relationship.

The third aim is to examine possible mediating factors of treatment outcome, such as mindfulness skills (i.e. observing, describing, acting with awareness, non-judgement and non-reactivity), self-compassion and emotion regulation skills. Based on research by Jennings, (2017), Roeser, (2016), Roeser et al., (2012), Skinner and Beers (2016) we hypothesize that an improvement of mindfulness skills, self-compassion and emotion regulation skills will lead to a reduction of perceived stress. In addition, we explore whether school weight, age, past and present psychological problems and teachers' years of experience act as potential moderators of program effects. The final aim is to conduct qualitative interviews after the MBSR program to get a more in-depth view of teachers' perception of the impact of MBSR on their teacher skills, classroom climate quality and pupil-teacher relationship.

METHODS/DESIGN

Study design

The design of the study is a superiority RCT in which elementary school teachers are randomly allocated with a ratio of 1:1 to either the MBSR program or the waiting list control condition (see Fig. 1). Because of practical and financial constraints, the control condition consists of no intervention. As we would like to offer MBSR to all the teachers who express interest, we also wanted to be able to offer it to those allocated to the control condition. The study protocol has been ethically approved by the Internal Review Board (IRB) Ethics Committee Social Science, Faculty of social sciences Radboud University and is registered under number ECSW-2019-029.

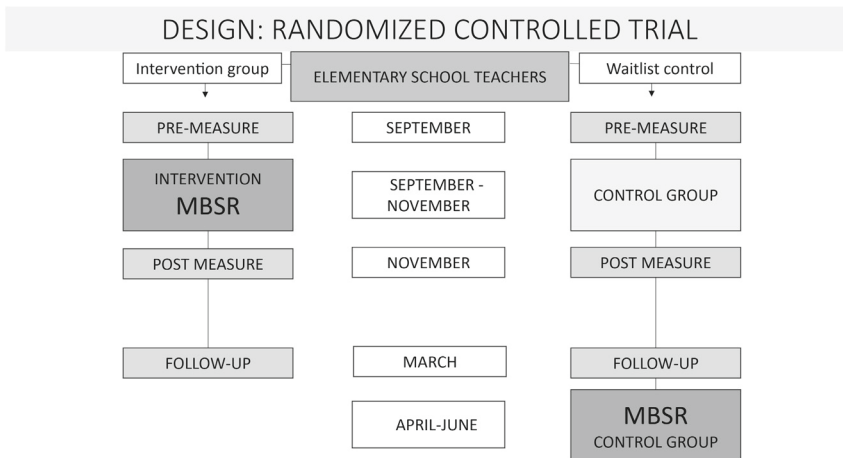


Figure 1. Flow diagram of the study design

Participant characteristics

The study population will consist of Dutch teachers in primary education teaching group 1-8, comparable to grades 1 to 6 in the US school system.

Eligibility criteria

We will include teachers who meet the following criteria: a) teaching at least two days in the same group during a school year between the start of the school year and March; b) willing to fill out questionnaires in Dutch three times in a school year; and c) able to start the program in either September or March.

Exclusion criteria will be previous participation in a Mindfulness Based Cognitive Therapy, MBSR program or a mindfulness-based workshop of more than three hours duration. During the trial, there will be no restrictions with regard to concomitant interventions. However, participants will be requested to not participate on an MBSR course offered elsewhere if they are allocated to the wait list control condition.

Procedure and allocation

Recruitment will take place in a large urban area in the Netherlands. School boards in the study area will be informed about the study and asked to make their teachers aware of it. Teachers will also be recruited by social media and by presentations at schools. Interested teachers will receive an information leaflet and be invited for a screening interview by telephone. Teachers who are willing to participate will provide written informed consent which will be obtained by one of the researchers (JL). Participants will receive online questionnaires, which will be processed anonymously. Questionnaires will be administered before and after the MBSR or wait list period (September and November), and at 3 months follow-up (March). As participants will be aware whether they have or have not participated in the course by the time they complete the follow-up assessments, they cannot be kept completely blinded. We will compare data related to teacher absenteeism from the school year prior to that in which they participate in the research. After completion of the follow-up teachers of the control group will be offered the MBSR program as well. To include the required 155 participants, the intervention procedure between September and June will be repeated for three consecutive school years.

The Ethics Committee Social Science (Radboud University) agreed (ECSW-2019-029) that there was no risk of physical or mental harm for participants during this trial. The Faculty of Social Science takes the juridical responsibility for accidents and damage caused by participating in the research. If participants report any adverse events during the trial, either during the MBSR course or during the wait list control condition, this will be registered in the electronic database system Castor. In case of serious adverse events, these will be reported to the Ethics Committee. If participants require additional mental health support, they will be referred to the regular services, but it is also possible for participants to consult with an appointed psychologist if they so request, or if the trainer

so advises. This psychologist collaborates with the overarching school organization/foundation to which most of the participating schools and therefore teachers in this study belong. If recruited participants do not attend the MBSR course, they will be contacted by the MBSR teacher. If they decide to discontinue, they will be given suggestions on how to obtain mental health support if needed. Lastly, if participants have questions about the study or the planning, they can always contact one of the researchers whose contact details are listed in the consent letter. These details also include the contact details of an independent supervisor at the Radboud University who can be contacted in case of complaints.

Randomisation

Randomisation will be performed after completion of the informed consent forms. It will be computerised and independently carried out by a team member (SS) using a blocked randomization scheme combined with minimisation (block size 4) and stratified by: a) gender (male versus female) and b) school weight. Block randomisation always wins over minimization.

During the first year of the study, the school weight will be determined on the basis of the educational level of the parents / caregivers of the pupils. The educational level will be divided into three categories: Category 1, parents / caregivers who have no education or only received primary education or low level practical/pre-vocational education. Category 2, parents / caregivers who have received no more than two years of secondary vocational education (of a higher level mentioned at category 1). Category 3: parents / caregivers who have more than two classes of vocational education.

During the second and third year of the study, the weighting formula will also take into account the average level of education of all mothers at the school of the child, the origin of the parents, the mother's length of stay in the Netherlands, the intelligence score of the child, and whether the parents are in debt restructuring (Dienst Uitvoering Onderwijs (DUO), the implementation organization of the National Government for Education (Statistics Netherlands, 2019)).

Intervention

The intervention will consist of the MBSR training developed by Kabat-Zinn (Full catastrophe living, 2013) which consists of 8 weekly group (6-15 persons) sessions with a duration of 120 min each. In the 6th week, an additional session of practice in silence with a duration of 6 hours will be included. The intervention consists of three primary components: (1) formal and informal meditation exercises, such as sitting meditation and yoga; (2) dialogue and (3) psychoeducation about stress and stress responses. A folder will be provided with information about each week's session. Participants will be asked to practice daily for at least 35 min.

Mindfulness teacher

The MBSR will be given by a mindfulness teacher who meets the criteria of the Association of Mindfulness Based Teachers in the Netherlands and Flanders and the internationally agreed good practice guidelines of the UK network for Mindfulness-Based Teachers (mindfulnessteachersuk.org, 2015). If the trainer notes that a participant might be in need of additional mental support or if a participant indicates this him- or herself, a licenced psychologist is available who can be contacted during, as well as after the program.

Sample size calculation

In determining the necessary number of participants, we have presumed a significance level (α) of 0.05 and a moderate effect size (δ) of 0.50 (e.g., Verweij et al, 2016). To achieve a power of 80%, we will need to include 64 participants in the intervention as well as the control group. With an estimated 17.5% drop-out, which is comparable to a similar study by Verweij et al, (2016), we will strive to recruit 155 participants divided over three school years.

Data analysis

All analyses will be performed in R (Core team R, 2020) by an independent statistician who is further not involved in the project. The results will be reported in accordance with the extended CONSORT statement (Schulz et al., 2010). Descriptive statistics will be calculated for all variables of interest.

Effectiveness

The primary analyses will be based on the intention-to-treat principle and linear mixed models (LMMs) will be used for the primary analyses. LMMs adequately deal with missing data at random and can be used to account for the hierarchical structure of the data (i.e. multiple assessments nested within teachers, teachers nested within groups and schools).

Time, condition and time by condition interactions will be specified as fixed factors to examine the effect of the intervention over time on primary and secondary continues outcomes. Baseline scores of the corresponding outcome will additionally be entered in the model to account for baseline imbalances. In accordance with the CONSORT statement, we will not statistically test whether the two groups differ in baseline variables. Therefore, the models that we will primarily report will not be adjusted for additional covariates. However, to examine whether adjusting the model for additional covariates substantially changes conclusions drawn from the analyses, we will conduct sensitivity analyses with the models adjusted for the following potentially confounding baseline variables: sex, age, school weight, teachers' years of experience, number of work days per week and past or present psychological problems. All models will also be run with completers only as additional sensitivity analysis. Post hoc tests will be conducted for between-group differences at each timepoint using analyses of covariance (ANCOVA),

including baseline scores of the corresponding outcome as covariate. Estimated marginal means and corresponding standard errors from the primary LMMs will be used to additionally calculate between-group effect sizes at each timepoint. Effect sizes will be expressed as Cohen's *d* with 95% confidence intervals. In addition, a clinically significant change will be examined using the reliable change index (Jacobson and Truax, 1991).

Moderation and mediation

To get more insight in for whom the MBSR program works best, we will test moderating effects of school weight, age, past or present psychological problems and teachers' years of experience by testing interactions with condition. In addition, we will test possible mediating variables between condition and the outcomes. The analyses regarding potential moderators and mediators are exploratory since the power for the trial is calculated to establish evidence for main effects on the primary outcome variables. For the mediation analysis, we will follow the recommendations of Preacher and Hayes for mediation analyses (Hayes and Rockwood, 2017; Preacher and Hayes, 2008). In the mediation models, X will be the categorical group variable (0=control, 1= intervention), Y will be the observed scores of primary or secondary continuous outcomes at post-test or follow-up and M will be the potential mediators, including self-compassion, mindfulness-skills and emotion regulation skills. Total, direct and (specific) indirect effects will be calculated for all models. To decide whether effects are significant, corresponding 95% bias-corrected and accelerated confidence intervals will be calculated based on 5000 bootstrap samples (Hayes and Rockwood, 2017; Hayes, 2017). Separate simple mediation analyses will be run for each putative mediator. In addition, multiple mediation analyses will be conducted with all potential mediators included.

Data collection

As soon as the participant is enrolled, across all assessments he or she will only be identifiable via a unique pseudocode identifier to anonymize all data. A separate protected database will link the unique pseudocode to the participants' names. Anonymous and non-anonymous (e.g. informed consent forms) data will be stored in separate password protected folders. Questionnaire data will be collected and stored with the online electronic data capture software CASTOR EDC (Ciwit bv, 2016), which tracks and logs any manual changes made to raw data. When questionnaires are not completed within the expected period, teachers will be sent online reminders. If no response follows, they will be contacted per telephone to discuss the absence of response and to motivate them to complete the questionnaires. In case participation is discontinued, reasons will be noted. Also, the number of sessions attended by each participant will be noted and sessions will be recorded. An overview of all measurements is given in Table 1.

Table 1 *Planning of measurements*

Enrolment 3 consecutive school years June 2019-August 2021	Study Period: June 2019- August 2022			
	Baseline Assessment	Post- treatment Assessment	3 months follow-up assessment	End of school year
Cohort 1	Sept 2019	Nov 2019	March 2020	July 2020
Cohort 2	Sept 2020	Nov 2020	March 2021	July 2021
Cohort 3	Sept 2021	Nov 2021	March 2022	July 2022
Variable				
<i>Primary:</i>				
Perceived Stress	x	x	x	
<i>Secondary:</i>				
Absenteeism	x			x
Mental Health	x	x	x	
Teacher skills	x	x	x	
Pupil-teacher relationship	x	x	x	
<i>Possible mediators:</i>				
Self-compassion	x	x	x	
Mindfulness skills	x	x	x	
Emotion regulation skills	x	x	x	

Data management plan

Radboud University and its research institutes have set strict conditions for the management of research data. The data management plan is a protocol for researchers, developed by the Radboud University and approved by important scientific funding agencies in the Netherlands. It is based on the general policy about Research Data Management, which was adopted by the executive board of the Radboud University in November 2013. The data management plan contains detailed information about our research project, the organizational context, data management roles, costs, data collection process, overview of the research data, informed consent, ethics committee, privacy in the data collection phase, security in the data collection phase, storing during research, privacy in the processing / analyzing phase, structuring and documenting data, sharing data during research, long-term storage, metadata and communication and access to the data. This data management plan is a dynamic document, which will be regularly updated based on discussion with colleagues and supervisors. The data management protocol for this research was written in consultation with the Research Data Officer of the Behavioural Science Institute. Together with the support service for issues concerning the management of research data (the Expert Center Research Data

of the Radboud University; <http://www.ru.nl/rdm>), the research data officer will help to store, share and reuse research data according to university's policy. The support service and the data officer are independent from this study's sponsor and there is no conflict of interest.

Primary outcome measure

Perceived Stress

Perceived Stress Scale (Cohen, et al., 1983). This questionnaire (PSS) measures the global stress levels in the past month using questions about the degree in which life is perceived as unpredictable, uncontrollable and overburdening. This self-report questionnaire has 10 items, which are scored on a 5-point Likert scale. The Dutch version of this instrument has a good internal reliability with Cronbach's α coefficients varying between .84 and .86 (Andreou et al, 2011).

Secondary outcome measures

Absenteeism

Teachers are asked about their absenteeism of the past year between the first and last day of the schoolyear (how many days they called in ill and with which frequency). In addition, teachers are requested to record their absence and frequency in the current year. To support this data, their records will be verified with the schools' absence system.

Mental Health

Mental Health Continuum-Short Form (Lamers et al. 2011). Emotional, psychological and social well-being will be assessed using self-report on the 14-item Mental Health Continuum-Short Form (MHC-SF). Each item is scored on a 6-point rating scale ranging from 0 (never) to 5 (every day) with higher scores indicating more positive mental health. The Dutch version shows high internal consistency for the total MHC-SF score ($\alpha = .89$) and the two subscales Emotional and Psychological Well-Being (both $\alpha = .83$), and adequate for the third subscale Social Well-Being ($\alpha = .74$) (Lamers et al. 2011).

Teacher skills

Teacher Self Efficacy Scale Short Form (TSES-SF; alpha .76; 10 items; Schwarzer & Hallum, 2008). This scale measures four areas directly related to successful teaching, namely job accomplishment, development possibilities within the workplace, social interaction with pupils, parents and colleagues and coping with work pressure/stress. This questionnaire consists of 10 items on a 3-point Likert scale and has nine subscales from 1 (nothing) – 9 (great deal). Cronbach's α coefficient in previous studies was higher than .75 (Nie et al., 2012).

Classroom climate and pupil-teacher relationship

We will use the teacher questionnaire of the Climate Scale (De Klimaatschaal; Donkers & Vermulst, 2011). This questionnaire consists of 33 items all scored on a 4-point scale ranging from 'almost never' till 'often'. This measures four areas from teachers' perception of: the quality of the classroom climate, the pupil-teacher relationship, the inter-pupil relationship and the experienced order in the classroom. Cronbach's α coefficient $>.70$ (Evers et al., 2010, p.33).

Potential mediators*Self-Compassion*

Self-Compassion Scale-short Form (Neff, 2016). The short form of the Self Compassion Scale (SCS-SF) will be used to measure self-compassion. This instrument consists of 12 items based on a 7-point Likert scale and measures six components of self-compassion: Self-kindness, Self-judgement, Common Humanity, Isolation, Mindfulness and Overidentification. The shortened scale shows a near-perfect correlation with the original Self Compassion Scale. In a Dutch population, Cronbach's α coefficient for the full scale is .87 and the coefficients for the subscales of the SCS-SF vary from .55 to .81 (Raes, et al., 2011).

Mindfulness Skills

The Five Facet Mindfulness Questionnaire Short Form (Baer, et al., 2008). We will use the short form of the Five Facet Mindfulness Questionnaire (FFMQ-SF) to measure mindfulness skills. This self-report questionnaire consists of 24 items, which are rated on a 5-point Likert scale. Five facets of mindfulness are distinguished: Observing, Describing, Acting with Awareness, Non-judging, and Non-reactivity. The Dutch version of the FFMQ-SF has been shown to be a reliable instrument, which is sensitive to change in a population with depressive and anxiety symptoms. Cronbach's α coefficients between .75 and .87 have been found (Bohlmeijer et al, 2011).

Emotion regulation Skills

BRIEF-A (Scholte, Noens, 2011). The self-report version for adults of the Behaviour Rating Inventory of Executive Function (BRIEF-A) will be used to measure executive functioning in daily life. This questionnaire consists of 75 items on a 3-point Likert scale and has nine subscales: Inhibit, Shift, Emotional Control, Self-monitor, Initiate, Working Memory, Plan/Organise, Task Monitor, and Organization of Materials. Three validity scales are included: Negativity, Infrequency, and Inconsistency. The Dutch version shows a good internal consistency for the global executive composite score and both indexes (Cronbach's α coefficient ranging from .92 to .96) and sufficient internal consistency for all subscales (Gioia et al., 2000)

Qualitative research

To get more in-depth insight into the effects of the MBSR-training, qualitative interviews with teachers will be conducted between 8 and 10 weeks after participating in the MBSR training. Purposive sampling will be used to include a subset of teachers with different backgrounds. The interviews will be semi-structured focusing on the main topic: How did the MBSR-program affect your ability to function as a teacher?

We will process and analyze the qualitative data by using Atlas.Ti. Interviews will be audio-recorded and transcribed verbatim. We will return a summary of the interview to the participants for member-checking. Two independent raters will code the data to minimize subjectivity. We will begin analysis as soon as the first data are collected and will continue with each additional interview. The constant comparison method will be used to analyze the data until saturation has been reached. This procedure is comparable to those used in other qualitative studies (e.g. Verweij, et al., 2018).

DISCUSSION

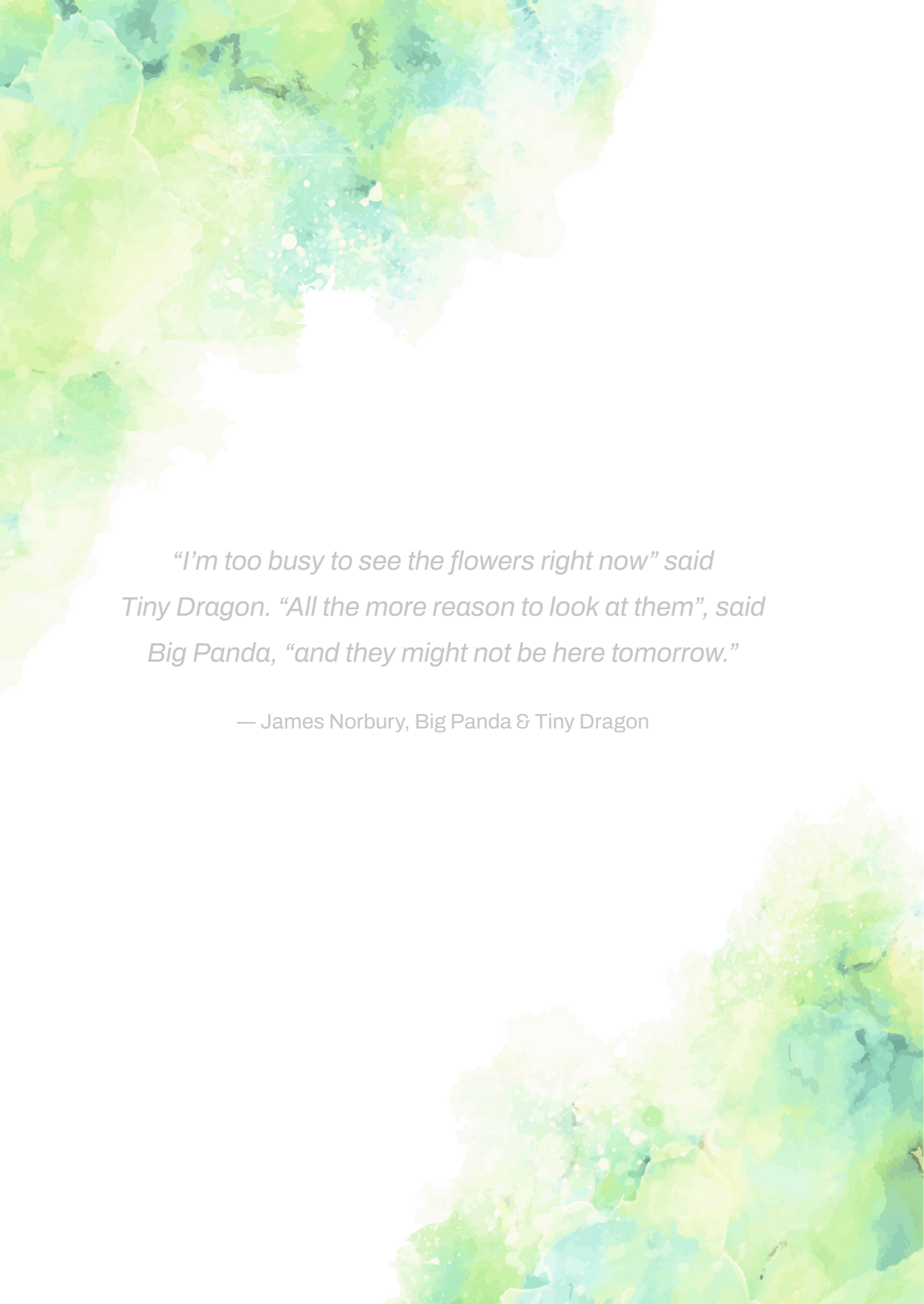
There is a lack of evidence-based effective interventions targeting stress/work-related problems in elementary school teachers. At the same time, many school organizations are looking for a way to reduce teachers' stress perception and to reduce absenteeism without loss of quality with regard to teaching, education quality, or pupils' achievements. From previous studies, it can be concluded that MBSR is a promising intervention for stress reduction in healthy subjects (Meiklejohn et al., 2012; Tang et al., 2015; Khoury et al., 2015; Goldberg et al., 2018). However, it is unknown whether MBSR is appropriate and effective for stress-reduction in teachers in primary education. The aim of this study is to examine the effectiveness of MBSR on elementary school teachers' perceived stress, absenteeism and mental health, their teaching skills (with an emphasis on emotion regulation), classroom climate quality, and pupil-teacher relationship.

Strengths and limitations

A strength of the current study design is that it not only assesses immediate effects, but also includes a follow-up after 3 months. This will allow us to test both the short and mid-term effects of the MBSR program. We also included a broad set of outcomes.

Second, the implications of this study may be important for both the regular and academic training of elementary school teachers. If the present study indicates that the program is effective in reducing stress, these educational systems may structurally integrate the program into their curriculum, thereby increasing both the personal resilience and the professional development of teachers nationwide. A third strength of the study is that the trainer in the present study has a longstanding career as a teacher and principal in primary education in addition to being a qualified mindfulness teacher.

The present study also has several limitations. Firstly, although school weight will be used for stratification, the study population based on initial recruitment and the pilot study will be predominantly from urban areas. This might limit generalizability to areas with other demographic characteristics such as rural areas. However, research shows that teachers in rural areas experience less stress compared to those in urban areas (Abel & Sewell, 1999). Due to the current growing shortage in teachers in urban areas (AVS, 2019), the discrepancy between teachers' stress levels in urban versus rural areas may increase further. The fact that only one trainer delivered the program could be considered another limitation of the study, as this might compromise the generalizability of the results. Should this study demonstrate that the MBSR-program is effective among teachers, further research should be set up with a broader diversity in the setting of schools and mindfulness trainers.



*“I’m too busy to see the flowers right now” said
Tiny Dragon. “All the more reason to look at them”, said
Big Panda, “and they might not be here tomorrow.”*

— James Norbury, Big Panda & Tiny Dragon

Chapter 4

Mindfulness-Based Stress Reduction for Elementary School Teachers: A Randomized Controlled Trial

This chapter is based on:

*Lensen, J. H., Stoltz, S. E., Kleinjan, M., Kraiss, J. T., Scholte, R. H., & Speckens, A. E. (2024, April). Mindfulness-based stress reduction for elementary school teachers: a randomized controlled trial. In *Frontiers in Education* (Vol. 9, p. 1385375). Frontiers Media SA.*

ABSTRACT

Educators frequently grapple with elevated levels of job-related stress, heightening the risk of mental health issues. Although Mindfulness-Based Stress Reduction (MBSR) has demonstrated effectiveness in reducing stress among the general populace, its implementation among educators, especially in non-U.S. settings, has received limited exploration. This pre-registered randomized-controlled trial investigates the effectiveness of the standard MBSR in reducing perceived stress among Dutch elementary school teachers. Additionally, it examines the impact of MBSR on well-being as a secondary outcome, as well as on mindfulness skills, emotion regulation, and self-compassion as secondary proximal outcomes. Furthermore, it explores its influence on teacher self-efficacy, perceived pupil-teacher relationships, and classroom climate quality as secondary distal outcomes. Involving 146 teachers randomly assigned to either the intervention ($n = 72$) or waitlist-control condition ($n = 74$), assessments were conducted pre- and post-intervention or control period, with a three-month follow-up. Participants in the intervention reported significantly lower perceived stress compared to the control group, demonstrating a substantial effect size at post-treatment ($d = -0.84$) and a moderate effect at follow-up ($d = -0.69$). MBSR not only yielded improvements in personal well-being but also positively impacted teacher self-efficacy and classroom climate quality at both post-treatment and follow-up. These positive outcomes aligned with enhancements in mindfulness skills, emotion regulation, and self-compassion. However, no significant effects were observed on the pupil-teacher relationship. Exploratory analyses revealed no moderation effects based on past or present psychological problems, school weight/pupil population, years of experience, or age on perceived stress at post-measurement. Furthermore, the study examined the potential influence of COVID-19 on the results, concluding that the pandemic had no discernible impact. These findings advocate for the widespread adoption of the standard MBSR program as a means of enhancing the well-being of elementary school teachers.

INTRODUCTION

Being a teacher is widely acknowledged as one of the most demanding professions (Lomas et al., 2017). This holds particularly true for elementary school teachers in the Netherlands, who report higher levels of burnout symptoms and increasing absenteeism compared to other professions (Statistics Netherlands, 2022). One in five elementary school teachers exits the educational system within five years (Ministry of Education, Culture and Science, 2022), with one in eight leaving due to reasons such as sickness, disability, or retirement (Statistics Netherlands, 2018). Elementary school teachers, interacting with their pupils on a daily basis, experience a stronger emotional involvement in teaching and cultivate stronger pupil-teacher relationships compared to teachers in secondary or higher education (Statistics Netherlands, 2020). Therefore, elementary school teachers may experience more profound effects from a stress reduction intervention. These benefits may manifest in various aspects, such as improved quality of pupil-teacher relationships and classroom climate quality, factors closely linked to teachers' perceived stress (Collie et al., 2017; Corbin et al., 2019; Jennings et al., 2017; Lomas et al., 2017). Moreover, there is a notable scarcity of research on interventions addressing stress among elementary school teachers (Jennings et al., 2017). A limited number of randomized controlled trials (RCTs), infrequent preregistration of study protocols, and rare follow-up assessments characterize the current state of research in this context. In response to this concerning trend, the current preregistered randomized-controlled trial aims to assess the effectiveness of the standard Mindfulness-Based Stress Reduction (MBSR) program on the perceived stress levels (primary outcome) of Dutch elementary school teachers. This research endeavors to address the following key inquiries:

1. Does participation in the standard MBSR training lead to a decrease in perceived stress and an enhancement in well-being among elementary school teachers?
2. To what degree do mindfulness skills, emotion regulation, and self-compassion serve as secondary proximal outcomes in the context of MBSR training?
3. To what degree do teacher self-efficacy and their perceived pupil-teacher relationship and classroom climate quality serve as secondary distal outcomes in the context of MBSR training?
4. Are the effects of the MBSR training moderated by factors such as past or present psychological problems, school weight, years of teaching experience, and age?

THEORETICAL BACKGROUND

Effects of stress on teachers

Increased perceived stress is associated with diminished emotional, psychological, and social well-being, along with lower performance (de Carvalho et al., 2021). It also negatively impacts teacher self-efficacy, influencing instructional practices, adaptability,

and classroom climate quality (Emerson et al., 2017; Lomas et al., 2017; McIntyre et al., 2017). Teacher self-efficacy refers to teachers' beliefs and attitudes about their ability to enhance pupils' learning outcomes (Tschannen-Moran & Hoy, 2001). Higher self-efficacy correlates with improved effectiveness, positive student outcomes, and better classroom climate quality (Meristo & Eisenschmidt, 2014; Chong & Kong, 2012; Robertson & Dunsmuir, 2013). Conversely, lower self-efficacy relates to increased stress and decreased commitment to teaching (Klassen & Chiu, 2011).

Furthermore, teachers' perceived stress has the potential to shape pupil-teacher interactions, constituting an integral aspect of teachers' perceived classroom climate quality. This encompasses not only the general atmosphere and environment within a classroom setting but also extends to factors such as classroom order, the quality of interpersonal relationships among pupils, and the nature of pupil-teacher interactions (Donkers & Vermulst, 2014, p. 9). Poor pupil-teacher relationships and a negative classroom climate quality directly and indirectly affect teachers' perceived stress and well-being (Lomas et al., 2017; Collie et al., 2017; Jennings et al., 2017). On the other hand, research by Corbin et al. (2019) shows that positive pupil-teacher relationships may help mitigate the stress they experience.

Reducing teachers' stress

Stress arises from interpreting stressors and regulating emotions (Lazarus, 1991), suggesting interventions should target emotion regulation, defined as the activation of a goal to influence the emotion trajectory (Gross et al., 2011). Research indicates that mindfulness increases emotional self-regulation (Hölzel et al., 2011; Vago & Silbersweig, 2012; Tang et al., 2015) which has also been supported by research in neuroscience (Hölzel et al., 2011; Tang et al., 2015). Mindfulness-Based Stress Reduction (MBSR), characterized as "the awareness that arises through purposeful, nonjudgmental attention to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p.145), stands out as a promising intervention to mitigate perceived stress and enhance well-being through the refinement of emotion regulation.

Theory of change

The core of MBSR involves cultivating mindfulness skills, allowing participants to direct their attention to the present moment through the development of an observing stance towards their thoughts, feelings, and behaviors. This practice improves the capacity to identify habitual reaction patterns, empowering individuals to make conscious choices. Participants develop the ability to respond with reduced reactivity to negative thoughts and emotions (Fanning et al., 2018; Rad et al., 2023, Gilbert & Waltz, 2010). Additionally, the overall fostering attitude of self-compassion in MBSR, which can be defined as the practice of providing oneself with support in times of suffering or pain, helps in developing empathy, understanding, and kindness towards oneself and others (Neff & Dahm, 2015; Neff, 2023). Empirical literature strongly supports the idea that self-compassion acts as

a buffer against the negative effects of stress on well-being (Neff et al., 2018a; Phillips & Hine, 2021; Zessin et al., 2015).

In summary, the intervention is anticipated to enhance teachers' mindfulness skills (Jennings et al., 2017) and foster self-compassion (Roeser et al., 2022). This, in turn, is expected to promote improved emotion regulation (Tang et al., 2015; Roeser et al., 2022; Jennings et al., 2017), leading to a reduction in perceived stress and an increase in emotional, psychological, and social well-being (Querstret et al., 2020; Jennings et al., 2017; Roeser et al., 2022). Regarding teacher skills, past MBSR interventions among teachers have demonstrated an increase in teachers' self-efficacy (Emmerson et al., 2017). This enhanced self-efficacy, facilitated by the fostering attitude of self-compassion, is anticipated to contribute to improved pupil-teacher relationships and a higher classroom climate quality (Robertson & Dunsmuir, 2013; Meristo & Eisenschmidt, 2014; Chong & Kong, 2012). For a visual representation of the theory of change, please refer to Figure 1.

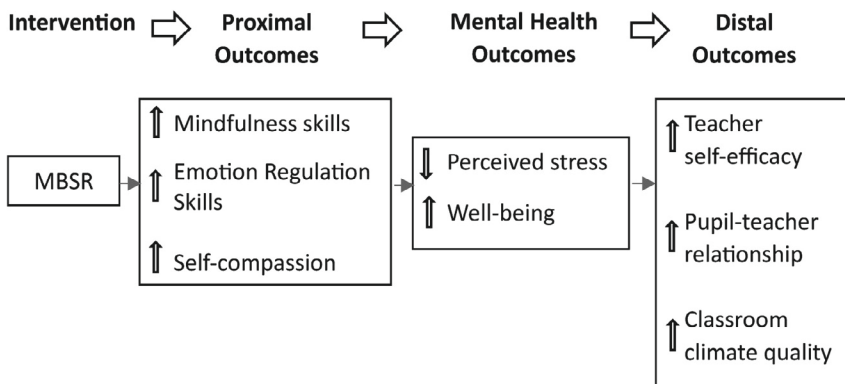


Figure 1. *Theory of change*

Mindfulness-Based Interventions for teachers

Over the past two decades, research on Mindfulness-Based Interventions (MBIs) for teachers has steadily grown. However, there is a notable scarcity of studies specifically addressing elementary school teachers. Furthermore, RCTs are relatively few, preregistration of study protocols is uncommon, and follow-up assessments are rare. The existing research on MBIs in education is predominantly conducted within the United States for pupils aged 5 to 18, differing from European educational systems where elementary school teachers primarily instruct children aged 4 to 12 (Emerson et al. 2017; Hwang et al., 2017; Klingbeil and Renshaw, 2018; Zarate et al., 2019). Unlike teachers in secondary or higher education, elementary school teachers typically maintain a consistent group of pupils for five days a week, fostering a stronger teacher-pupil relationship and

heightened emotional involvement in teaching (Statistics Netherlands, 2020). Given these distinctions, a reasonable hypothesis is that MBIs may exhibit more pronounced effects in elementary schools. Moreover, the majority of studies investigating mindfulness for teachers focus on MBIs specifically tailored to the educational context. Consequently, these interventions often deviate in terms of content and duration from the standard MBSR program. Numerous studies collectively suggest that these MBIs yielded positive effects. First, the meta-analysis of 29 studies by Klingbeil and Renshaw (2018) evaluated teacher interventions in which training mindfulness skills was the primary therapeutic component. This included standard or adapted versions of MBSR, but also programs such as Stress Management and Relaxation Techniques-in-education (SMART) (Cullen & Wallace, 2010), Cultivating Awareness Resilience in Education (CARE) (Jennings et al., 2011) and Cultivating Emotional Balance Training (Kemeny et al., 2012). There was a large variety in duration (from 2 to 36 weeks) and dosage (from 2 to 75 hours) of the MBIs. The impact on teachers' occupational stress and burnout ranged from small to medium, accompanied by enhancements in mindfulness skills and psychological well-being. A meta-analytic review of MBIs, including 18 manuscripts with a total of 1001 in-service teachers (Zarate et al., 2019), has found similar findings.

Furthermore, MBIs contributed to a slight improvement in the quality of teachers' interactions with students and the overall classroom climate. Another systematic review (Hwang et al., 2017) including 16 intervention studies with a mixed teacher population on MBIs (e.g. CARE, adapted MBSR) showed large effects on perceived stress and mindfulness skills, medium effects on self-compassion and small effects on teacher self-efficacy. In addition, from a systematic review and narrative synthesis (Emerson et al., 2017) on the effects of MBIs for K-12 teachers (e.g. SMART, CARE, adapted MBSR, Mindful Based Wellness Education; Poulin et al., 2009) it was concluded that MBIs resulted in improvements in mindfulness skills, emotion regulation and self-compassion. Consequently, these enhancements played a role in reducing stress levels among teachers and fostering an increase in teacher self-efficacy.

While these overview studies exhibit promising effects, it's essential to note that the majority of included studies were conducted in the USA and encompassed a diverse teacher population. Notably, a recent study by de Carvalho et al. (2021) examined the effects of MBIs specifically for elementary school teachers. This recent research, involving 228 Portuguese elementary school teachers, stands out as one of the few European RCTs, albeit without a longer-term follow-up. The intervention group reported a significant increase in well-being, mindfulness skills, emotional regulation, and self-efficacy. However, classroom observations revealed only short-term benefits for teachers' classroom climate quality. This study enriches existing literature by investigating the effects of a standard 8-week MBSR program on Dutch elementary school teachers. Our primary outcome on mental health is perceived stress, and our secondary outcome is well-being. Secondary measures also include teacher self-efficacy, teacher-perceived

pupil-teacher relationships, and classroom climate quality. Employing a pre-registered RCT design with follow-up assessments and a substantial sample size, we also explore proximal outcomes such as mindfulness skills, emotion regulation, and self-compassion. Distinguishing itself from previous research (e.g., Roeser et al., 2022; Emmerson et al., 2017; Klingbeil & Renshaw, 2018), this study utilizes a larger sample, extended follow-up, and evaluates the impact of mindfulness training on teachers at various career stages, in diverse school environments, and of different ages. To advance our understanding of program impacts, it is crucial to extend these studies to elementary and secondary school teachers worldwide, promoting a sustainable field marked by diverse replications.

Potential moderators

Elementary school teachers form a diverse cohort, prompting an exploration of potential moderators influencing the impact of the MBSR program. The preliminary pilot, conducted prior to this RCT (Lensen et al., 2022), indicated a potential magnified effect of MBSR on teachers who have or had psychological challenges, especially those working in schools with pupils facing a higher risk of educational disadvantage, as quantified by school weight in the present study. In the Netherlands, school weight is a government metric objectively assessing the complexity of the educational environment. It assigns significance to specific pupil characteristics, ensuring additional funds for schools to support high-risk pupils and address educational inequalities (Statistics Netherlands, 2019). In addition, a recent study (Roeser et al., 2022) revealed that an adapted MBI for teachers (grade 6-8) had more positive outcomes for newer teachers (experience < 5 years) in terms of job stress, self-compassion, and classroom organization compared to experienced teachers. Moyano et al. (2021) observed that greater teaching experience was associated with increased reliance on automatic pilot mode, leading to reduced focus. Additionally, Huang et al. (2020) noted that as teaching experience increased, empathic concern decreased, perspective taking diminished, and personal distress increased. Although age was often unrelated in previous research (e.g. Moyano et al., 2021; de Carvalho et al., 2021) we included it due to an increasing number of lateral entries in the primary education sector in response to the teacher shortage. These teachers, though older, have accumulated fewer years of work experience in education compared to their younger colleagues potentially resulting in distinct experiences and lessons derived from the intervention.

Hypotheses

Drawing upon insights from prior research (e.g., Klingbeil & Renshaw, 2018; Emerson et al., 2017; Hwang et al., 2017; Roeser et al., 2022; Tang et al., 2015), our hypothesis posits that elementary school teachers participating in the MBSR program will exhibit enhanced mental health. This enhancement is substantiated by anticipated reductions in stress (primary outcome) and improvements in personal well-being (secondary outcome), as compared to teachers in the waiting list control group, evident in both post-test and three-month follow-up assessments. Moreover, we anticipate positive developments in various secondary outcomes, categorized as proximal and distal. Proximal outcomes denote

personal-level achievements that may be realized during, directly after, or shortly following the intervention, potentially serving as working mechanisms in enhancing mental health outcomes related to stress and well-being. Distal outcomes, on the other hand, represent effects of the MBSR program observable in the teaching environment, which may require a longer duration for observation. Specifically, we expect the MBSR program to yield improvements in proximal outcomes such as mindfulness skills, emotion regulation, and self-compassion. Concurrently, we anticipate positive developments in distal outcomes, encompassing teacher self-efficacy, perceived pupil-teacher relationships, and the overall quality of the classroom climate as distal (secondary) outcomes. This multifaceted approach allows for a comprehensive evaluation of the MBSR program's impact, both on the personal well-being of participating teachers and the broader teaching environment.

MATERIALS AND METHODS

Study Design

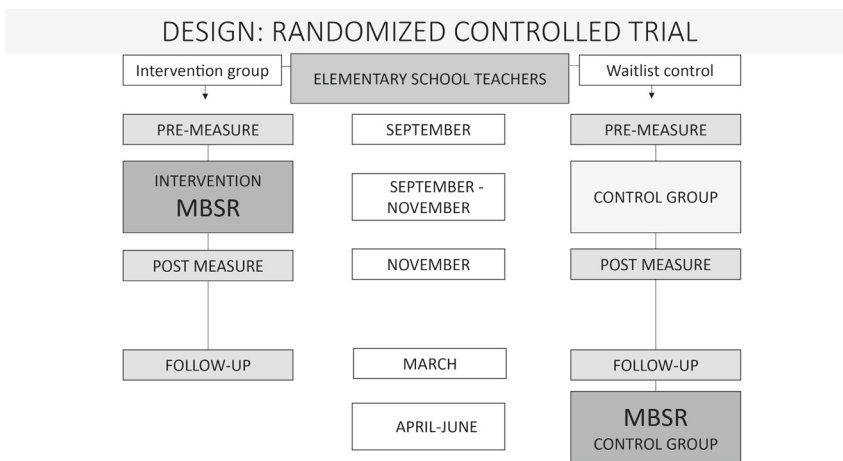


Figure 2 Study design

This study employed an RCT to assess the efficacy of MBSR compared to a waiting list control condition in alleviating perceived stress among elementary school teachers. The stratified random sampling was conducted at an individual level, taking into account factors such as school weight and gender. Assessments took place before and after the MBSR program or waiting list period (September and November), and at three months follow-up (March, within the same school year). Teachers in the control group were offered to participate in MBSR after the follow-up assessment within the same school year. Recruitment took place in a large urban area in the Netherlands, in three consecutive school years: 2019-2020, 2020-2021 and 2021-2022. See Figure 2 for an overview of the

study design. In the first school year, recruitment of teachers took place between June and late August 2019 ($n = 41$ teachers), in the second between March and August 2020 ($n = 50$ teachers) and in the last between March and August 2022 ($n = 55$ teachers). It is important to notice that the COVID-19 pandemic started in March 2020, between school year 1 and 2. The study protocol was ethically approved by the Internal Review Board (IRB) of the faculty of social sciences Radboud University and is registered under number ECSW-2019-029. The protocol details are available in a publication by Lensen et al. (2021).

Participants

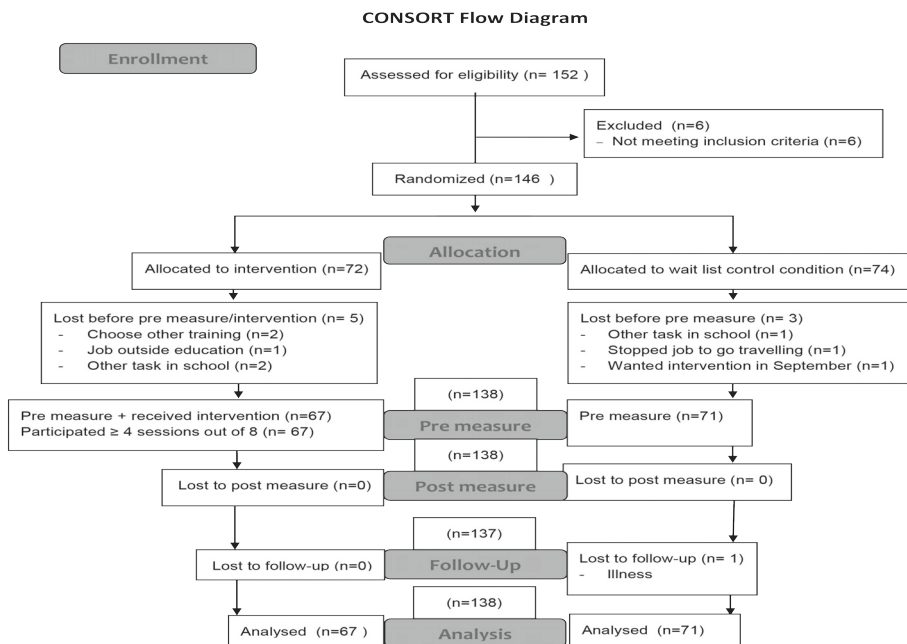


Figure 3 Consort flow diagram

The study population consisted of 146 Dutch elementary school teachers from 62 different public elementary schools who taught groups 1 to 8, comparable to grades 1 to 6 in the US school system. Of the 152 teachers who had registered to participate, six teachers did not meet the inclusion criteria. See Figure 3 for an overview of the Consort flow diagram. Inclusion criteria were: a) teaching at least two days a week in the same year group (1 to 8), during a school year between September and March (moment of follow-up); b) willing and able to fill out questionnaires in Dutch three times during a school year; and c) being able to start MBSR in both September and March. Exclusion criteria were previous participation in a MBI or a mindfulness-based workshop lasting more than three hours.

Stratified random sampling

Stratified random sampling at individual level was performed after completion of the informed consent forms using Castor Electronic Data Capture system (Castor EDC, 2019). It was independently carried out by a team member, SS, using a stratified blocked random sampling scheme (block size 4) and stratified by: a) gender (male versus female) and b) school weight of the school the teacher was employed by. We stratified by gender because female teachers experience more stress than their male colleagues (Li, et al., 2020; Ozamiz-Etxebarria et al., 2020). School weight is a government measure used in the Dutch education system to give weight to characteristics of a pupil associated with a higher risk of educational disadvantage (Statistics Netherlands, 2019, <https://www.cbs.nl/en-gb>). Each pupil is assigned a specific 'weight'. For every school, the weighted number of pupils is calculated by multiplying the total number of pupils by their respective individual weights. This results in the overall school weight. Depending on stratified random sampling, teachers who were included in the study were allocated to start MBSR either in September (intervention condition) or in March (wait-list control condition) of a particular school year. As the study involved a psychological intervention that teachers actively engaged in, maintaining participant blinding to their assigned condition was not feasible.

Procedure and allocation

To recruit participants, information about MBSR and the research study was disseminated to school boards in the study area and they were asked to bring it to the attention of their teachers. Teachers were also recruited by social media and during presentations at schools. Teachers who were interested in participating were asked to contact the study team by e-mail, telephone, or they could use an online login link. A member of the research team (JL) contacted each interested teacher for a screening interview by telephone. Details about the program were explained and teachers were able to ask questions. Next, it was determined whether the teacher met eligibility criteria. Teachers who were willing to participate provided written informed consent, after which they received an online questionnaire asking for their demographic characteristics. Other self-report questionnaires were sent to all teachers before (pre) and after MBSR or waiting list period (November) and at three months follow-up (March). All questionnaires were digitally sent and processed anonymously by Castor EDC, which tracked and logged any manual changes made to the raw data. After 5 days, participants who had not completed the questionnaires were reminded by email. If no response followed, they were contacted per telephone to motivate them to complete the questionnaires. During each school year, the intervention training was taught 'live' three times a week between September and November at a centrally located training facility within the region. When registering, participants were given the option to prioritize their preferred training session time (e.g. afternoon, evening), aiming to encourage research participation. These groups were supplemented by diverse participants from elementary schools (e.g. teachers, principals, staff members, school administrators) from the region who registered for the standard

MBSR program but did not participate in the study. Group sizes ranged from a minimum of 6 to a maximum of 15 participants. Participants were not paid for providing data and completing the intervention. Costs for participating in the course were covered by their school boards.

Although the protocol paper for this study (Lensen et al, 2021) referred to data collection for the outcome measure ‘teacher absenteeism’, due to the COVID-19 pandemic we had to drop this outcome measure. The regular absence of teachers for a variety of COVID-19 related reasons would have biased this outcome measure. In contrast to our original plans, we opted not to incorporate pupil perspectives on pupil-teacher relationships and classroom climate quality due to insufficient parental consent. Despite our concerted efforts, response from parents was limited, especially in schools with a higher school weight.

Intervention

The intervention consisted of the original MBSR-program developed by Kabat-Zinn (2013) containing 8 weekly group sessions (6 - 15 participants) with a duration of 120 minutes each. The training consists of three primary components: (1) formal and informal meditation exercises, such as sitting meditation and yoga; (2) dialogue and (3) psychoeducation about stress and stress responses. A folder was provided with information about each weeks’ session and participants were asked to practice daily for at least 35 minutes. The study did not assess the amount of practice outside the sessions. Initially, MBSR was primarily offered in a face-to-face format. However, due to COVID-19, for school year 2020-2021 the last four sessions had to be conducted online. In the 6th week, an additional day of silent practice was included. Due to COVID-19 restrictions, this additional session could not take place face-to-face and participants were encouraged to practice a day in silence at home using a protocol which was provided by the trainer. For the face to face training in school years 2020-2021 and 2021-2022, additional measures were implemented, including increased spacing between participants and extra ventilation. The mindfulness teacher (JL) met the advanced criteria of the internationally agreed good practice guidelines of the UK Network and the Association of Mindfulness-Based Teachers in the Netherlands and Flanders (Crane et al., 2013). In addition, the trainer had supervision by a licensed MBSR supervisor once or twice during each MBSR program. As planned the number of sessions attended by each participant was noted and several sessions were recorded. A licensed psychologist was available during and after the program when the trainer or participants noted that they might be in need of additional mental support.

Measures

Primary outcome measure

Perceived Stress

The main mental health outcome is perceived stress as measured by the Perceived Stress Scale (PSS, Cohen et al., 1983). The PSS is a self-report questionnaire to measure teachers' global stress levels in the past four weeks. The PSS contains 10 items, which are scored on a 5-point Likert scale ranging from 'never' to 'all the time'. The Dutch version of the PSS was used. The PSS has been translated into different languages and its validity has been demonstrated in several populations (Andreou et al., 2011; Bellinghausen et al., 2009; Mitchell et al., 2008; Nordin & Nordin, 2013). In the current study, the Cronbach's α coefficient of the PSS ranged between .86 and .89.

Secondary outcome measures

Well-being

The secondary mental health outcome is well-being. Emotional, social and psychological well-being was assessed using the Dutch version of the Mental Health Continuum- short Form (MHC-SF). The MHC-SF has been used and validated in previous Dutch studies (e.g. Franken et al., 2018; Lamers et al., 2011; Westerhof & Keyes, 2010). This is a self-report questionnaire consisting of 14 items on a 6-point rating scale ranging from 0 (*never*) to 5 (*every day*). The Cronbach's α coefficient of the MHC-SF ranged between .87 and .91.

Proximal secondary outcomes

Mindfulness skills

The Five Facet Mindfulness Questionnaire Short Form (FFMQ – SF) was used to measure mindfulness skills (Baer et al., 2006). This self-report questionnaire contains 24 items on a 5-point Likert-scale ranging from 1 'never or very rarely true' to 5 'very often or always true'. This questionnaire consists of five subscales: observing, describing, acting with awareness, non-judging and non-reactivity. The Dutch version of the FFMQ-SF has proven to be a reliable questionnaire which is sensitive to change in a population with anxiety and depressive symptoms (Bohlmeijer et al., 2011). The Cronbach's α coefficient of the FFMQ – SF ranged between .77 and .80.

Emotion regulation Skills

The Dutch self-report version for adults of the Behavior Rating Inventory of Executive Function (BRIEF-A, Scholte & Noens, 2011) was used to assess emotion regulation skills. For this study we only used the subscale 'Emotional Control' which consists of 10 items on a 3-point Likert scale: 'never', 'sometimes' and 'often'. The Cronbach's α coefficient ranged between .90 and .91.

Self-Compassion

The Dutch version of the short form of the Self Compassion Scale (SCS-SF) was used to assess self-compassion (Neff, 2016). This self-report questionnaire consists of 12 items on a 7-point Likert scale ranging from 1 'almost never' to 7 'almost always'. It consists of six subscales: Mindfulness, Self-kindness, Isolation, Self-judgement, Over identification and Common Humanity. The shortened scale shows a near-perfect correlation with the original Self Compassion Scale (Raes, et al., 2011). The Cronbach's α coefficient of the SCS-SF ranged between .79 and .83.

Distal secondary outcomes

Teacher's self-efficacy

The Dutch version of the Teacher Sense of Efficacy Scale-Short Form (TSES-SF; Tschannen-Moran & Woolfolk Hoy, 2001) was used to measure successful teaching on four domains: coping with pressure and stress experienced at work, development possibilities within the workplace, job accomplishment and social interaction with pupils, parents and colleagues. The TSES-SF has been used and validated in previous Dutch studies (Hoogendijk et al., 2018). The TSES-SF consists of 12 items on a nine-point-Likert scale ranging from '1 (nothing)' to '9 (great deal)'. The Cronbach's α coefficient of the TSES-SF ranged between .90 and .93.

Pupil-teacher relationship and classroom climate quality

The self-report teacher questionnaire of the Dutch Class Climate Scale (DCCS; Donkers & Vermulst, 2014) was used to assess teacher's perceptions of the classroom quality. The subscales 'pupil-teacher relationship' (11 items) and 'quality of classroom climate' (8 items) were included in this study. Both subscales scored on a 4-point scale ranging from 1 (almost never) to 4 (often). The Cronbach's α coefficient of the subscale classroom climate quality ranged between .89 and .92 for the pupil-teacher relationship between .83 and .87.

Possible moderators

As moderators we include past or present psychological problems (coded as 0 = no, 1 = yes), school weight (coded as 0 = < regional weight average 1 = \geq regional weight average), teachers' years of experience (in years) and age (in years).

Possible confounders

As a complicating factor, the onset of the COVID-19 pandemic occurred during this study. Chan et al. (2021) have highlighted the challenges that elementary teachers faced during the COVID-19 era, such as socially distanced classrooms and hybrid teaching, which brought about increased levels of stress and uncertainty, possibly impacting their teaching efficacy (Cho et al., 2021). Because of the possible impact of COVID-19 'school years' was additionally included as a categorical confounding variable (coded as 0 = before COVID-

19, 1 = during COVID-19) in the sensitivity analyses next to the following potentially confounding baseline variables as stated in the protocol paper (Lensen et al., 2021): gender (coded as 0 = female, 1 = male), age (in years), school weight (coded as 0 = < regional weight average 1 = ≥ regional weight average), teachers' years of experience (in years), number of work days per week (in days), past or present psychological problems (coded as 0 = no, 1 = yes).

Sample size calculation

In determining the necessary number of participants, we presumed a significance level (α) of 0.05 and a moderate effect size (δ) of 0.50 (e.g., Verweij et al, 2018). That study gives a good indication as the study population consisted also of professionals in a highly demanding job, was comparable in age and living situation and was not selected on psychological complaints. To reach 80% power, 64 participants had to be included in the intervention as well as the control group. With an estimated dropout rate of 17.5%, comparable to the study from Verweij et al. (2018), we focused on recruiting 155 participants during three consecutive school years.

Data analyses

All analyses were conducted in R (R Core Team, 2020) using the packages *esc* for effect size calculation (Lüdtke, 2019) and *lme4* (Bates et al., 2018) for linear mixed models and were in accordance with the previously published protocol (Lensen et al, 2021). A probability cut-off of $\alpha < .05$ was used for all analyses. Intention-to-treat analyses were conducted to examine the effect of the intervention on primary and secondary outcomes and proximal outcomes. Linear mixed models were used for the analyses, which adequately deal with missing data and can account for the multilevel structure of the data (Scott et al., 2013). In this study, observations were nested within participants, and participants were nested within MBSR-training groups and schools. However, since the intraclass-correlation (ICC) of the MBSR-training groups and schools ($ICC < .01$) was negligible, all models were fitted as two-level models including only random effects for observations nested within teachers (Theobald, 2018). All models were specified including random intercepts, as a more complex random intercept and slope model did not show a significantly better fit for the primary outcome perceived stress. The variance-covariance structure was set to compound symmetry, since a more complex unstructured covariance structure did not show a significantly better fit when compared with a likelihood-ratio test ($p = .64$). Restricted maximum likelihood was used for estimation in all models. To determine whether the intervention had an effect on the corresponding outcomes, fixed effects for time and group as well as their higher-order interaction were included in the mixed models. Furthermore, the models were repeated using per-protocol data including completers only. In this context, completion was defined as having attended at least 4 of the 8 group sessions (Kuyken et al., 2015). Estimated marginal means and standard errors from the mixed models were used to calculate between-group Cohen's d effect sizes and corresponding 95% confidence intervals. Effect sizes > 0.80 were considered

large, effects > 0.50 as moderate, and effect sizes > 0.20 as small. As post-hoc tests, analyses of covariance (ANCOVAs) with condition and baseline scores as covariates were conducted to examine the effect of the intervention on primary and secondary outcomes at each timepoint. In line with the previously published protocol (Lensen et al., 2021), we did not account for potential covariates in the primary analyses. However, to determine whether including covariates substantially changed the models, sensitivity analyses were conducted in which all linear mixed models were re-ran with the following potentially confounding baseline variables included: gender, age, school weight, teachers' years of experience, number of work days per week, and past or present psychological problems (Lensen et al., 2021). To determine the potential impact of COVID-19, we additionally included a categorical confounding variable in the sensitivity analyses indicating whether people participated before or during COVID-19 (0=before COVID, 1=during COVID). To test the robustness of the results, outlier checks were performed for all outcomes and all timepoints. If outliers were identified, we re-ran the analyses with these outliers excluded. Outliers were defined as scoring lower or higher than 3 standard deviations from the sample mean at the respective time point. Finally, the proportion of participants in both groups showing reliable change on the primary outcome was calculated for post-measurement and follow-up (Jacobson & Truax, 1992). Uncertainty surrounding the proportions was expressed with 95% binomial confidence intervals. Moderator analyses in terms of the primary outcome measure perceived stress were conducted using fixed effects models. Condition and the corresponding moderator were included as fixed effects as well as the interaction of the two variables. A significant interaction would indicate that the moderator influences the effect of the intervention. The following moderators were analyzed: past or present psychological problems, school weight, teachers' years of experience and age (Lensen et al., 2021).

Data availability, transparency and openness

All data has been analyzed by an independent statistician and analyses are in accordance with the previously published protocol (Lensen et al., 2021). We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. This study was preregistered; see <https://clinicaltrialsregister.nl/nl/trial/21817>. The data that support the findings of this study are available from the corresponding author upon request. Data were analyzed using R (R Core Team, 2020) using the packages *esc* for effect size calculation (Lüdtke, 2019) and *lme4* (Bates et al., 2018) for linear mixed models.

RESULTS

Sample characteristics

Of the 146 elementary school teachers who were randomized, eight dropped out before the pre-treatment assessment because they got another job ($N=5$) or did no longer want to participate in the training ($N=3$). Of the remaining 138, the majority was female

($n = 124$, 89.9%). The gender composition of our sample is consistent with the profession as a whole in the Netherlands (Statistics Netherlands, 2016, 2018). Almost all ($n = 130$, 94.2%) had a Western background. The average age of participants was 39.4 years old ($SD = 11.3$). The majority had quite a long term experience in teaching (Md 10-20 years). School weight was below average in slightly more than half of the participants. There were no relevant differences between the intervention group and the control group in terms of sociodemographic, clinical or professional characteristics. Descriptive characteristics of the participants are presented in Table 1.

Table 1 Baseline Demographic Characteristics participants total and by group

	Total <i>N</i> = 138 <i>n</i> (%)	MBSR <i>n</i> = 67 <i>n</i> (%)	Control <i>n</i> = 71 <i>n</i> (%)
Sociodemographic			
<i>Gender</i>			
Male	14 (10.1)	8 (11.9)	6 (8.5)
Female	124 (89.9)	59 (88.1)	65 (91.5)
<i>Marital status</i>			
Single	58 (42.0)	30 (44.8)	28 (39.4)
Married/living with a partner	72 (52.2)	35 (52.2)	37 (52.2)
Divorced/widowed/separated	8 (5.8)	2 (3.0)	6 (8.4)
<i>Ethnicity</i>			
Western background	130 (94.2)	63 (94.0)	67 (94.4)
Non-western background	8 (5.8)	4 (6.0)	4 (5.6)
<i>Age M /SD</i>	39.4/11.3	39.5	39.2
<i>Children</i>			
Yes	81 (41.3)	39 (58.2)	42 (59.1)
No	57 (58.7)	28 (41.8)	29 (40.9)
<i>Education level</i>			
Higher Vocational Education	105 (76.1)	51 (76.1)	54 (76.1)
Higher Vocational Educ. master	21 (15.2)	11 (16.4)	10 (14.1)
≥ Academic bachelor/master	12 (8.7)	5 (7.5)	7 (9.8)
Clinical			
<i>Current psychological symptoms</i>			
No	123 (89.1)	58 (86.6)	65 (91.6)
Yes	15 (10.9)	9 (13.4)	6 (8.5)

Table 1 Baseline Demographic Characteristics participants total and by group (continued)

	Total N = 138 n (%)	MBSR n = 67 n (%)	Control n = 71 n (%)
<i>Being treated for psychological symptoms</i>			
No	35 (74.5)	18 (78.3)	17 (70.8)
Yes	12 (25.5)	5 (21.7)	7 (29.2)
<i>Psychological complaints before</i>			
No	84 (60.9)	40 (59.7)	44 (62.0)
Yes	54 (39.1)	27 (40.3)	27 (38.0)
<i>Treatment before</i>			
No	22 (30.6)	13 (35.1)	9 (25.7)
Yes	50 (69.4)	24 (64.9)	26 (74.3)
Professional			
<i>Type of education teaching</i>			
Regular elementary school	131 (94.9)	62 (92.5)	69 (97.1)
Elementary school special needs	7 (5.2)	5 (7.5)	2 (2.9)
<i>Teaching group</i>			
1-4	66 (47.8)	30 (44.8)	36 (50.7)
5-8	60 (43.5)	29 (43.3)	31 (43.7)
Combination 3,4,5 of 6,7,8	12 (8.7)	8 (11.9)	4 (5.6)
<i>Years of employment</i>			
< 2	25 (18.1)	14 (20.9)	11 (15.5)
2-5	21 (15.2)	10 (14.9)	11 (15.5)
5-10	11 (8.0)	6 (9.0)	5 (6.0)
10-20	49 (35.5)	21 (31.3)	28 (39.4)
20-30	24 (17.4)	9 (13.4)	15 (21.1)
>30	8 (5.8)	7 (10.5)	1 (1.4)
<i>Days a week teaching (M)</i>	3.9	4.0	4.0
<i>School weight</i>			
< regional average	73 (52.9)	36 (53.7)	37 (52.1)
≥ regional average	65 (47.1)	31 (46.3)	34 (47.9)

Program Completion

The number of sessions attended by each participant was noted by the mindfulness teacher. On average, participants attended 7.10 sessions, ranging from 4 to 8 sessions. The distribution of session attendance was as follows: 2 participants attended 4 sessions, 2 participants attended 5 sessions, 8 participants attended 6 sessions, 27 participants attended 7 sessions, and 28 participants attended 8 sessions.

Primary outcome: Perceived Stress

The results of linear mixed model analyses for primary and secondary outcomes are summarized in Table 2. A significant group by time interaction was found for the primary (mental health) outcome perceived stress ($p < 0.01$), so the intervention was significantly more effective in decreasing perceived stress over time than the control condition. Large effects in favor of the intervention group were found for perceived stress at post-treatment ($d = -0.84$), and a moderate effect at follow-up ($d = -0.69$). Figure 4 shows estimated marginal means for perceived stress over time and across groups. Figure 5 presents all secondary outcome measures. Per-protocol analyses using completers only did not reveal different results compared to Intention-to-treat (ITT) analyses for the primary outcome.

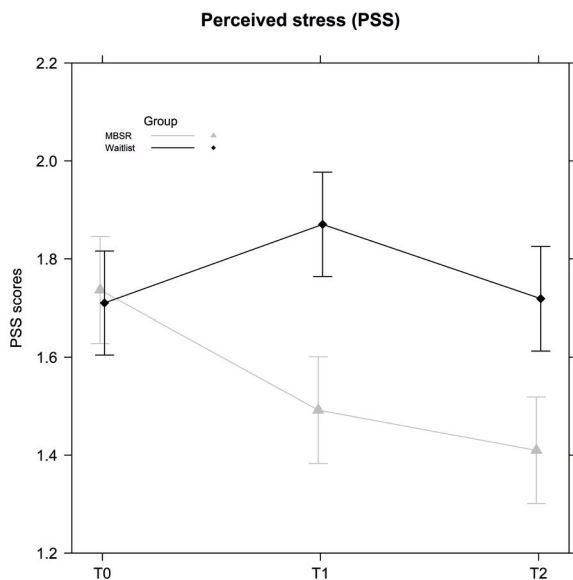


Figure 4 Time point and group primary outcome

Table 2 Means and measurements

		Pre (T0)	Post (T1)	FU (T2)	Group x time	Between-group effect size <i>d</i> [95% CI]
Group	M (SE)	M (SE)	M (SE)	M (SE)	<i>F</i>	T1 T2
Primary outcome						
<i>Mental Health</i>						
Perceived stress (PSS)	MBSR 1.74 (0.06)	1.49 (0.06)	1.41 (0.06)	10.81**	-0.84 [-1.19; -0.49]	-0.69 [-1.03; -0.34]
	WL 1.71 (0.05)	1.87 (0.05)	1.72 (0.05)			
Secondary outcomes						
<i>Mental Health</i>						
Well-being (MHC-SF)	MBSR 2.93 (0.06)	3.33 (0.06)	3.39 (0.06)	11.09**	0.54 [0.20; 0.88]	0.72 [0.37; 1.06]
	WL 2.94 (0.06)	3.06 (0.06)	3.02 (0.06)			
Proximal outcomes						
<i>Mindfulness skills (FFMQ-SF)</i>						
	MBSR 3.18 (0.03)	3.41 (0.03)	3.48 (0.03)	46.16***	0.91 [0.56; 1.26]	1.37 [1.00; 1.74]
	WL 3.19 (0.03)	3.21 (0.03)	3.18 (0.03)			
<i>Emotion regulation (BRIEF-A)</i>						
	MBSR 0.68 (0.03)	0.48 (0.03)	0.47 (0.03)	16.55**	-0.74 [-1.09; -0.39]	-0.80 [-1.15; -0.46]
	WL 0.66 (0.03)	0.68 (0.03)	0.69 (0.03)			
<i>Self-compassion (SCS-SF)</i>						
	MBSR 2.89 (0.08)	3.62 (0.08)	3.82 (0.08)	40.19***	0.88 [0.53; 1.23]	1.26 [0.90; 1.63]
	WL 2.95 (0.07)	3.07 (0.07)	3.02 (0.07)			
Distal outcomes						
<i>Teacher's self-efficacy (TSES-SF)</i>						
	MBSR 5.21 (0.07)	5.75 (0.07)	5.97 (0.07)	20.07***	0.78 [0.44; 1.13]	0.86 [0.51; 1.21]
	WL 5.26 (0.07)	5.32 (0.07)	5.49 (0.07)			
<i>Pupil-teacher relationship</i>						
	MBSR 2.37 (0.03)	2.52 (0.03)	2.58 (0.03)	2.11	0.30 [-0.03; 0.64]	0.29 [-0.05; 0.63]
	WL 2.38 (0.03)	2.44 (0.03)	2.50 (0.03)			
<i>Classroom climate quality</i>						
	MBSR 2.45 (0.02)	2.53 (0.02)	2.59 (0.02)	10.08**	0.49 [0.15; 0.83]	0.62 [0.28; 0.96]
	WL 2.45 (0.02)	2.44 (0.02)	2.48 (0.02)			

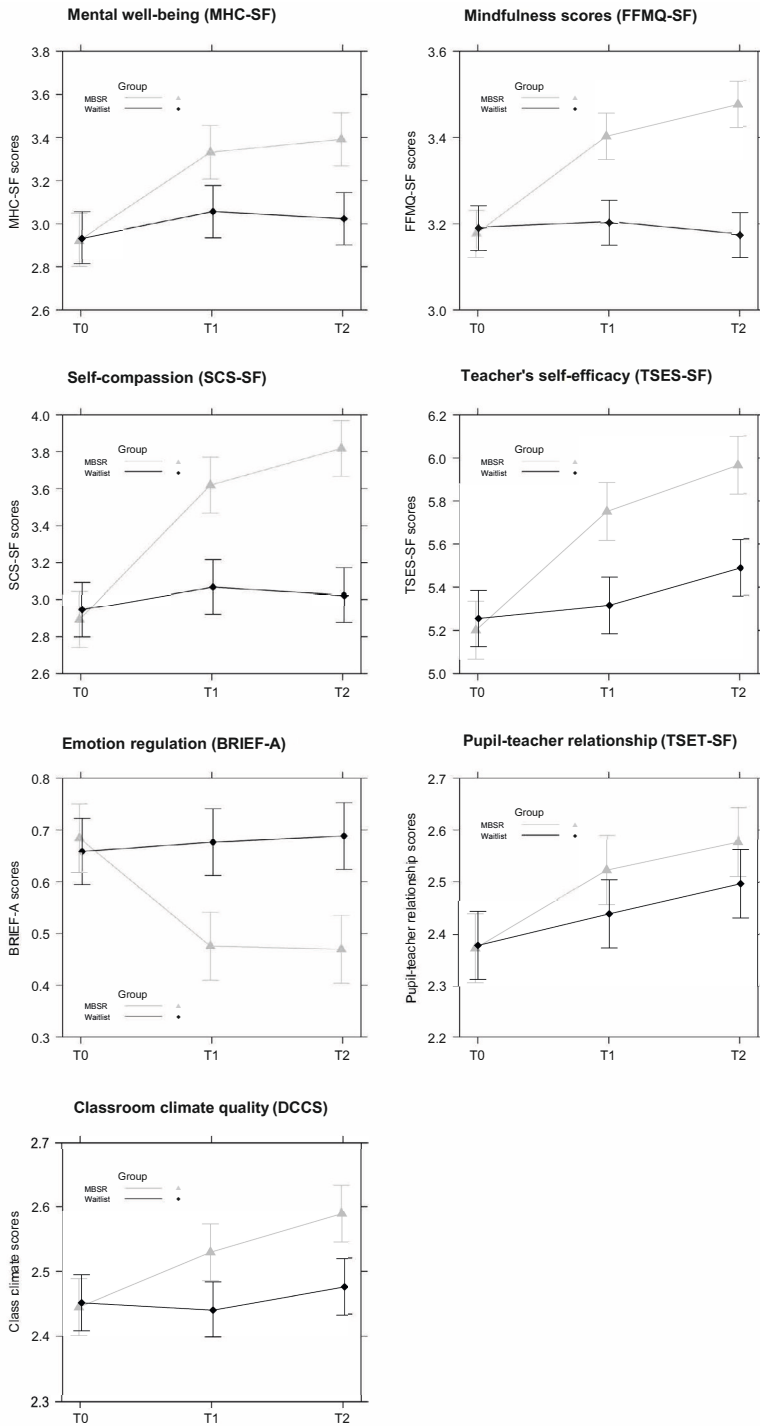


Figure 5 Time point and group secondary outcomes

Secondary outcomes

Well-being

Analyses of secondary outcomes showed significant group by time interactions for almost all secondary outcomes, with all effects being in favor of the intervention group. With regard to the mental health outcome measure of well-being, moderate between-group effect sizes at post-treatment and follow-up were found for well-being.

Proximal secondary outcomes

Analyses of proximal secondary outcomes showed significant group by time interactions for all proximal outcomes; mindfulness skills, self-compassion and emotion regulation. All effects were in favor of the intervention group. Large effects were found for mindfulness skills and self-compassion at post-treatment and follow-up, and for emotion regulation at follow-up. Moderate between-group effect sizes were found for emotion regulation at post-treatment. Between-group post-hoc tests were significant for all proximal outcomes at all timepoints (p 's < 0.05). Per-protocol analyses using completers only did not reveal different results compared to ITT analyses for the proximal outcomes.

Distal secondary outcomes

Regarding distal secondary outcome measures, large effects were found for teacher self-efficacy at post-treatment and follow-up and moderate effect sizes at both time points for teacher-perceived classroom climate quality. Between-group post-hoc tests were significant for almost all distal outcomes at all timepoints (p 's < 0.05), except for classroom climate quality at post-treatment, which just fell short of significance ($p = 0.08$). No significant interaction effect was found for teacher-perceived pupil-teacher relationship ($p = 0.15$), and the between-group post-hoc tests did indicate that there was no significant between-group difference at any of the timepoint (p 's > 0.10). Per-protocol analyses using completers only did not reveal different results compared to ITT analyses for the distal outcomes.

Sensitivity analyses

Adjusting the models for covariates did not change conclusions drawn from the models for primary and secondary outcomes. None of the covariates was significantly related with the outcome variable, and a significant group by time interactions were still found for all outcomes (p 's < 0.01), except for the effect on the pupil-teacher relationship ($p = 0.15$). One outlier was identified for the primary outcome perceived stress at post-treatment. This person scored at least three standard deviations higher than the mean. However, excluding the data of this person from the analyses did not substantially change the results of the linear mixed model and between-group post-hoc tests. Also, one outlier was identified for teacher's self-efficacy at follow-up, class climate at post-measurement and pupil-teacher relationship at post-measurement and follow-up. In all cases, the scores

were at least three standard deviations lower than the mean score. Again, excluding these cases from the data did not substantially alter the results.

Reliable change

The reliable change for the PSS was 0.50 in the current sample. For the primary outcome perceived stress at post-treatment, 26 people in the intervention group showed reliable change (38.8%, 95% CI = 28.0 - 50.8), while 7 people showed reliable change in the control group (10.0%, 95% CI = 0.05 - 0.19). At follow-up, 28 people showed reliable change in the intervention group (41.8%, 95% CI = 0.31 - 0.54) and 14 people in the control group (20%, 95% CI = 0.12 - 0.31).

Moderator analyses

No significant moderation effects were found for any of the baseline variables past or present psychological problems, school weight, teachers' years of experience and age on the primary outcome at post-measurement.

DISCUSSION

Given the elevated levels of stress symptoms among teachers, the principal aim of this study was to assess whether participation in a standard MBSR training could result in a reduction of perceived stress among elementary school teachers. Results indeed demonstrated that teachers in the MBSR group reported significantly lower perceived stress levels at both post-treatment and the three-month follow-up compared to those in the waitlist control group, with substantial to moderate effect sizes between the groups. While no significant effects emerged regarding teacher-perceived pupil-teacher relationships, teachers in the MBSR group reported significantly higher levels of well-being and moderate to large improvements in self-efficacy and classroom climate quality, both at post-treatment and the three-month follow-up. Moreover, beyond these effects, substantial enhancements were observed in proximal outcome measures, including mindfulness skills and self-compassion at both post-treatment and three months follow-up. For emotion regulation, these improvements were of moderate magnitude. Our findings are in line with previous work in predominantly mixed teacher populations, which also found positive effects of mindfulness interventions on teacher stress and well-being (e.g., Klingbeil & Renshaw, 2018; Emerson et al., 2017; Hwang et al., 2017, de Carvalho et al., 2021). The current study adds to these findings by focusing exclusively on elementary school teachers and examining effects of the standard MBSR program without adaptations to the educational field, which might be easier to implement on a larger scale.

Where the present study showed large effects on teachers' self-efficacy, earlier studies on elementary school teachers - using adapted teacher MBIs - show mixed findings. For example, the research conducted by Jennings and colleagues (2017) demonstrated no effects on teacher self-efficacy, while the study by de Carvalho and colleagues (2021)

revealed significant effects. Conversely, both systematic reviews on mixed teacher populations (Hwang et al., 2017; Emerson et al., 2017) reported only small effects on teacher self-efficacy. While replication of our findings is warranted, elementary school teachers' self-efficacy seems to benefit considerably from standard MBSR training.

While we did not observe significant enhancements in teacher-perceived pupil-teacher relationships, it's noteworthy that previous studies included in the meta-analysis by Klingbeil and Renshaw (2018) generally reported small effects. In contrast, concerning classroom climate quality, the effects documented in the meta-analysis (Klingbeil & Renshaw, 2018) were modest, whereas our recent study demonstrated substantial to moderate effects. The mixed study conducted by de Carvalho et al. (2021), exclusively focusing on elementary school teachers, also showcased promising effects on classroom climate quality through classroom observations.

A plausible explanation for the absence of effects on pupil-teacher relationships and the larger effects observed in classroom climate quality in our current study might be attributed to the notion that changes in teaching behavior could exert a more immediate impact on overall classroom climate quality than on individual pupil-teacher relationships. Furthermore, behavioral change necessitates time and commences with an understanding of thoughts and unhelpful patterns, a process that evolves during the training and may only result in behavioral adjustments later on (Tang et al., 2015). It's plausible that changes in pupil-teacher relationships might require an even more extended period to manifest.

It is essential to acknowledge that the meta-analysis (Klingbeil & Renshaw, 2018) and systematic reviews (Emerson et al., 2017; Hwang et al., 2017) encompassed numerous smaller studies with a mixed teacher population, and only a limited number included follow-up assessments. Long-term follow-ups are imperative to comprehensively explore the evolution of pupil-teacher relationships, potentially integrating observations or feedback from the pupils' perspective on the relationship.

The observed effects on mindfulness skills, emotion regulation, and self-compassion align with our proposed theory of change. We hypothesized that the intervention's impact on reducing perceived stress would be accompanied by enhancements in mindfulness skills, emotion regulation, and self-compassion. (Hölzel et al., 2011; Vago & Silbersweig, 2012; Tang et al., 2015; Neff & Dahm, 2015; Neff, 2023).

Moderation

Moderation analyses revealed no significant effects for any of these variables on the primary outcome at post-treatment. Contrary to our expectations, our findings deviated from indications discovered in a pilot study conducted before this RCT (Lensen et al., 2022). The pilot study suggested that teachers' past or present psychological problems and the school weight could potentially moderate effects, indicating larger benefits of

MBSR for teachers in high school weight (high-risk) schools and for those who have had or currently have symptoms of psychological problems. Additionally, a study by Jennings et al. (2011) suggested that an MBI might exert a larger effect on teachers who worked in schools with more complex pupil populations, which is related to school weight. It is also inconsistent with the study of Roeser et al. (2022) indicating that newer teachers (<5 years) showed better personal and classroom outcomes at follow-up than more experienced teachers.

The absence of moderation effects of past or present psychological problems, school weight, years of experience and age, may suggest that the benefits of the MBSR training were consistent across different teachers, schools and intervention characteristics, indicating its broad applicability. Nevertheless, it's crucial to note that the moderation analyses were exploratory in nature, and it's plausible that the power was insufficient to detect moderating effects. Therefore, firm conclusions regarding this aspect cannot be drawn.

COVID-19

The COVID-19 pandemic, with its profound effects on teachers and heightened stress levels, introduced numerous challenges during this period. Recognizing the potential confounding impact of COVID-19 on our study results, we incorporated it as an additional variable in the sensitivity analyses. Participation before or during COVID-19 was not associated with any of the outcomes, nor were results altered after including COVID-19 as potential confounder. It may be the case that MBSR contributed significantly to the improvement of teachers' resilience, thereby buffering the possibly adverse effects of COVID-19 on their stress (Cho et al., 2021). For instance, previous research has demonstrated that teachers' self-efficacy, a protective factor for resilience, played a crucial role in facilitating successful online teaching (König et al., 2020). Therefore, it is plausible that MBSR provided additional support to teachers in managing their stress during COVID-19. Furthermore, Flemish qualitative research has revealed that teachers employed various strategies, including mindfulness, to cope with the increased perceived stress caused by COVID-19 (Desmet, 2021). Earlier investigations indicated that elementary school teachers reported lower levels of COVID-19 stress in comparison to their secondary school counterparts (Klapproth et al., 2020). It's plausible that a similar trend occurred in our study, and the impact of COVID-19 was less pronounced than anticipated. Since we did not directly inquire about the specific impact of COVID-19 on teachers' perceived stress and teaching, caution is warranted in drawing definitive conclusions from the findings in our current study.

Strengths, limitations and future research

This study employed a bottom-up approach. Teachers seeking relief from ongoing stress were facilitated to participate in an MBSR training at a regional University of Applied Sciences. Positive experiences led to a pilot study, culminating in this RCT. Teachers

found the mindfulness training valuable in their demanding professional lives, as evident from high participation rates. Importantly, the study leverages an existing training intervention, ensuring widespread availability for prompt, personalized implementation in educational settings at various levels. This study also has limitations. First, participation was voluntary, potentially affecting the applicability of findings to mandatory program attendees. The urban-centric study population may limit generalizability, given regional stress variations (Abel & Sewell, 1999). All groups had the same mindfulness teacher, impacting generalizability. Future research should diversify geographical regions, trainers, and explore various program delivery features for a comprehensive understanding (Hill et al., 2013).


Secondly, this study relied on self-reported questionnaires, introducing the possibility of social desirability and other biases (Caputo, 2017). The assessment of teaching quality, in particular, might have benefited from additional observer-rated measures. For future research, it is important to consider incorporating more objective outcome measures alongside self-report data, aligning with the notion of utilizing direct observations of classroom variables or informant-report measures (Klingbeil & Renshaw, 2018). Moreover, relying on a single source of information tends to overinflate the significance and size of detected effects. We suggest to include pupil perspectives and to further explore teachers' experiences through qualitative research methods to gain a more in-depth understanding of their perceptions regarding the impact of MBSR. In that regard, it might also be interesting to investigate to what extent the MBSR for teachers has an effect on pupil performance. Additionally, investigating whether MBSR enhances teaching quality, as assessed by the adoption of an enthusiastic and motivating style, could provide valuable insights as well (e.g., Keller et al., 2016; Moè & Katz, 2022; Taxer & Frenxzel, 2018). Last, because the control group was a waiting list rather than active control group the study design does not allow to differentiate between specific and non-specific effects of (parts of) the intervention.

Implications

Many school organizations are seeking a way to reduce teachers' perceived stress without compromising the quality of teaching and education. Based on our findings, it might be beneficial to implement MBSR within educational settings as a stress prevention intervention. We do stress the importance of addressing perceived stress in elementary school teachers not only through individual interventions, but to also take the broader context and system into account in which teachers operate.

CONCLUSION

The present study provides compelling evidence that standard MBSR training affects mental health through reducing perceived stress and improving well-being in elementary school teachers. Teacher self-efficacy and classroom climate quality also significantly improved, as well as mindfulness skills, emotion regulation and self-compassion. If school leaders, policymakers, and educational systems endorse the cultivation of both personal resilience and professional development among teachers nationwide, the systematic integration of MBSR into the curriculum should be considered.



*“One of our greatest freedoms is how we react to things”,
said the mole to the boy.*

Charlie Mackesy, *The Boy, the Mole, the Fox and the Horse*

Chapter 5

What makes Mindfulness-Based Stress Reduction programs effective among Dutch elementary school teachers?

The mediating role of mindfulness skills, self-compassion, emotion regulation and teacher self-efficacy

This chapter is based on:

M. Rombouts, J. H. Lensen, J. T. Kraiss, E. L. Duinhof K. Monshouwer, S. E. M. J. Stoltz, R. H. J. Scholte, A.E.M. Speckens, M. Kleinjan (under review). What makes Mindfulness-based stress reduction programs effective among Dutch elementary school teachers? The mediating role of mindfulness skills, self-compassion, emotion regulation and teacher self-efficacy.

ABSTRACT

Objectives: Few studies have examined why Mindfulness-Based Stress Reduction (MBSR) programs are effective among teachers. The aim of this study was to examine possible mediators underlying the effectiveness of an MBSR program for Dutch elementary school teachers.

Method: Data of a randomized controlled trial (RCT) with intervention ($n = 72$) versus control group ($n = 74$) was used. Questionnaires were completed before and after the intervention and at three-month follow-up. First, twelve mediation models with mindfulness skills, self-compassion, teacher self-efficacy, or emotion regulation as mediator (M) at post-test and perceived stress, well-being, and class climate as dependent variable (Y) at three-month follow-up were conducted. Second, when these factors have shown to be mediating factors in the simple mediation models, they were entered simultaneously in three multiple mediation models for each dependent variable.

Results: Self-compassion and emotion regulation mediated the effects of the MBSR program on perceived stress. Self-compassion mediated the effect of the MBSR program on well-being and teacher self-efficacy mediated the effect of the MBSR program on improvement of classroom climate quality.

Conclusions: Findings imply that including intervention components targeting self-compassion and self-efficacy might increase the effectiveness of MBSR programs in reducing teachers' perceived stress and improving teachers' well-being and classroom climate quality. In addition, emotion regulation is an important aspect to maintain in current MBSR programs.

INTRODUCTION

Teachers experience a high level of work-related stress (Adriaens et al., 2016; Agyapong et al., 2022; OECD, 2020). In the Netherlands, 37% of the elementary school teachers and 34% of the secondary school teachers experience high levels of stress (Sapulete et al., 2020). Additionally teacher absenteeism due to work or workload is higher than in any other profession (Central Bureau for Statistics, 2024). Teachers' stress does not only impact their own health, but also influences the quality of pupil-teacher relationships and classroom climate quality (Flook et al., 2013; Spilt et al., 2011). Eventually, this could affect pupils' health and academic achievements (Harding et al., 2019; Klusmann et al., 2016).

One promising method to reduce stress and improve well-being among teachers are mindfulness-based interventions (MBI's; Agyapong et al., 2023; Bonde et al., 2022; Emerson et al., 2017; Hidajat et al., 2023; Hwang et al., 2019; Oliveira et al., 2021). Mindfulness can reduce stress by creating emotional awareness, developing regulation of emotions, and providing insight in behavioral patterns (Tang et al., 2015). One of the most widely adopted MBIs is the Mindfulness-Based Stress Reduction (MBSR) program of Jon Kabat-Zinn (2013).

Although increasingly studies are conducted to examine the effectiveness of MBIs among teachers (e.g. Agyapong et al., 2023; Bonde et al., 2022; Lensen et al., 2024), so far only few studies report mechanisms of change of the program's outcome (Davis et al. 2024; Emerson et al., 2017; Tsang et al., 2021). This is unfortunate, as knowledge of the working mechanisms and essential elements of MBSR programs will enable us to understand what makes these programs effective and develop more effective MBSR programs for teachers in the future.

The aim of this study is to gain more insight into the mechanisms driving the effects of MBSR on perceived stress and well-being of Dutch teachers. In addition, the effect of the program on perceived classroom climate quality and the potential mechanisms underlying this relationship was studied since lower stress and higher levels of well-being among teachers was found to be related to improvements in classroom climate (Jennings et al., 2017). For this study, data of the randomized controlled trial (RCT) by Lensen et al. (2024) were used, in which MBSR was proven effective in reducing stress of Dutch elementary school teachers at both post-treatment and three-month follow-up. In addition, improvements of well-being, and classroom climate quality at post-test and follow-up were found in the intervention versus control group.

In this study, four possible mediators were chosen to gain more insight into the possible mediators of the effectiveness of the MBSR program on teacher's perceived stress, well-being and classroom climate quality. The first factor that was investigated was mindfulness skills. According to Bear and colleagues (2008) mindfulness includes five

component skills: observing, describing, acting with awareness, nonjudging of inner experience and nonreactivity to inner experience. Results of previous studies suggest that mindfulness skills may lead to a reduction in stress among teachers, enhancement of their well-being and improve classroom climate (Hwang et al., 2017; Jennings et al., 2013; Lomas et al., 2017).

The second factor that was investigated as potential mediator of the MBSR program was self-compassion. Self-compassion involves being kind, non-judgmental, and a caring approach towards oneself when suffering or challenges occurs (Neff, 2003). Studies that explored the mechanisms of change of a mindfulness training found that mindfulness and self-compassion mediated reductions in stress among teachers (Roeser et al., 2013; Taylor et al., 2016). Evidence also suggest that self-compassion has been positively linked to well-being and decreased negative outcomes like anxiety, depression, and stress (Eriksson et al., 2018; Matos et al., 2024). Given the documented benefits of self-compassion on teachers' well-being, it stands to reason that such positive effects would extend to fostering a more conducive and supportive classroom environment.

Third, it was expected that emotion regulation worked as a mediator for MBSR programs (Hölzel et al., 2011; Taylor et al., 2016). Emotion regulation can be defined as “the processes by which individuals influence which emotion they have, when they have them, and how they experience and express these emotions” (Gross, 1998). Studies have found that teachers' stress decreases when they are able to better regulate their emotions (Montgomery & Rupp, 2005; Skinner & Beers, 2016; Taylor et al., 2016). It was expected that emotion regulation would also lead to better well-being since emotion management was identified as mediator in a mindfulness training for teachers (Tsang et al., 2021). Further, it was hypothesized that emotion regulation could lead to a better classroom climate quality since some studies found that teachers who can regulate their own emotions are more able to deal with conflicts or other difficult situations in the class (Valente et al., 2022; Alvarez et al., 2022).

Finally, teacher self-efficacy could mediate the effectiveness of an MBSR program. Teacher self-efficacy indicates teachers' beliefs and attitudes about their capacity to improve pupils' learning outcomes (Tschannen-Moran & Hoy, 2001). Some studies showed a negative correlation between teacher self-efficacy and stress (Betoret, 2006; Klassen & Chiu, 2010). Therefore, it is expected that increased teacher self-efficacy and greater confidence in their own attitudes will lead to reduced perceived stress and higher levels of well-being. Furthermore, a previous study showed that mindfulness programs can improve self-efficacy among teachers and short-term benefits for classroom climate quality (de Carvalho et al., 2021).

To explore what makes MBSR programs effective among Dutch elementary school teachers, this study examined whether mindfulness skills, self-compassion, emotion

regulation and teacher self-efficacy serve as mediators in the impact of the MBSR program on teachers' perceived stress, well-being, and classroom climate quality. Our hypothesis posits that these variables serve as mediators in the effectiveness of the MBSR program.

METHODS

Participants

In total, 146 Dutch school teachers who taught group 1 to 8 from 62 different elementary schools were included in this study. Of the 152 teachers that were interested in participating in the study, six teachers did not meet the inclusion criteria. After randomization, eight teachers withdrew their participation because of several reasons (e.g. job switch or choose to follow another training). In total, 138 teachers participated in the study. The final sample included 138 participants, divided into three cohorts: cohort 1: 35 participants (2019-2020), cohort 2: 48 participants (2020-2021) and cohort 3: 55 participants (2021-2022).

Procedure

Design

An RCT was conducted with two conditions: an intervention condition (MBSR program) and a wait-list control condition. For the randomization, participants were stratified by gender (male versus female) and school weight (< regional average versus ≥ regional average). In the Dutch context, school weight is an indicator of the complexity of the pupil population. A higher score on school weight, means a more complex pupil population and lower expected learning results of the school (Posthumus et al., 2019). The intervention group started with MBSR in September, the wait-list control group started with MBSR in March (after the follow-up measurement). Three measurements were conducted: T0 (pre-test), T1 (post-test) and T2 (three-month follow-up). Data was collected in school years 2019-2020, 2020-2021 and 2021-2022.

Ethical approval for this study was provided by the Internal Review Board Ethics Committee Social Science, Faculty of social sciences Radboud University, 06 June 2019, Reference number: ECSW-2019-029. The study is registered in the Dutch Trial Register (Trial 21817). More information about the study design can be found in the study protocol Lensen et al. (2021).

Study setting

In the Netherlands, elementary schools consist of eight grades (group 1 to 8). Pupils in class 1 to 8 are between 4 and 12 years old. These groups are comparable to grades 1 to 6 in the school system of the United States of America.

Recruitment and eligibility criteria

Teachers were recruited via schoolboards, presentations at school and social media. Teachers received an information letter and signed up for the study by contacting the research team or filling out an online form. Inclusion criteria were 1) teaching in the same group for at least two days a week during a school year between September and March; 2) willing to participate in the three measurements; and 3) available to start the MBSR intervention in September and March. Teachers were excluded if they had participated in an MBI before that lasted for more than three hours. Teachers were asked to sign an informed consent form.

Data collection

Data was collected through an online self-report questionnaire at pre-test, post-test and three-month follow-up. Participants received the questionnaires via e-mail. When participants did not complete the questionnaire within five days, they received a reminder. If no response followed, participants were called and asked to complete the questionnaire. The questionnaires were processed anonymously in an online software system.

Intervention

The intervention in this study was the MBSR-program developed by Kabat-Zinn (2013). The intervention involved 8 weekly group sessions with 6 to 15 participants. The intervention was provided by a qualified mindfulness teacher who was supervised by a licensed MBSR supervisor once or twice during the MBSR-program. Each session lasted 120 minutes and consisted of different parts: (a) meditation exercises, (b) dialogue and (c) psychoeducation about stress and stress responses. The participants had to practice every day for at least 35 minutes and received a folder with information about the sessions. The attendance of the participants in each session was noted. More information about the intervention, can be found in Lensen et al. (2021).

Measures

Perceived stress

Perceived stress was measured with the Dutch version of the Perceived Stress Scale (PSS, Andreou et al., 2011; Cohen et al., 1983). The PSS contains 10 items measured on a five-point Likert scale ranging from (1) 'never' to (5) 'all the time'. An example of an item is: 'In the last month, how often have you felt nervous and stressed?'. Higher scores on the total sum score indicate a higher level of perceived stress. In this study, the PSS at baseline had a Cronbach's alpha of 0.86 and a McDonald's omega of 0.89.

Well-being

Well-being was measured with the Mental Health Continuum – Short Form (MHC-SF, Lamers et al., 2011). The MHC-SF consists of 14 items that assess emotional, psychological, and social well-being, for example 'During the past month, how often did

you feel happy?'. Answers could be given on a six-point Likert scale ranging from (1) 'never' to (6) 'every day'. Higher scores indicate a higher level of well-being. In this study, the Cronbach's alpha was 0.87 and the McDonald's omega was 0.90 at baseline.

Classroom climate quality

Classroom climate quality was measured with the subscale 'quality of classroom climate' (8 items) of the Dutch Class Climate Scale (DCCS; Donkers & Vermulst, 2014). Participants could answer on a four-point scale ranging from (1) 'almost never' to (4) 'often'. An example of an item is 'In my class, pupils are bullied'. Higher scores indicate a higher level of classroom climate quality. For this study, the classroom climate quality scale had a Cronbach's alpha of 0.89 and a McDonald's omega of 0.83 at baseline.

Mindfulness skills

Mindfulness skills was measured with the Dutch version of Five Facet Mindfulness Questionnaire – Short Form (FFMQ-SF; Baer et al., 2006; Bohlmeijer et al., 2011). The FFMQ-SF contains five subscales: observing, describing, acting with awareness, non-judging, and non-reactivity. An example of one of the 24 items is 'I'm good at finding the words to describe my feelings'. Participants could answer on a five-point Likert scale from (1) 'never or very rarely true' to (5) 'very often or always true'. A higher score on these items means better mindfulness skills. In this study, the Cronbach's alpha of the FFMQ-SF at baseline was 0.77 and the McDonald's omega was 0.88.

Self-compassion

Self-compassion was measured with the short form of the Self Compassion Scale (SCS-SF; Raes et al., 2011; Neff, 2016). The SCS-SF consists of six subscales: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identifications. One of the 12 items is: 'I try to see my failings as part of the human condition'. Responses categories include a seven-point Likert scale ranging from (1) 'almost never' to (7) 'almost always'. In this study, the SCS-SF at baseline had a Cronbach's alpha of 0.81 and a McDonald's omega of 0.85.

Emotion regulation

Emotion regulation was measured with the subscale emotion control of the Behaviour Rating Inventory of Executive Function (BRIEF-A; Scholte & Noens, 2011). The subscale emotion control includes 10 items measured on a three-point scale: (1) 'never', (2) sometimes and (3) 'often'. An example of an item is 'My mood changes quickly'. Higher scores indicate lower emotion regulation. In this study, the subscale emotional control of BRIEF-A at baseline had a Cronbach's alpha of 0.90 and a McDonald's omega of 0.95.

Teacher self-efficacy

Self-efficacy was measured with the Dutch version of the Teacher Self Efficacy Scale – Short Form (TSES-SF; Schwarzer & Hallum, 2008). The TSES-SF includes 12 items, for

example: 'How well can you motivate uninterested students?'. Participants could give answers on a nine-point Likert scale ranging from (1) 'nothing' to (9) 'great deal'. A higher score on these items indicates a higher amount of teacher self-efficacy (Nie et al., 2010). In this study, the TSES-SF at baseline had a Cronbach's alpha of 0.90 and a McDonald's omega of 0.93.

Data analyses

All analyses were conducted in R (R Core Team, 2022). Before running mediation analyses, Pearson correlations were calculated between all outcome and mediator variables. Mediation models were fitted using structural equation modelling implemented in the Lavaan package (Rosseel, 2012) and followed recommendations by Preacher and Hayes (Hayes & Rockwood, 2017; Preacher & Hayes, 2008). Condition (0=control group, 1=intervention group) was used as independent variable (X) in all models. First, simple mediation models with mindfulness, self-compassion, teacher self-efficacy, or emotion regulation as mediator (M) at post-test and perceived stress, well-being, or classroom climate quality as dependent variable (Y) at follow-up were conducted (Figure 1). In addition to the three previously described mediators in the study protocol (Lensen et al., 2021), we decided to also include teacher self-efficacy based on the literature. Second, three multiple mediation models were conducted including all mediators that had been shown to be significant factors in the simple mediation models. One multiple mediation model was performed per dependent variable. In all models, the mediator at post-test was additionally regressed on baseline scores of the mediating variables to account for possible baseline differences (Preacher & Hayes, 2008).

Further, regression coefficients for the a-path, b-path, as well as direct (c'), total (c), and indirect effects were calculated for all models (Figure 1). The a-path represents the effect of X on M, while the b-path is the effect of M on Y while controlling for X. The total effect is the effect of X on Y, without partialling out the indirect effect and the direct effect represents the effect of X on Y after partialling out the indirect effect of the mediator. The direct effect therefore represents the effect of X on Y after taking into account the indirect effect of M. To test for mediation, indirect effects were calculated as the product of a and b . Bootstrapped confidence intervals (95%) with 5000 iterations were calculated for these indirect effects. If the corresponding confidence interval did not contain zero, indirect effects were seen as significant. All models were analyzed using per-protocol data including only participants that attended at least four of the eight group sessions.

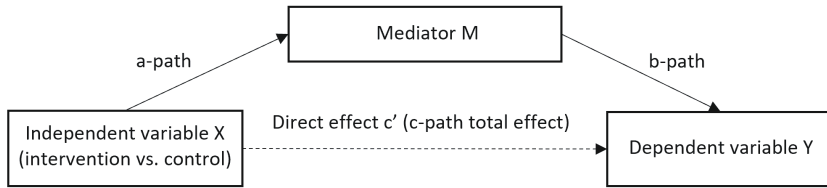


Figure 1 Visualization of mediation models

RESULTS

Preliminary analyses

The final study sample included 138 participants, of which 89.85% were female ($n = 124$) and 94.20% had a western background ($n = 130$). On average, the participants were 39.4 years old ($SD = 11.3$). Descriptive analyses (means and standard deviation) for the control and intervention group are presented in Table 1. Correlation analyses demonstrated multiple positive or negative correlations between the outcome measures and mediators at baseline (Table 2). For example, perceived stress had a negative correlation with well-being ($r = -0.42, p < 0.001$), classroom climate quality ($r = -0.20, p = 0.02$), mindfulness skills ($r = -0.49, p < 0.001$), self-compassion ($r = -0.53, p < 0.001$), teacher self-efficacy ($r = -0.19, p = 0.02$). Perceived stress was positively correlated with emotion regulation ($r = 0.55, p < 0.001$).

Table 1. Means (M) and standard deviation (SD) at pre-test (T0), post-test (T1) and follow-up (T2) for the intervention (I) and control group (C)

	Group	Pre (T0)		Post (T1)		FU (T2)	
		M	SD	M	SD	M	SD
Perceived stress (PSS)	I	1.76	0.66	1.52	0.57	1.44	0.66
	C	1.68	0.55	1.85	0.57	1.69	0.63
Well-being (MHC-SF)	I	2.91	0.81	3.32	0.70	3.38	0.77
	C	2.95	0.81	3.07	0.81	3.03	0.88
Classroom climate quality (DCCS)	I	2.43	0.28	2.51	0.30	2.57	0.30
	C	2.47	0.26	2.46	0.27	2.49	0.30
Mindfulness skills (FFMQ-SF)	I	3.15	0.37	3.38	0.29	3.45	0.32
	C	3.22	0.39	3.23	0.41	3.21	0.41
Self-compassion (SCS-SF)	I	2.81	0.99	3.54	0.80	3.71	0.86
	C	3.02	0.97	3.14	1.07	3.10	1.08
Emotion regulation skills (BRIEF-A)	I	0.73	0.51	0.52	0.43	0.52	0.44
	C	0.61	0.43	0.64	0.46	0.64	0.47
Teacher self-efficacy (TSES-SF)	I	5.05	0.96	5.60	0.92	5.81	1.02
	C	5.41	0.84	5.47	0.94	5.64	1.00

Table 2. Bivariate Pearson correlations between outcome measures and mediators at pre-test (T0)

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Perceived stress (PSS)						
(2) Well-being (MHC-SF)	-0.42***					
(3) Classroom climate quality (DCCS)	-0.20*	0.31***				
(4) Mindfulness skills (FFMQ-SF)	-0.49***	0.49***	0.25**			
(5) Self-compassion (SCS-SF)	-0.53***	0.59***	0.21*	0.57***		
(6) Emotion regulation skills (BRIEF-A)	0.55***	-0.18*	-0.25**	-0.33***	-0.35***	
(7) Teacher self-efficacy (TSES-SF)	-0.19*	0.29***	0.49***	0.25**	0.31***	-0.18*

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Simple mediation models

Table 3 shows the simple mediation models between the mediator measures (post-test, M) and dependent variables perceived stress, well-being, and classroom climate quality at follow-up (Y). The 95% CI of all indirect effects did not contain zero in any model. This indicates that the effects of the intervention versus control group on the dependent variables perceived stress, well-being and classroom climate quality were each mediated through mindfulness skills, self-compassion, teacher self-efficacy and emotion regulation.

Table 3. Simple mediation models with mediators at post-test (T1) and dependent variables at follow-up (T2)

Mediators T1	a	b	Total effect c	Direct effect c'	Indirect effect a x b (95% CI)
Perceived stress					
Mindfulness skills (FFMQ)	0.19***	-0.66***	-0.28**	-0.16	-0.12 (-0.20, -0.06)
Self-compassion (SCS-SF)	0.49***	-0.35***	-0.29**	-0.12	-0.17 (-0.28, -0.08)
Emotion regulation skills (BRIEF-A)	-0.18***	0.07***	-0.30**	-0.19	-0.11 (-0.20, -0.04)
Teacher self-efficacy (TSES-SF)	0.38**	-0.13*	-0.29**	-0.24*	-0.05 (-0.11, 0.00 ¹)
Well-being					
Mindfulness skills (FFMQ)	0.19***	0.85***	0.37**	0.21	0.16 (0.07, 0.27)
Self-compassion (SCS-SF)	0.49***	0.46***	0.38**	0.16	0.22 (0.09, 0.38)
Emotion regulation skills (BRIEF-A)	-0.18***	-0.48**	0.38**	0.29*	0.09 (0.02, 0.18)
Teacher self-efficacy (TSES-SF)	0.38**	0.19*	0.38**	0.31*	0.07 (0.01, 0.16)

Table 3. Simple mediation models with mediators at post-test (T1) and dependent variables at follow-up (T2) (continued)

Mediators T1	<i>a</i>	<i>b</i>	Total effect <i>c</i>	Direct effect <i>c'</i>	Indirect effect <i>a x b</i> (95% CI)
Classroom climate quality					
Mindfulness skills (FFMQ)	0.18***	0.22***	0.09	0.05	0.04 (0.01, 0.07)
Self-compassion (SCS-SF)	0.47***	0.10***	0.09	0.04	0.05 (0.02, 0.08)
Emotion regulation skills (BRIEF-A)	-0.18***	-0.15*	0.09	0.07	0.03 (0.01, 0.06)
Teacher self-efficacy (TSES-SF)	0.38**	0.17***	0.12**	0.06	0.07 (0.03, 0.11)

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

¹ The actual upper bound of the 95% CI was smaller than zero.

Multiple mediation models

The multiple mediation model of perceived stress shows that all a-paths were significant (Figure 2). The b-paths were only significant for self-compassion and emotion regulation. The total effect was significant, but the direct effect was not significant. The 95% CI of the indirect effect of self-compassion ($ab = -0.13$, 95% CI = -0.24 to -0.04) and emotion regulation ($ab = -0.06$, 95% CI = -0.13 to -0.01) did not contain zero. This means that the intervention decreased the level of perceived stress at follow-up (T2) through its effect on increasing self-compassion and emotion regulation at post-test (T1).

Figure 3 shows the multiple mediation model of well-being. The indirect effect of self-compassion was significant ($ab = 0.19$, 95% CI = 0.07 to 0.35). This means that increased levels of well-being at follow-up (T2) through the intervention was mediated by self-compassion.

In the multiple mediation model of classroom climate quality, teacher self-efficacy was indicated as a mediator (Figure 4, $ab = 0.06$, 95% CI = 0.02 to 0.10). This indicates that the significant improvement of classroom climate quality at follow-up (T2) through the intervention was mediated by teacher self-efficacy.

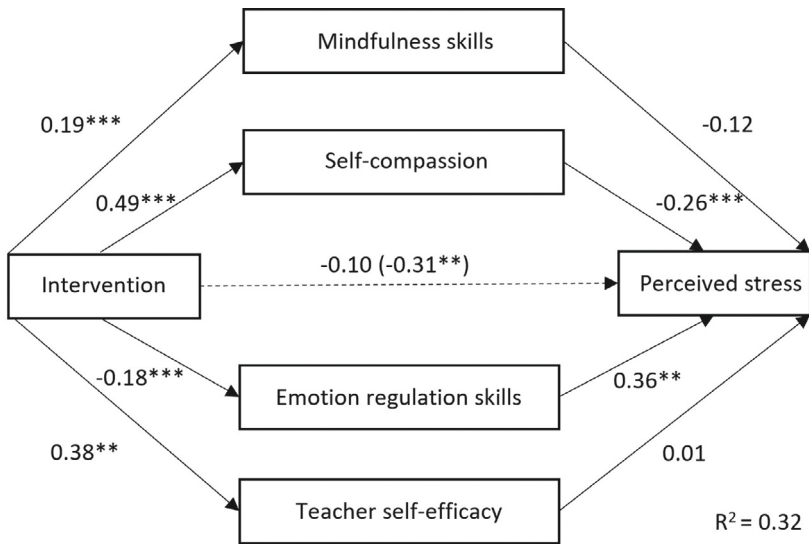


Figure 2 Multiple mediation model of the effect of the intervention group versus control group on perceived stress, mediated by four mediators. Total effect (c-path) is given in parentheses. Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

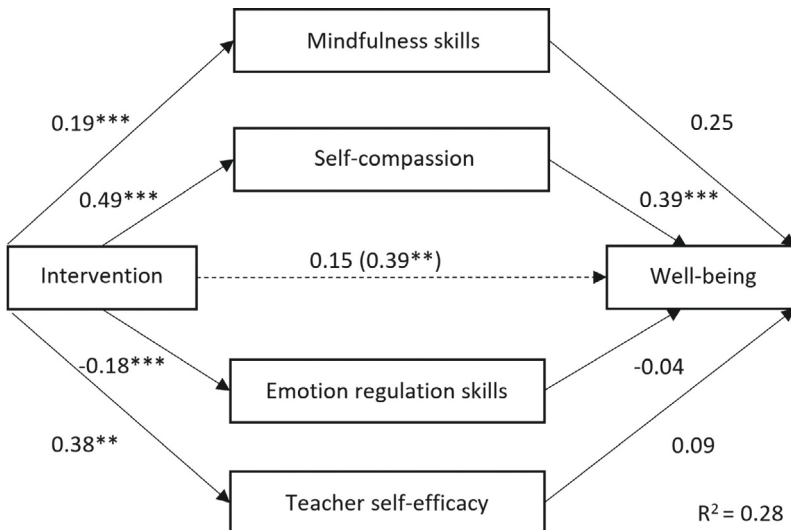


Figure 3 Multiple mediation model of the effect of the intervention group versus control group on well-being, mediated by four mediators. Total effect (c-path) is given in parentheses. Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

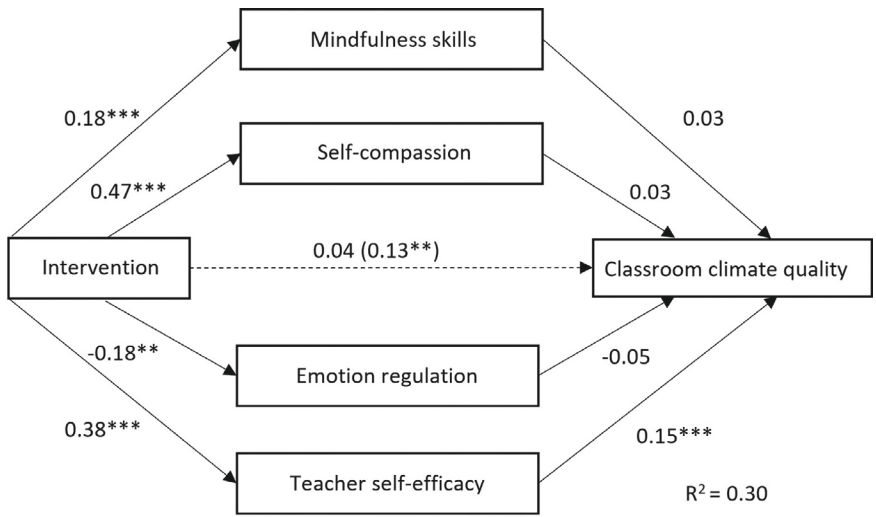


Figure 4 Multiple mediation model of the effect of the intervention group versus control group on classroom climate quality, mediated by four mediators. Total effect (c-path) is given in parentheses. Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

DISCUSSION

In this study, we investigated the effects of an MBSR program on four potential working mechanisms (mindfulness skills, self-compassion, emotion regulation and teacher self-efficacy) and explored whether these processes constitute mediators underlying program effectiveness. The analyses were conducted with data of a longitudinal RCT study with a three-month follow-up design which allowed us to provide more insight into the causality of the found relationships. We hypothesized that the MBSR program would strengthen these four mechanisms which would lead to a decrease in perceived stress and an improvement in teachers' well-being and classroom climate quality. The findings of this study contribute to the limited number of studies that examine mediators of MBSR programs for teachers (Emerson et al., 2017; Tsang et al., 2021). This is important as gathering information about the working mechanisms will enable us to increase the effectivity of MBSR programs for teachers. More effective MBSR programs may results in higher levels of teachers' well-being (Emerson et al., 2017) and, ultimately, their pupils' health and academic achievements too (Harding et al., 2019; Klusmann et al., 2016).

Our findings show that self-compassion mediates the effects of the MBSR program on perceived stress and well-being. Self-compassion helps to be non-judgmental towards oneself when dealing with challenges. When teachers are less afraid of making mistakes, prioritize self-care, and can better contextualize a situation, it is more likely that they experience less stress and more well-being. Our findings are in line with previous studies from Canada and the United States that found that self-compassion mediated

the reduction in stress among public school teachers who followed a mindfulness training (Roeser et al., 2013; Taylor et al., 2016). In addition, self-compassion has been identified as a mediator in MBSR programs for patient populations for the improvement of well-being (Evans et al., 2018), positive mental health (Geurts et al., 2021) and reduction in psychological symptoms (Sevel et al., 2020). Also in a non-clinical population self-compassion was found to be a mediator in increasing mental well-being (Maloney et al., 2023).

Further, our findings showed that emotion regulation is an important aspect of MBSR in reducing stress. This could be explained by the fact that when people are better able to recognize and regulate their emotions, it allows them to respond more calmly and effectively to challenging situations. Taylor and colleagues (2016) also suggest that emotion regulation is a way for mindfulness training to reduce teachers perceived job stress. In addition, other studies found that teacher stress is decreased when they could better regulate their emotions (Montgomery & Rupp, 2005; Skinner & Beers, 2016; Taylor et al., 2016; Tsang et al., 2023).

Moreover, our findings showed that teacher self-efficacy mediates the effect of MBSR on classroom climate quality. When self-efficacy is increased, teachers believe more in their own abilities and feel more secure. Studies found that high-efficacy teachers were better able to deal with different behavior problems or student misbehavior (for example bullying), had less conflictual relations with pupils and were better on dealing with challenging pupils (Almog & Shechtman, 2007; Zee & Koomen, 2016). Teacher self-efficacy has also a positive impact on the engagement of pupils in the lessons (Holzberger et al., 2014) and helps teachers to better deal with stress in the classroom like classroom disruptions (McCarthy & Lineback, 2015). When teachers are more confident in dealing with challenging situations or classroom disruptions, lessons will take place more calmer and less messy. This will lead to a better classroom atmosphere and learning environment for the pupils.

Some of the mediating effects that were found in the simple mediation models were not found in the multiple mediation models. For example, mindfulness skills is a mediator in the simple mediation models for perceived stress and well-being, but not in the multiple mediation models. In the multiple models, self-compassion and emotion regulation were more important than mindfulness skills. This finding could be explained by the fact that the bivariate Pearson correlations showed moderate to strong significant correlations between mindfulness skills, self-compassion, and emotion regulation (Table 2). This means that these concepts are interrelated and could reinforce each other. Therefore, adding mindfulness to the model may not lead to a larger explained variance. Further research could add one or more measurements during the intervention. This will provide a more comprehensive understanding about the changes over time and to delve more deeply into the dynamics of the mediators during the intervention.

Limitations

The present study has some limitations to consider. First, we had three measurements (pre, post and follow-up) and no mid-treatment measurement. Including an extra measurement would give us more insight in the order of changes in the mediation process. Second, in this study, subjects participated voluntarily and were possibly more interested into mindfulness than others. So, it is unsure if the results are generalizable to all teachers. Third, participants knew if they participated in the intervention or control group. This knowledge might have influenced the teachers' report about their own improvements. To limit these possible biases, it would be interesting to also measure classroom climate quality among pupils or through observations in the classroom.

Future Directions

Based on our findings, there are multiple ways for future studies to further explore *what* components make MBSR programs effective. First, further research is needed to gather more information about the dynamics of mediators during the intervention. This could be done by adding weekly measures for participants during the intervention. This will give us more information about the potential interplay and influence among mediator and outcome variables.

Second, exploring alternative methods or intervention activities that further enhance teacher self-efficacy could be a fruitful avenue for future research. This broader investigation may give more insight into supplementary strategies to strengthen the beneficial outcomes associated with MBSR programs for teachers.

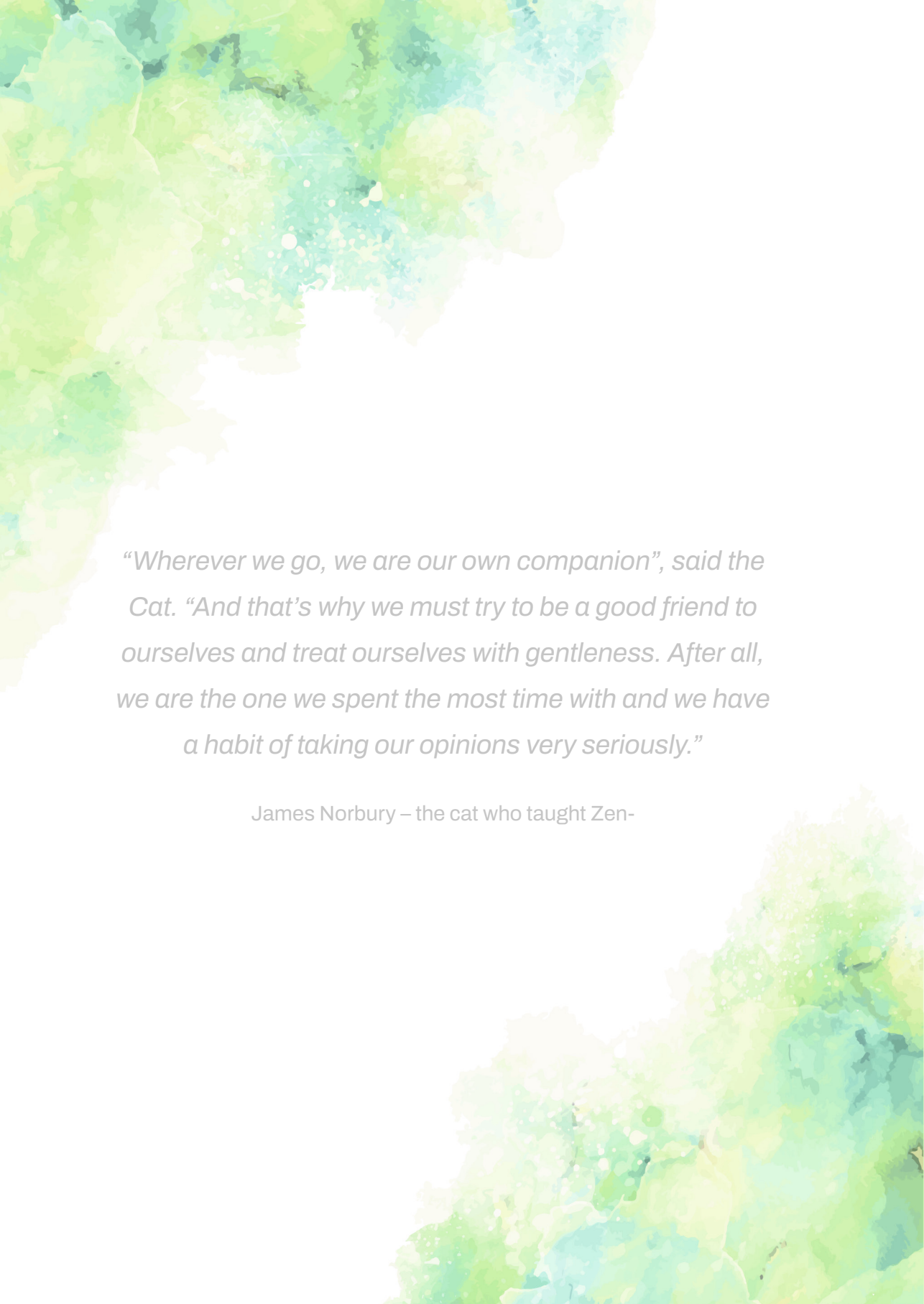
Third, in this study, the multiple mediation models elucidated a variance in the outcome measures (perceived stress, well-being, and classroom climate quality) ranging from 28% to 32%. These percentages of explained variance are relatively high in comparison to similar studies (Roeser et al., 2013; Taylor et al., 2016). However, it also suggests that not all potential mediator variables contributing to the total variance in the outcome measures were identified and included in the current investigation. To achieve a more comprehensive understanding, future research should explore additional variables – in addition to self-compassion, emotion regulation and teacher self-efficacy – which could mediate the efficacy of a MBSR program, such as empathy (Birnie et al., 2010).

Fourth, the present research focused exclusively on elementary school teachers in the Netherlands. Future studies are needed to examine whether these identified variables also serve as mediators in the context of the MBSR program among secondary, high school or university teachers in and outside the Dutch context. This broader exploration will enhance the generalizability of findings of the program's effectiveness across diverse educational settings.

In addition to suggestions for further research, we also recommend some practical implications. This research showed that strengthening emotion regulation, self-efficacy and self-compassion are important components of MBSR programs for elementary school teachers. Emotion regulation is already well secured in the MBSR program and is, according to this research, an important aspect to maintain. To increase self-efficacy, it could be helpful to increase trust in oneself and to being more appreciative of the things that are going well. To pay more attention to self-compassion, components of self-compassion programs like Mindfulness Based Compassionate Living (van den Brink & Koster, 2019) or Mindful Self-Compassion (Germer & Neff, 2019) could be integrated into MBSR programs. Such a targeted approach may have the potential to significantly improve the effectiveness of MBSR programs in supporting teachers and, subsequently, their pupils.

In addition, it is imperative to recognize that a holistic approach is essential. Rather than relying solely on individual interventions, adopting a comprehensive, whole-school strategy focused on well-being is necessary to foster positive mental health outcomes for both teachers and pupils (Weare, 2015). Mindfulness programs for teachers could be a great start since there are some indications that this may also improve school climate (Kuyken et al., 2022).

In summary, the aim of this study was to examine the mediating processes underlying the effectiveness of an MBSR program for Dutch elementary school teachers. The multiple mediation model showed that self-compassion and emotion regulation mediated the effects of the MBSR program on perceived stress. Additionally, self-compassion mediated the effect of the MBSR program on well-being and teacher self-efficacy mediated the effect of the program on improvement of classroom climate quality. Our findings imply that the intervention components targeting self-compassion and self-efficacy might increase the effectiveness of MBSR programs in reducing teachers' perceived stress and improving teachers' well-being and classroom climate quality.



“Wherever we go, we are our own companion”, said the Cat. “And that’s why we must try to be a good friend to ourselves and treat ourselves with gentleness. After all, we are the one we spent the most time with and we have a habit of taking our opinions very seriously.”

James Norbury – the cat who taught Zen-

Chapter 6

Mindfulness-Based Stress Reduction for Elementary School Teachers: A Qualitative study

This chapter is based on:

J.H. Lensen, M. Kleinjan, S.E.M.J. Stoltz, F.N. van Breukelen, I.Hanssen, A. Mol Lous, R.H.J. Scholte, , A.E.M. Speckens (under review). Mindfulness-based stress reduction for Elementary School Teachers: a qualitative study

ABSTRACT

Objective: Mindfulness-based interventions are increasingly applied in educational settings to reduce stress and improve well-being and performance in teachers. However, effects on European elementary school teachers are understudied so far. The aim of this explorative qualitative study is to obtain a more in-depth view of elementary school teachers' perceptions of the impact of a standard eight-week Mindfulness-Based Stress Reduction (MBSR) program on their personal functioning, their professional functioning, and on the classroom climate quality.

Methods: In total, 46 elementary school teachers from 23 different elementary schools participated in this study. Twenty of these were interviewed 16 weeks after completing MBSR using semi-structured focus groups. The other 26 teachers were interviewed during their last session of MBSR. Thematic analysis identified themes that described teachers' experiences.

Results: The thematic analysis showed that the effect of mindfulness resulted in positive changes, categorized in three main themes: (a) changes affecting the teacher personally, e.g. more insight in patterns, (b) changes affecting the teacher professionally, e.g. more awareness during teaching, and (c) changes affecting the pupils as observed by the teacher, e.g. improved classroom climate.

Conclusions: This study suggests that a standard MBSR program could be a valuable contribution to elementary school teachers' personal and professional functioning, as well as on their classroom climate quality. Additional quantitative research on the effectiveness of MBSR training in an elementary school setting is recommended.

INTRODUCTION

In the past decades, teachers reported increasing work pressure and stress (de Carvalho et al., 2021). The work requirements are high but also emotionally demanding (Blomberg & Knight, 2015, Jennings et al., 2017). Research shows that elementary school teachers report increasing absenteeism and a higher percentage of burnout symptoms compared to teachers in secondary schools or higher education and compared to people in other professions (Statistics Netherlands, 2017, 2018, 2020, 2022, Algemene Onderwijs Bond, 2020). For more than half of the elementary school teachers (i.e. 56%) in the Netherlands, the work load is even experienced as unacceptably high (Grinsven et al., 2016), resulting in drop-out and burn-out symptoms (e.g., Jennings and Greenberg, 2009). Increased stress levels are associated with teachers' lower health, well-being and performance (de Carvalho, 2021). In order to reduce teachers' stress levels, interventions aimed at teachers' social and emotional competencies are needed (de Carvalho, 2021). A proposed method that focuses on strengthening these competencies is mindfulness training.

Mindfulness-Based Interventions (MBIs) aim to enhance one's capacity to pay attention to experiences in the present moment (Kabat-Zinn, 2013). Mindfulness-Based Stress Reduction (MBSR) has been developed to improve emotion and attention regulation in order to reduce perceived stress. Different studies have shown that MBIs can reduce experienced stress, depressive and anxiety symptoms, and improve quality of life (e.g. Khoury et al., 2015; Goldberg et al., 2018). The number of studies exploring the effects of MBIs on stress reduction in school teachers have increased over the past few years (Jennings, 2017). However, these are often small quantitative non-registered studies within the United States (US) education system or outside Europe with mixed teacher populations or (preservice) teachers from kindergarten to grade 12, teaching pupils aged 5 to 18, which is different from the majority of the European educational systems. Elementary school teachers in Europe basically teach children aged 4 to 12, except for Scandinavia where pupils at the age of 16 leave elementary school. Moreover, elementary school teachers – in contrast to teachers in secondary or higher education - teach the same group of pupils for five days a week, which may lead to a stronger connection between teacher and pupil, and in turn make teachers more emotionally involved in their teaching (Statistics Netherlands, 2020). It can thus be expected that MBSR may have stronger effects in elementary schools, as a small change in the teacher may have a greater impact on the quality of the classroom climate and in turn on pupils, compared to teachers who see their pupils less often as in secondary and higher education. The effects of MBSR in European elementary schools could therefore differ from the effects in a mixed, K-12, secondary or high school teacher population. As a result, effects found so far cannot be generalized across countries and school levels (Roesser, 2022). Research specifically focused on European elementary school teachers is rather needed.

So far, several studies on the effectiveness of MBIs in the educational field have been conducted. For example, results from a recent meta-analysis (Klingbeil & Renshaw, 2018) on 29 studies on MBIs for the educational field, delivered in 2 to 36 weeks with a dosage ranged from 1.67 hours to 74.75 hours, indicated that MBIs are effective in increasing K-12 teachers' mindfulness ($k = 17$ studies $N = 1,001$ teachers), psychological well-being ($k = 23$, $N = 1,248$) and in decreasing psychological distress ($k = 27$, $N = 1,469$). Results for classroom climate and teaching practices ($k = 8$, $N = 536$) showed a small treatment effect. It was concluded that mindfulness training may enhance enactment of effective teaching practices. However, none of these studies specifically focused on elementary school teachers and 28 out of 29 studies had a small sample size varying from 16 to 102 teachers. More recently, two studies on the effectiveness of MBIs have been published, with positive results. First, a study ($N = 23$) by Taylor et al. (2021) found that even a relatively short, adapted MBI of four sessions reduced stress levels, burn-out, and depression in high school teachers. Second, a study by Hirshberg et al. (2020) showed that preservice teachers ($N = 88$) showed improvements in teaching practices (e.g. instructional supports, emotional supports, and classroom organization) up to six months after participating in an MBI. Daily mindfulness practice was significantly associated with these improvements. There were no group differences observed on well-being.

Although these studies on the effectiveness of MBIs in education provide important insights, none of the studies tell us about how elementary school teachers *experience* participating in standard MBSR and the possible relation between participating in MBSR and their personal functioning, their professional functioning and their classroom climate quality. Therefore, using a qualitative design the current study will examine how teachers in elementary schools experience the effects of standard MBSR on their personal and professional functioning and on the classroom climate quality.

By using a qualitative research design, it is perhaps possible to not only examine direct effects, but also to zoom in on potential working mechanisms of MBIs. From a systematic review of the empirical literature on the impact of mindfulness on the well-being and performance of educators (Lomas et al., 2017), it has been suggested that more research is needed to understand how mechanisms operate. They suggested that mindfulness involves self-reflective practices that help develop attention and awareness abilities. These abilities can lead to improved emotional regulation and intelligence, which includes the ability to view things from different perspectives. Improved emotional regulation and intelligence can support multiple positive health and well-being outcomes. In the current study we will explore potential mechanisms by including questions in our topic list that relate to the suggested mechanisms.

So far, few studies on MBIs in the education field adopted a qualitative design examining how teachers reflect upon what they have learned during the intervention. Only a number of qualitative studies, all with a mixed teacher population, show hopeful results. For

example a qualitative study by Sharp & Jennings (2016) in which researchers conducted semi-structured interviews at K-12 teachers ($N = 8$) to examine how participants utilized mindfulness techniques learned from an adapted MBI teacher training. Participants reported applying mindfulness strategies in three key ways: (1) focusing on present emotions, (2) reframing emotional responses to situations, and (3) utilizing metaphors introduced in a MBI-teacher program. As a result, participants reported a shift in their emotional reactions and approach to students. But also a study by Hwang et al (2019), including interviews of 6 elementary school and 4 special school teachers after an 8-week MBI teacher program, revealed that learning to be mindful and self-compassionate could function as self-help skills, promote person-centred teaching practices, and enhance interconnectivity between teachers and students. The study provides some evidence that mindfulness-based programs can contribute to changes in teacher well-being and teaching practices. In addition a study by Mackenzie et al (2020) evaluated the effects of an 8-week MBI teacher program on 80 teachers and school staff of elementary, middle and high schools, using individual exit interviews and focus groups. The qualitative findings revealed that teachers found the ability to slow down, pause, and stop as a key component of increased social-emotional competence in the classroom. The study suggests that mindfulness skills can empower teachers to respond to classroom pressures in ways that improve classroom climate quality for both educators and students. The study concludes that cultivating present-moment awareness through mindfulness training may improve the social-emotional competence of educators and support a prosocial classroom. However, they suggest that more research is needed to determine if helping educators change their relationship to time may be an important key to accessing greater levels of awareness that allow for the development of mind states that form the basis of the prosocial classroom' (p.2755, Mackenzie et al., 2020). These studies showed how mixed teachers populations experience the influence of an MBI intervention on their professional functioning and how they apply mindfulness in their school environments. To our knowledge, there is only one qualitative study (Schlusser et al., 2019), which focused solely on elementary school teachers (k-5 inner city teachers). This study examined the relationship between home practice and reperiencing for teachers who participated in an MBI teacher program. The study ($N = 16$) found no differences between practice groups in reported stress levels, but differences were found in mindfulness and efficacy. The no practice group engaged in more suppression and felt less capable of handling stressors, while teachers who adopted practice described an emerging awareness of negative emotions, more ability to let go of stressors, and greater affirmation of the importance of self-care. Based on these qualitative studies on MBIs so far, we can conclude that more research is needed to understand how and why MBIs exert their effect in elementary school teachers.

In sum, although there is already evidence for the effectiveness of MBIs on teacher functioning in education, however, as far as we know, no qualitative research so far has focused on standard MBSR for elementary school teachers within the European school system, focusing not only on professional functioning of the teachers, but also on personal

functioning and in turn effects on classroom climate quality. The present explorative qualitative study aims to extend previous studies by examining the impact of a *standard* 8-week MBSR intervention on their personal functioning, professional functioning and the classroom climate quality, as perceived by elementary school teachers themselves. It also extends the study of Lomas et al (2017) which recommended that more research is needed to understand how mechanisms operate. The aim of the present study was to gain more insight in elementary school teachers experiences with the standard MBSR intervention. As a starting point we aimed to examine perceived effects of MBSR on three main themes: Personal functioning, professional functioning and classroom climate quality. In order to be able to triangulate the qualitative data, we used two different sources: interviews during the last session of MBSR and focus group interviews 16 weeks after MBSR.

METHODS

Participants were recruited from a randomized controlled trial (RCT) on the effectiveness of MBSR versus waitlist control for elementary school teachers, including measures at pre- and post-MBSR, with three months follow-up after completion of the course (Lensen et al., 2024). The study protocol was ethically approved by the Internal Review Board (IRB) of the Ethics Committee Social Science, Faculty of social sciences Radboud University and is registered under number ECSW-2019-029.

Participants

Participants included in the RCT met the following inclusion criteria: a) teaching at least two days a week in the same year group (grade 1 to 8, comparable to grades 1 to 6 in the US school system), during a school year between September and March (moment of follow-up); b) willing to fill out questionnaires in Dutch three times during a school year; and c) being able to start MBSR in either September or March. Exclusion criteria were previous participation in an MBI or a mindfulness-based workshop of more than three hours duration. Teachers who participated in the RCT between September 2020 until April 2021 were invited for the current qualitative study.

Three semi-structured focus groups, each consisting of 6 or 7 participants, were conducted with 20 from the 26 teachers in the RCT intervention groups. The other 6 indicated that they were too busy to participate. Twenty-six of 27 teachers of the RCT control group participating in MBSR after the follow-up assessment in March 2021, attended the last session. They were divided into 3 groups consisting of 8, 9 or 10 participants. Consequently, 46 teachers from 23 different schools participated in this qualitative study: 20 from the RCT intervention group and 26 from the RCT control group who completed the program after completion of the study. Sociodemographic characteristics for focus group and last session participants are provided in Table 1.

Table 1. Demographic Characteristics of the Interviewed Participants After Mindfulness-based Stress Reduction: Focus groups (n=20) and Last session (n=26)

Characteristics	Focus groups	Last session
Age in years, M (range)	39.3 (23-59)	39.6 (21-62)
Gender, male n (%)	3 (15%)	4 (15%)
Gender, female n (%)	17 (85%)	22 (85.%)
Type of education teaching n (%)		
Primary education	19 (95%)	25 (96%)
Special needs primary education	1 (5%)	1 (4%)
Year group teaching, n (%)		
Group 1-4	12 (60%)	12 (46%)
Group 5-8	8 (40%)	14 (54%)
Psychological complaints at the start of the program n (%)		
No	19 (95%)	24 (92%)
Yes	1 (5%)	2 (8%)
School weight score (range 20-40) compared to regional average n (%)		
< 32,2	13 (65%)	16 (62%)
≥ 32,2	7 (35%)	10 (38%)
Average number of sessions participated (range)	7.4 (6-8)	7.6 (6-8)

¹ The school weight score ranges from 20 to 40 and is related to the complexity of the pupil population and school results. The higher the score, the more complex the pupil population and the lower the expected learning results for this school (Statistics Netherlands [CBS], 2019).

Intervention

The intervention was the original MBSR-program developed by Kabat-Zinn (Full catastrophe living, 2013) which consists of eight weekly group sessions (6 - 9 participants) of 120 minutes each. MBSR consists of three primary components: (1) formal and informal meditation exercises, such as sitting meditation and yoga; (2) dialogue; and (3) psychoeducation about stress and stress responses. Participants received a reader with information about each weeks' session and they were asked to practice daily for at least 35 minutes. In the original program, an additional day of 6 hours silent practice takes place between session six and seven. Due to COVID-19, this additional session could unfortunately not take place. The mindfulness teacher (JL) met the advance criteria of the Association of Mindfulness-Based Teachers in the Netherlands and Flanders and the internationally agreed good practice guidelines of the United Kingdom (UK) Network for Mindfulness-Based Teachers (Crane et al., 2013) and had supervision by a licensed MBSR supervisor once or twice during each MBSR program. A licenced psychologist was available during and after the program when the trainer noted that a participant might be

in need of additional mental support or when a participant indicated this him- or herself. As planned several sessions were recorded.

Procedure

Between January and Augustus 2020 a total of 54 elementary school teachers were recruited for RCT participation in school year 2020-2021. They received an information leaflet, had a screening interview by telephone and provided written informed consent. Teachers were randomly assigned to either MBSR between September and November 2020 or the waiting list control condition. Teachers in the control group were offered to follow the program in March and April 2021. Both the intervention group and the control group for the 2020-2021 school year participated in the current qualitative study. Due to COVID-19 restrictions MBSR for the intervention group was offered in person for sessions 1 to 4, and online for sessions 5 to 8. MBSR for the control group was offered online.

For reasons of triangulation, the qualitative data was collected in two different ways. The first was by means of focus group interviews. Focus groups are semi-structured discussions with small groups ($n = 4 - 12$) that aim to explore a specific set of issues. Participants individually answer the facilitators' questions and are encouraged to talk and interact with each other. In this way the group interaction encourages respondents to explore and clarify individual and shared perspectives (Hutter et al., 2011). Focus group interviews were scheduled in March 2021, 16 weeks after the intervention group completed MBSR. The participants were contacted by telephone, asked whether they would like to participate in a focus group interview and provided written informed consent for recording the interview. An independent, experienced researcher and lecturer in higher education with expertise in education and knowledge of mindfulness (AML) conducted the three focus group interviews online for approximately 1 hour per group. The semi-structured interview started with the open question: Can you tell us something about the impact of the mindfulness course on your functioning as a teacher. A topic list with main themes was used to guide the remainder of the interview: specific (teacher) skills, classroom climate quality and pupil teacher relationship (See Table 2). If necessary, questions about these themes were supplemented with clarifying or deepening questions.

The second way we collected data was through video and audio recordings during the last session of MBSR which was offered to the control group. All participants were told at the start of the program that, with their permission, part of the last session would be recorded. During the penultimate session, as part of the regular program, it was announced that during the last session, participants would be asked to answer the question: "What has MBSR program brought you?" which was then supplemented for this study with the question: " Can you tell something about the impact of the mindfulness course on your functioning as a teacher?" No topic list was used during these interviews. Each participant had a few minutes to answer both questions.

Qualitative analyses

Early March 2021 all focus group interviews were conducted within one week. At the end of April 2021 the three closing MBSR sessions were recorded within two consecutive days. Due to COVID-19 restrictions, all interviews were recorded via videoconferencing and anonymized and transcribed by three students. Thematic analysis was used, meaning that raw data were transformed to codes and codes to themes and subthemes. Identifying and defining these themes led to interpretations (Castleberry and Nolen, 2018). The interviews were coded by two independent raters (JL, FB) to minimize subjectivity. The raters discussed their codes per interview until agreement was reached and they created a code book that was complemented with new codes as they continued analysing new interviews. The final codes were processed and analysed by using a qualitative software package (Atlas.ti version 8.0, Scientific Software Development GmbH, Berlin, Germany). To construct the themes and subthemes, an expert team of five different researchers (AS, IH, FB, SS, JL) discussed the focus group codes and combined them into themes. This procedure was repeated for the last session group. The results of both groups were then compared and differences were explored. The five members of the team were a psychologist with expertise in primary education (SS), a psychiatrist with expertise in mindfulness (AS), a psychologist/mindfulness trainer (IH), a researcher and practitioner in behavioural science and education (FB) and a mindfulness trainer with a longstanding career as a teacher and principal in primary education (JL). Finally, we examined to what extent saturation had been achieved and if sufficient information had been obtained within all (sub)themes.

RESULTS

Themes and subthemes

Three main themes emerged from the focus group interviews: (a) effects on teachers personally, further divided into six subthemes; (b) effects on teachers professionally, further divided into five subthemes; and (c) effects on pupils as observed by the teachers, further divided into five subthemes (See Table 3). Citations per (sub)theme can be found in Table 4. No saturation was achieved and insufficient information was obtained within some (sub)themes, i.e. relationship with colleagues and parents.

It turned out that the effect of MBSR on teachers personally was often connected to their functioning as a teacher and was thus most often mentioned. For example, one participant indicated: *“It’s kind of difficult to explain what it has brought me purely in terms of my work, because I actually think that this is first of all a huge process you have to go through with yourself, and that in my case, this also really touches on my private life.”* (M3-R1). Teachers mentioned that there was a mutual relationship between personal and professional functioning and their relationships with their pupils. They indicated for example that due to awareness and insights from MBSR, they adjusted their behaviour, which had an influence on both their personal and professional lives. For example, they

created moments of rest more often. They also noticed that these behavioural changes had a positive effect on the pupils.

Effects on teachers personally

The first theme was divided into six subthemes: *Increased awareness in general, more insight in patterns, decentring/disidentification of negative thoughts, behavioural changes, increased self-compassion* and finally *personal consequences*. *Increased awareness in general* was mentioned by most teachers in relation to their own thoughts, bodily sensations and emotions, but also in relation to the environment.

With regard to *insight in patterns*, the realization that there is always a choice in how to react was mentioned often. In addition, teachers indicated that both the insight into unhelpful patterns and into the role of judgments in thinking and acting had increased. To be aware of the difference between an automatic stress reaction versus a more conscious stress response was also regularly mentioned as helpful. A few respondents indicated to have experienced that awareness of the circle of influence appeared to determine the degree of perceived stress. For example, they noticed more awareness of situations in which they could have some influence or in which acceptance of the situation would be more appropriate.

Decentring/disidentification of negative thoughts enabled teachers to step back from thoughts, putting them more into perspective. They could observe their thoughts without identifying with them, non-judgmentally and with acceptance. Teachers indicated that this also made it easier to put things into perspective. With regard to *behavioural changes*, teachers indicated that they created moments of rest more often, improved their planning and organization by setting different priorities and were also better able to recognize their limits. The underlying attitude of teachers was often characterized by an increase in *self-compassion*. For example, more self-care, self-acceptance and a more positive self-image were experienced. A few indicated that comparing less with others and relying more on oneself was also helpful.

The subtheme *personal consequences* for the teacher was further subdivided into four sub-themes: *less psychological distress, fewer physical complaints, improved work-life balance and more appreciation and joy*. For a large number of teachers there was *less psychological distress*. They mentioned in particular that they worried less and were better able to manage their perceived stress. The vast majority of teachers experienced more peace, both in the body and in the mind. As for *fewer physical complaints*, a number of teachers indicated that the quality of sleep had improved and that pain symptoms had decreased. In addition, the *work-life balance* had improved for the majority. And lastly, *more appreciation and joy* was characterized by the fact that teachers reported that they took much more time to observe and consciously enjoy something. Several teachers also indicated that they felt more positive and happier.

Effects on teachers professionally

The second theme was divided into six subthemes: *more awareness during teaching, more positive and understanding attitude towards pupils, increased emotion regulation, more adaptive behaviour towards pupils and finally offering mindfulness-based interventions to pupils*. Regarding to *more awareness during teaching*, teachers indicated that they more often consciously paid attention to pupils. For example, they noticed tension and restlessness in pupils more quickly. In addition, it emerged that teachers noticed that they more often had a *positive and understanding attitude towards pupils*. In general, this was described as a more patient and compassionate attitude towards pupils. Giving more space to pupils' emotions was also mentioned several times by teachers. It was also regularly mentioned that, for example, consciously focusing on the body or breathing during moments of stress, had a positive influence on teachers' *emotion regulation*. For example, they lingered less with negative emotions. *More adaptive behaviour of teachers towards pupils* was often mentioned and appeared to be diverse. For example, some teachers chose to start or end (part of the) day more consciously. For example, they chose to start very calmly and to end the school day by letting the pupils mention the positive things of the day. In addition, it emerged that teachers dared to be more vulnerable, for example by expressing their own feelings towards pupils more easily. With regard to pedagogy and didactics, a number of teachers indicated that they were better able to adapt their teaching to the needs of their pupils and invest more in promoting the autonomy of pupils. What was most striking, however, was the fact that the vast majority of teachers themselves *offered mindfulness-based exercises to pupils* and regarded this as positive. For example, breathing exercises or exercises related to body consciousness, but also exercises focusing on senses.

Effects on pupils as observed by the teachers

The effects on pupils was divided into five subthemes: *increased concentration, more self-insight, more expressing and naming of feelings/emotions, more prosocial behaviour towards classmates and improved classroom climate*. With regard to *increased concentration* teachers indicated that there was more 'calmness' in both the children themselves and in the classroom. A number of teachers also noticed that the commitment and effectiveness of pupils increased and that they were able to focus longer or were more involved in the lesson. It was striking that it was indicated that pupils themselves asked for the mindfulness exercises because they noticed that they became more calm and concentrated. When it comes to *more expressing and naming of emotions*, teachers noticed that pupils became more self-confident, more proud of themselves and less reliant on comparisons with their peers. They also indicated that pupils dared to be more vulnerable and felt more heard. With regard to pupils' *self-insight*, a number of teachers noticed that pupils *gained more insight into the thoughts and judgments about others and themselves* and subsequently started to talk about them more easily. Teachers also noticed more *prosocial behaviour towards classmates*. Pupils complimented and helped each other more often and they showed more empathy and compassion. A number of

teachers also indicated that the *classroom climate* had improved, that there was a good atmosphere in the group and that the pupils had more fun.

Triangulation with the information from the last MBSR session

All codes from the focus groups resurfaced in the comments of the teachers during the last session of MBSR. About 80% of the codes from the focus groups and the last session matched, with 23 more codes found in the last sessions. With regard to the content of these codes, *insight and awareness* were discussed in more detail, for example the insight ‘that everything will pass’. In contrast, emotion regulation was expressed less often. With regard to *behaviour and attitude towards pupils*, we found more differentiation and information about awareness and attitude, but less on the theme *effects on pupils as observed by the teachers*.

During the interviews, the main focus was on what MBSR had brought teachers and how it was used during teaching. However, there was also a teacher who said that he did not apply anything from MBSR. *“I can’t say that I apply it every day in practice. It’s always there, at the back of my mind, but That’s it, it’s mostly in my mind, and I don’t apply it enough.” [F3p5]*. In addition, some teachers have indicated that MBSR effected only their private life and far less their functioning as a teacher. *“It works better at home than at work. Because when I’m in work mode, I find it difficult to slow down and take it easy.” [F3p3]*

DISCUSSION

This qualitative study examined perceived effects of MBSR for elementary school teachers in the Dutch school system. From the focus groups, effects became apparent on three main themes: (a) effects on teachers personally, (b) effects on teachers professionally and (c) effects on pupils as observed by the teachers. Findings indicate that elementary school teachers experienced many positive changes after participating in standard MBSR, both on a personal (i.e. increased awareness in general, increased insight in patterns, behavioural changes) and a professional (i.e. more awareness during teaching, more positive and understanding attitude towards pupils, increased emotion regulation) level. This resulted in a positive effect on pupils which in turn positively influenced the classroom climate quality.

To our knowledge this is one of the first qualitative studies within a European educational system on the effect of standard MBSR on elementary school teachers teaching K-5/6 pupils (aged 4 to 12 years). This study not only focused on teacher skills, but also on personal skills, how these two relate to each other and to what extent this affects the classroom climate quality. We were interested in effects on these different aspects, as we expected that learning mindfulness skills during the intervention positively influences teachers mental and physical well-being, which in turn make teachers more resilient to the high emotional demands in their teaching, and thus eventually also may have positive

effects on pupils and the classroom climate quality. By examining experienced effects on these different aspects, this study contributes to the existing literature by providing insights in how mindfulness effects the mutual connection between elementary school teachers' personal and professional skills, how this relates to their classroom climate quality and how mindfulness mechanisms might operate which can be important for both the scientific as the educational field. Below, we explain our findings in more details.

First of all, it was found that in general teachers were more likely to bring up effects of mindfulness on changed *insight and awareness* immediately after finishing MBSR, while participants reported more effects on their personal and professional *functioning* 16 weeks after MBSR. Apparently, developing new behaviour starts *after* becoming aware of and understanding unhelpful patterns in thinking and behaviour (Tang et al., 2015). It then takes time and practice to adjust the behaviour and even more time to exert its effects on others (i.e. pupils). So, results suggest that the first step in effects of mindfulness can be seen in changes in awareness. In turn, change in awareness may lead to insight and insight may lead to changes in behaviour. This is an important finding, contributing to our knowledge of the working mechanism of mindfulness.

When it comes to effects on personal functioning, teachers mentioned that in addition to increased awareness and insights they also experienced more pleasure and appreciation, more self-compassion and self-care in their personal life. As a result they were better able to recognize their limits, to set priorities and to create more moments of rest which in turn led to better sleep and less physical complaints. It can be concluded that teachers experienced improved personal functioning leading to an increase of physical and mental well-being.

Next, the improved personal functioning seemed to be helpful in professional functioning as well. First of all increased awareness and insight in teachers' unhelpful patterns *during teaching* had a positive effect on their emotion regulation by shifting from an automatic stress reaction to a conscious stress response. These findings are in line with a qualitative study by Sharp and Jennings (2016) on how *K-12* teachers applied mindfulness strategies: focusing on present emotions and reframing emotional responses to situations. Teachers in that study reported shifting their emotional reactivity and approach to students by applying mindfulness through, for example, present-centered awareness of emotions and emotional reappraisal of situations. Results of that study suggests that it is a promising approach to support teachers experiencing stress and burnout. Teachers' experiences in the current study indicate that they applied the same strategies. Another effect on the professional functioning in the current study was that teachers more often consciously paid attention to pupils which allowed them to better see and meet the needs of their pupils. This resulted in a more patient and compassionate attitude towards pupils which in general led to a more open and safe climate (i.e., more attention for emotions and autonomy) and to changes in their lessons (e.g. including mindfulness exercises). It can be

expected that these adaptations may have a positive influence on the social and cognitive development of pupils.

So from the current study we can conclude that there is a mutual connection between elementary school teachers' personal and professional skills. The acquired personal skills thus have a positive impact on the professional skills that in addition allowed teachers to better adapt their teaching to the needs of their pupils. This contributes to the findings of a study by Hwang et al (2019), in which it was found that learning to be self-compassionate could function as self-help skills, promote person-centered teaching practices, and enhance interconnectivity between teachers and students. Also, Jennings (2015) suggested the critical importance of selfcare and how by addressing one's own physical, emotional, intellectual, and spiritual well-being teachers become better equipped to meet the needs of their students in the classroom.

Finally, we found effects on classroom climate. Teachers observed effects, for example, on concentration and more 'calmness' in both the children themselves and in the classroom, more expressing and naming of feelings and emotions by the pupils and more prosocial behaviour towards classmates. Teachers experienced that changing their attitude, behaviour and content of lessons directly impacted the classroom climate quality. It is a promising finding that a standard MBSR intervention – not especially adapted for the educational field – has positive effects on pupil and on classroom functioning through the effects it exerts on teachers. With these findings the current study adds to previous studies (e.g. Schlusser, 2019; Klingbeil & Rendshaw, 2018; MackKenzie et al., 2020) in which it was suggested to also examine effects on teachers personal functioning and classroom quality and to provide insight in working mechanisms of the intervention (Lomas et al., 2017).

A strong point of the current study is the fact that this qualitative study involved a large number of teachers from 23 different schools. A diversity of teachers and participating schools will contribute to the generalizability of this research. Another strong point is the fact that we had an independent interviewer who is familiar with education and mindfulness. By using an independent interviewer in the focus groups, possible social desirability might have been reduced. However, this has obviously not been the case during the last session group interviews. A third strength is the diversity of the expert group that has thematized, in which there were a number of experts who had no experience with mindfulness. The fact that there were five different researchers represented in the expert team who discussed the codes and combined them to themes ensured different perspectives on the data could be seen as a strength as well. Lastly, strong point of the current study was the triangulation, because it allowed us to obtain a better impression of the reliability and validity of the effects. Most other (mixed) studies only rely on individual interviews in particular (Hwang et al., 2019; Mackenzie et al., 2020; Schlusser et al., 2019).

Limitations and future directions

Unfortunately COVID-19 resulted in a number of adaptations to the study. At first, we had to use video conferencing for conducting the interviews, which sometimes made it difficult because of, for example, faltering connections that limited spontaneous interactions. Secondly, parents were no longer allowed to enter the school, and teachers often worked in small 'bubbles' to limit infections. This may explain why none or a few experiences regarding to the effect on contact with parents or colleagues were exchanged during the interviews. A third limitation could be time difference between the focus groups, where a topic list has been used during the interviews 16 weeks after MBSR and the last session groups in which only the starting question of the topic list was used. Despite these differences all codes from the focus groups resurfaced in the last session-group. The 23 remaining codes only related to the last session interviews. *Insight and awareness* were discussed in more detail and could be explained by the difference in time between the last session of MBSR and the time of the focus group interviews because the first step in effects can be seen in changes in insight and awareness which overtime may lead to changes in behaviour.

Because our study indicates that MBSR can make a valuable contribution to the functioning of teachers and their classroom climate quality, these findings may be important for academic training of elementary school teachers nationwide so that they acquire these skills during their education. It is not only important for their professional actions or skills, but can also contribute to personal well-being, as teachers often experience a high level of stress. These findings may contribute to the call of the World Health Organization (WHO) that stress will be the number one cause of disease by 2030 (WHO, December 2011). MBSR could possibly contribute to an adequate response to this worrying development, especially within the educational sector. Another recommendation might be to use mindfulness teachers with an educational background in primary education. Teachers in this study indicated that accessibility of MBSR was facilitated by the educational background of the trainer. In terms of future research, quantitative research on the effectiveness of MBSR for elementary school teachers is needed to complement these qualitative findings. An RCT investigating the effectiveness of MBSR in this population is currently underway (Lensen et al., 2024). This qualitative study might help, however, to use questionnaires in this type of research that are better aligned with the experiences of participants themselves. For example, both professional and personal aspects should be considered as well as the effect on pupils. This study provides indications for the functioning mechanisms. Mediation effects should be examined to test these potential working mechanisms.

This study suggests that the standard MBSR program can be a valuable contribution to elementary school teachers' professional and personal functioning and their classroom climate quality. However, more quantitative research on the effectiveness and possible working mechanisms of MBSR for elementary school teachers is recommended.

Table 2. *Topic List of Semi Structured Focus Group Interviews 16 Weeks after MBSR*

Start question:

Can you tell us something about the impact of the mindfulness course on your functioning as a teacher.

Can you give an example of a moment when you consciously noticed during your working day or in the preparations for it that you were applying something from the mindfulness training?

What did that bring you, what did you notice exactly?

Specific (teachers) skills

To what extent can you tell us something about the impact of the mindfulness course on:

The relationship with yourself as a teacher. For example on:

How you look at yourself / your self-image

How to deal with frustration

How strict you are with yourself

The classroom climate and teacher-pupil relationship. For example on:

How you relate to the pupils.

How pupils relate to you.

The classroom climate.

Dealing with other professional relationships. For example on:

The relationship with the parents

The relationship with colleagues

(Content of) teaching. For example on:

Your pedagogical actions

Your didactic actions

Your teaching offer, e.g. do you consciously teach/offer something specific?

Planning/organizing

Other

What influence of the mindfulness course that has not yet been discussed would you certainly like to have mentioned with regard to the practice of your profession?

Table 3. *Overview of the Main and Subthemes*

Main themes	Sub (sub)themes
Effects on teachers personally	Increased awareness in general Increased insight in patterns Decentring/disidentification from negative emotions Behavioural changes Increased self-compassion Personal consequences: Less psychological distress Fewer physical complaints Improved work-life balance More appreciation and joy
Effects on teacher professionally	More awareness during teaching More positive and understanding attitude towards pupils Increased emotion regulation More adaptive behaviour towards pupils Offering mindfulness-based interventions to pupils
Effects on pupils	Increased concentration More self-insight More expressing and naming of emotions More prosocial behaviour towards classmates Improved classroom climate

Table 4. Citations per (Sub)Theme

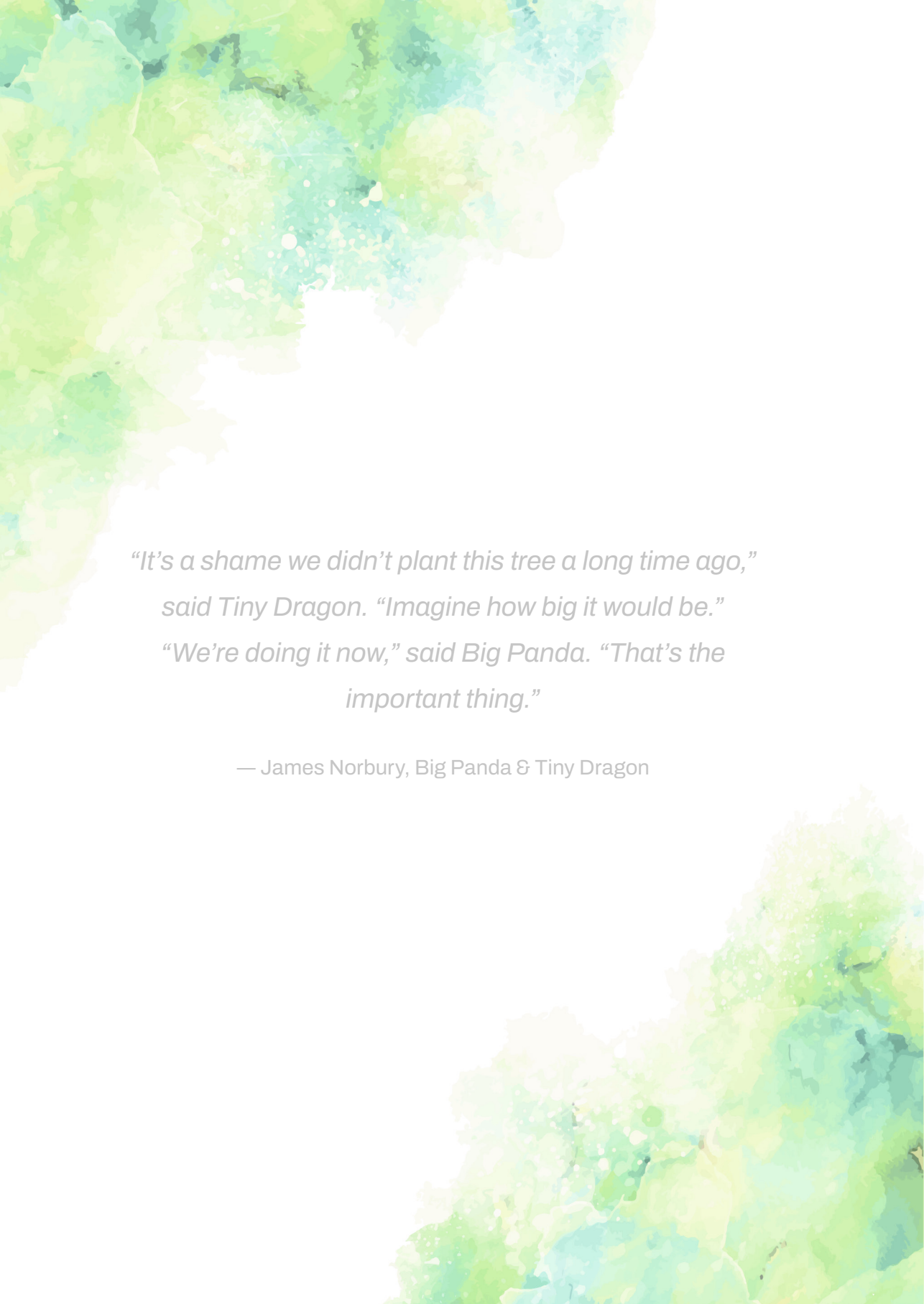
	Citation
Effects on teachers personally	
Increased awareness in general	<i>What I really enjoy, is that I can now notice these kinds of things; that I'm aware of them. "Hey! This is what I'm thinking right now. Is this what I want? No, it isn't. OK, take a few deep breaths, look at the sun shining, watch the children play, relax your face, because you're frowning, take a sip of tea, and shift your perspective for a moment."</i> (M1-p1)
More insight in patterns	<i>That I'm able to see my thoughts as thoughts, and not as facts. As a result, I'm less judgmental, but not yet as judgment-free as I'd like to be. (M2-p1)</i>
Decentring /disidentification of negative thoughts	<i>When something happens in class, I like to take a step back, to literally distance myself a little from the situation. This helps me to think and calm down, and to respond better. (M2-p5)</i>
Behavioural changes	<i>And I really notice the difference in myself, in whether I think I have to do it all in one day, because as soon as I think that, I start to feel rushed. Whereas if I think: "I'll do what I can and I may not manage to do it all, but what I do, I will do well," that gives me so much peace, and I can really see that it also has a positive effect on the children. (F3-p3)</i>
Increased self-compassion	<i>One example is that I'm more likely, also with colleagues, to explain what I mean or what is happening to me, that I don't have to set such high expectations for myself, having to do it all on my own and making sure everything goes well. That it's OK to say: "Hey, I'm struggling here." (F3-p1)</i>
Personal consequences Less psychological distress	<i>Before, whenever I found a situation difficult, I would really blame myself. Whereas now, I'm far more able to leave it with the other person. I can much more consciously think: "Well, yes, but this is not mine, it's theirs; it's their thing, and I'm just communicating my needs or my boundaries, and I remained polite and kind," for example in a parent-teacher discussion. (F2-p2)</i>
Personal consequences Fewer physical complaints	<i>But if I can't sleep in bed at night, I've kind of devised my own variation of the body scan, and it helps. (F2-p5)</i>

Table 4. Citations per (Sub)Theme (continued)

	Citation
Personal consequences Improved work-life balance	<i>What I also notice is a better work-life balance. Before, I used to also work in weekends. Now, I've said clearly that I don't mind doing something on a weeknight, but in weekends, I really want to let go, enjoy my weekend, and do nice things. (F1-p1)</i>
Personal consequences More appreciation and joy	<i>I feel much more positive and cheerful, and I start the day feeling happier. (F2- p8)</i>
Effects on teachers professionally	
More awareness during teaching	<i>The fact that I take short moments to pause, and look at the children better. But also in my chats with them. More attention for the child and the communication. (F1-p1)</i>
More positive and understanding attitude towards pupils	<i>The first thing that I notice is that yes, I'm actually more positive with the children. Meaning that I spend more time telling them what they did well, and being really specific about it. So, not: "Wow, that's pretty!", but "Look how well you did the cutting!" As a result, they also give each other better compliments, and it just really helps with the positivity in the group. (F2-p4)</i>
Increased emotion regulation	<i>But also in situations in the classroom, when there is a lot happening, and my emotions start to run away with me, that's when I do a few breathing exercises. It helps me to calm down. I think it's also better for the children. (M2-p9)</i>
More adaptive behaviour towards pupils	<i>I wait and see more, and I try to let the children solve things for themselves, or ask them questions so that they can find their own solutions. I'm more laid-back. (F2- p3)</i>
Offering mindfulness-based interventions to pupils	<i>The children were very tense. So, I asked them to stand behind their chair and close their eyes. I had opened all the windows. I invited them to listen to what they could hear outside. My school is in a park, so you can hear birds and trees rustling. Then I did a few more exercises. Afterwards I said: "Now we can do the test." And the children themselves said: "Oh wow, this is actually a really nice way to start, Miss!" And they felt they could focus better, so in this way, it's also having a domino effect. (F1-P6)</i>

Table 4. Citations per (Sub)Theme (continued)

Citation	
Effects on pupils as observed by the teachers	
Increased concentration	<i>Calmly sorting through things with the pupils also gave them clarity. They had to choose what they wanted to keep in their work folder, which meant they had to choose work they were proud of. The children were more focused, they were really joining in and helping each other. (F1-p1)</i>
More self-insight	<i>So we now have this form , with ‘event’, ‘thought’, ‘feeling’, ‘behaviour’, and ‘consequence’. And we fill it in, together with the children, about whatever it is that has happened. ... I noticed that this leads to a better dialogue. (F3-p5)</i>
More expressing and naming of emotions	<i>And I really notice, in the conversations children have with each other, that they’re also starting to name emotions, or asking each other: “What is it that you need then?”. I notice that especially naming emotions, acting on this information, processing your own emotions, and responding from that place, that is something that is really growing. (F2- P4)</i>
More prosocial behaviour towards classmates	<i>I’ve noticed that I’m now much more focused on checking whether they’re relaxed and how they feel. And we talk about it with each other, and maybe one child tells another that they don’t need to be nervous. It looks as if they’re using it in their interactions with each other. It’s great to see. (F1-p6)</i>
Increased classroom climate	<i>I think that the children in my class are happier now that I feel happier too. We have a lot more fun together, we laugh every day, we make jokes; we also know that we have some serious work to do, but we are there for each other, so the atmosphere is... I think the atmosphere is just good, and I think that this is mostly due to the fact that I feel more comfortable being myself. (F2-p8)</i>



*“It’s a shame we didn’t plant this tree a long time ago,”
said Tiny Dragon. “Imagine how big it would be.”
“We’re doing it now,” said Big Panda. “That’s the
important thing.”*

— James Norbury, *Big Panda & Tiny Dragon*

Chapter 7

Summary and general discussion

SUMMARY AND GENERAL DISCUSSION

Teaching is one of the most challenging professions, particularly for elementary school teachers in the Netherlands, where burnout and absenteeism are notably high (Lomas et al., 2017; Statistics Netherlands, 2022). Additionally, one in five elementary school teachers leaves the profession within five years, highlighting the need for stress-reducing interventions (Statistics Netherlands, 2022; Ministry of Education, Culture and Science, 2022). Despite the significant impact of stress on teachers' well-being and performance (de Carvalho, 2021; Emerson et al., 2017; Lomas et al., 2017; McIntyre et al., 2017), there is a lack of research on stress interventions for this group (Jennings et al., 2017). Mindfulness-Based Stress Reduction (MBSR) has shown promise in reducing perceived stress (Khoury et al., 2015; Goldberg et al., 2018), but research on its use with elementary school teachers, especially outside the U.S., is limited. This thesis investigates the effectiveness of standard MBSR training in reducing stress among elementary school teachers in the Netherlands.

In **Chapter 2**, an uncontrolled pilot study is outlined, encompassing a research sample of 71 elementary school teachers. Questionnaires were administered immediately before and after the training. Analyses revealed a significant reduction in perceived stress, along with significant increases in mental, emotional, and social well-being, as well as in mindfulness skills and self-compassion, following the completion of the standard MBSR training. Indications were also found that the training might have a larger effect on a) teachers with current or previous symptoms of mental health problems and/or b) teachers working in schools with more complex pupil populations. **Chapter 3** outlines the study protocol for a pre-registered randomized-controlled trial (RCT) and an exploratory qualitative study. Inclusion criteria were: a) teaching at least two days a week in the same year group, b) ability to complete Dutch questionnaires three times during a school year, and c) flexibility to start MBSR in either September or March. Exclusion criteria included prior participation in Mindfulness-Based Cognitive Therapy, MBSR training, or any mindfulness workshop over three hours. The qualitative study recruited participants from the RCT for semi-structured interviews, focusing on the question: How did the MBSR program affect your ability to function as a teacher? **Chapter 4** presents the results of the main RCT in 146 elementary school teachers who were randomly allocated to MBSR ($n = 72$) or wait list control condition ($n = 74$). Assessments were conducted pre- and post-intervention, and at a three-month follow-up. The intervention was significantly more effective in decreasing perceived stress over time than the control condition. Large effects in favor of the intervention group were found for perceived stress at post-treatment and a moderate effect at follow-up. Analyses of secondary outcomes showed significant group-by-time interactions over the entire period for almost all secondary outcomes, with all effects favoring the intervention group. This includes the outcome measure of well-being as well as the proximal outcome measures: mindfulness skills, self-compassion, and emotion regulation. Outcomes which are directly related to perceived stress. Regarding

distal secondary outcomes, factors more distantly or indirectly related, large effects were found for teacher self-efficacy at both post-treatment and follow-up. Moderate effect sizes were noted for teacher-perceived classroom climate quality at post-treatment and 3-month follow-up. Between-group post-hoc tests showed significant results for most distal outcomes over the course of the follow-up period. Classroom climate quality fell just short of significance. There was no significant interaction effect for teacher-perceived pupil-teacher relationship. No significant moderation effects were found for any of the baseline variables past or present psychological problems, school weight, teachers' years of experience and age on the primary outcome at post-measurement. In conclusion, the study provided compelling evidence that standard MBSR training may affect mental health through reducing perceived stress and improving well-being in elementary school teachers. Teacher self-efficacy and classroom climate quality also significantly improved, as well as mindfulness skills, emotion regulation and self-compassion. **Chapter 5** describes the effects of the MBSR training on four potential mediators (mindfulness skills, self-compassion, emotion regulation and teacher self-efficacy) and explored whether changes in these processes are related to the program effectiveness. The multiple mediation model showed that changes in self-compassion and emotion regulation during the training mediated the effects of the MBSR training on perceived stress at 3-month follow-up. Additionally, changes in self-compassion during the training mediated the effect on well-being at 3-month follow-up and changes in teacher self-efficacy the effect on improvement of classroom climate quality. These findings indicate that including intervention components targeting self-compassion, emotional regulation and self-efficacy might increase the effectiveness of MBSR in reducing teachers' perceived stress, increasing teachers' well-being and improving the classroom climate quality. **Chapter 6** details an explorative qualitative study ($N = 46$). Teachers who participated in the RCT between September 2020 until April 2021 were invited to the qualitative study. Twenty teachers from the intervention groups took part in semi-structured focus groups 16 weeks after completing MBSR, while 26 teachers from the control group, who participated in MBSR after the follow-up assessment in March 2021, were asked to evaluate the training during the last session of MBSR. Three key themes arose: a) changes affecting the teacher personally, (b) changes affecting the teacher professionally and (c) changes affecting the pupils as observed by the teacher. These themes were further subdivided into subthemes. A significant part of the participants reported increased awareness and insight in unhelpful patterns on a personal level but also during teaching. They experienced a positive effect on their emotion regulation by shifting from an automatic stress reaction to a conscious stress response. Furthermore, the acquired personal skills were found to positively impact professional skills, enabling teachers to better adapt their teaching to the needs of their pupils. Additionally, it is concluded that a mutual connection exists between teachers' personal and professional skills. In addition, teachers also experienced that changing their attitude, behavior and lesson content (e.g. interweaving short mindfulness exercises during the day) directly impacted the classroom climate quality in a positive manner.

MBSR training could be a valuable contribution to elementary school teachers' personal and professional functioning, as well as on their classroom climate quality.

In this thesis, we formulated a theoretical framework to study the effect of a standard MBSR training on elementary school teachers' mental health with perceived stress as primary outcome and well-being as secondary outcome. We hypothesized that the intervention's impact on reducing perceived stress would be brought about by enhancements in mindfulness skills, emotion regulation and self-compassion and bring forward an increase in self-efficacy, pupil-teacher relationship and classroom climate quality .

How do the results relate to the theoretical model

The underlying theoretical model, as described in the introduction and in chapter 4, guided our exploration of the effects of MBSR training. The uncontrolled pilot study reported significant reductions in perceived stress and increases in well-being, mindfulness skills, and self-compassion post-training, aligning closely with the theory's first step of enhancing proximal outcomes. The pilot study informed the design of the RCT.

The RCT confirms the efficacy of MBSR training in reducing perceived stress and improving secondary outcomes. These secondary outcomes include well-being, as well as the proximal outcomes: mindfulness skills, self-compassion, and emotion regulation. Our findings are in line with previous work in predominantly mixed teacher populations (e.g., de Carvalho et al., 2021; Emerson et al., 2017; Hwang et al., 2017; Klingbeil & Renshaw, 2018). Regarding distal outcomes it demonstrates significant improvements in teacher self-efficacy. Previous research on elementary school teachers, utilizing adapted versions of the teacher MBI, presents conflicting results. Jennings et al. (2017) found no effects in teacher self-efficacy, contrasting with the significant findings of de Carvalho et al. (2021). In contrast, systematic reviews in mixed teacher populations reported minimal effects in teacher self-efficacy (Emerson et al.; Hwang et al.). Although further replication is needed, standard MBSR training appears particularly beneficial for enhancing elementary school teachers' self-efficacy. Furthermore, notable effects on pupil-teacher relationships were not observed. It is worth noting that previous research, as synthesized in the meta-analysis by Klingbeil and Renshaw (2018), generally reported small effects on pupil-teacher relationships. However, this often involved research in mixed teacher populations combined with mostly MBIs adapted to the educational field. Additionally, a study by de Carvalho et al. (2021), focused solely on elementary school teachers, also indicated promising effects on classroom climate quality through observational data. It could suggest that MBSR might have a greater positive impact on classroom climate quality among elementary school teachers compared to other teacher populations. Teachers in elementary schools consistently engage with the same group of pupils on a daily basis throughout the school year, which may contribute to the greater effect. The lack of effects on teachers' perceived pupil-teacher relationships and the greater

impact observed in teachers' perceived classroom climate quality could be attributed to the notion that changes in teaching behavior might have a more immediate effect on the overall classroom climate quality than on individual pupil-teacher relationships. According to Mainhard (2023), teachers play an essential role in shaping a positive classroom climate in which peace, confidence, and effective learning thrive. Throughout the day, teachers mainly focus on the group of pupils as a whole. Sutton et al. (2009) suggest that teachers use emotions as a tool to maintain a harmonious classroom. Shewark et al. (2018) found in their qualitative research on 31 teachers from 10 private and public schools that teachers view their emotions as key determinants of classroom climate quality, emphasizing the importance of regulating emotions to model positive behavior for pupils. This regulation helps create a well-managed classroom climate, which children closely observe and imitate. However, Shewark et al. (2018) also noted that failure to regulate emotions causes stress for teachers, potentially explaining why improvements in the present thesis are first seen in teachers' perceived classroom climate quality rather than in individual relationships. Additionally, Mainhard (2023) underscores the significance of the interpersonal perspective, which is always at play when several people are present simultaneously, such as in a classroom (Leary, 1957; Sullivan, 1953). He emphasizes the importance of teachers being able to interpret and direct interpersonal processes, as they can influence the atmosphere and social standards through their behavior and actions (Pennings et al., 2018; Sadler et al., 2010; Sadler et al., 2009), which initially impacts classroom climate quality more visibly. Over time, as teachers continue to adjust their behaviors, the focus may shift to enhancing individual pupil-teacher relationships.

In this thesis, mediation research has identified mindfulness skills, self-compassion, emotion regulation, and teacher self-efficacy as potential mediators of program effectiveness. Self-compassion and emotion regulation mediated the effects of the MBSR program on perceived stress. Self-compassion mediated the effect of the MBSR program on well-being and teacher self-efficacy mediated the effect of the MBSR program on improvement of classroom climate quality. This supports the theory's proposed pathways from proximal outcomes to distal outcomes. This suggests that targeting these mechanisms could enhance the program's effectiveness in reducing teachers' perceived stress, improving their well-being, and fostering a positive classroom climate. However, the absence of a mid-treatment assessment in our study limited insight into the sequential progression of changes in the mediation process, thereby partially impeding the testing of the theoretical model. Prior research has shown self-compassion and emotion regulation mediating stress reduction among public school teachers (Roeser et al., 2013; Taylor et al., 2016). However, a systematic review of mediation studies highlights inconsistent evidence for the mediation effects of self-compassion in MBIs on psychological outcomes, attributed partly to methodological limitations (Gu et al., 2015). Regarding teacher self-efficacy, it aligns with other research demonstrating that high levels of teacher self-efficacy are associated with better management of behavior problems, positive teacher-student relationships, increased student engagement, and

effective stress management in the classroom (Almog & Shechtman, 2007; Holzberger et al., 2014; McCarthy & Lineback, 2015; Zee & Koomen, 2016). Given these findings, it is reasonable to suggest that teacher self-efficacy plays a vital role in fostering a positive classroom climate. Teacher self-efficacy is defined as teachers' confidence in their capability to positively influence pupil learning outcomes (Tschannen-Moran & Woolfolk Hoy, 2001). When teachers radiate confidence in the way they guide and approach a group and individual pupils it can provide pupils with a sense of clarity and security, fostering a safe and calm classroom environment.

The qualitative study further emphasizes the interconnectedness between personal and professional skills and their impact on classroom climate quality, echoing the findings of the quantitative analyses. Overall, it provides a comprehensive understanding of the mechanisms underlying the effectiveness of MBSR training, substantially validating the theory's proposed cascade of effects, except for the pupil-teacher relationship. These findings are generally in line with the qualitative research analyses within the mixed-methods evaluation comparing the impact of two different mindfulness approaches on stress, anxiety, and depression in elementary and secondary school teachers by Todd et al. (2019).

MBSR in a broader context of stress reduction approaches for teachers

Given the limited research specifically focusing on stress reduction among elementary school teachers, it becomes important to explore this topic from a broader research perspective. Understanding the existing knowledge on various stress reduction approaches in general and specifically for teachers, is crucial in assessing the relevance of MBSR within this context. While some studies and meta-analyses explore stress reduction methods in broader populations, dedicated research addressing the unique stressors faced by elementary school teachers is lacking. There is limited knowledge regarding optimal interventions to address stress among teachers. Agyapong et al. (2023) performed a scoping review of recent literature from the past five years (2018-2022) to identify different psychological interventions aimed at addressing stress and burnout among teachers. They identified sixteen types of interventions, with 32 out of 40 studies focusing on stress. The interventions most frequently examined were Mindfulness-Based Interventions (MBIs), often combined with yoga or Cognitive Behavioral Therapy (CBT). These were followed by Rational Emotive Behavioral Therapy (REBT) and Rational Emotive Occupational Health Coaching (REOHC). REBT and REOHC, foundational components of CBT, target irrational beliefs to transform them into rational beliefs, fostering adaptive behaviors and emotions (David et al., 2018).

MBIs resulted in reduced Teacher Stress Inventory scores. REBT and REOHC, mainly applied to special education teachers in Africa, were effective in alleviating both subjective feelings and physiological symptoms of job stress. Other successful interventions included Inquiry-Based Stress Reduction, the Stress Management and Resiliency

Training Program, Cyclic Meditation, Group Sandplay, Progressive Muscle Relaxation, Autogenic Training, Sport-Based Physical Activity, Emotional Intelligence Ability Models, and Christian Prayer and Prayer-Reflection. However, due to methodological differences and the varying quality of the studies, it is difficult to draw definitive conclusions about the most effective interventions for educators' mental health. Von der Embse et al. (2019) conducted a systematic review of 64 studies on teacher stress interventions published between 1998 and 2017, including both experimental and quasi-experimental research. They concluded that mindfulness, behavioral, and cognitive-behavioral interventions were the most effective, while interventions that were solely informational were the least effective. Similarly, Sanetti et al. (2021) reviewed 18 articles from 1987 to 2016 and discovered that the most frequently evaluated stress-reduction interventions involved meditation or mindfulness-based practices. Mindfulness could therefore play a role in multifaceted interventions. For example, Acceptance and Commitment Therapy (ACT), a 'third wave' cognitive therapy incorporating cognitive strategies and mindfulness, focuses on psychological flexibility, self-concept, values and committed action, potentially making it more effective than CBT or REBT for stress reduction (Agyapong et al., 2023; Wetherell et al., 2011). However, ACT research within the educational field is still in its infancy. At the moment, research has mainly been conducted into the effect on students and as far as we know there is no thorough research into the effect on teachers' stress reduction.

Strengths

A notable strength of this thesis lies in its comprehensive methodology, including a pre-registered study protocol for a mixed-method investigation. It incorporates an RCT with a 3-month follow-up, qualitative research, and mediation research. This design enables exploration of MBSR from multiple perspectives, including research on its working mechanisms—a combination that is rare in the current state of research in this context. Moreover, it represents the first large-scale RCT examining the effectiveness of MBSR on perceived stress in elementary school teachers in the Netherlands, utilizing a substantial sample of 146 teachers from 62 different schools, covering all year groups in elementary school. This is particularly notable given the relatively limited research on elementary school teachers compared to mixed teacher populations or those in secondary and higher education (Jennings, 2017). Another strength is the bottom-up approach employed in this study. The standard MBSR training for teachers was already being offered by a university of applied sciences in the area. Based on the positive feedback from participating elementary school teachers, the idea for a pilot program emerged, which was then followed by a RCT in which teachers were encouraged to participate voluntarily. This approach fostered a sense of ownership and investment among participants, enhancing the study's overall effectiveness and credibility, as evidenced by low dropout rates. With regard to choice of outcome measures, it is noteworthy that the study not only examined the effect on teachers but also explored its potential impact on pupils and classroom climate quality. This holistic approach provides a more nuanced understanding of the intervention's broader implications. Regarding intervention fidelity, another strength is

the use of an existing protocolized MBSR training intervention—the original program developed by Kabat-Zinn (2013). This approach not only allows for prompt intervention implementation in many schools but also provides teachers with access to training programs available within a reasonable distance due to the increasing availability of certified MBSR trainers.

Limitations and directions for future research

Our research should be considered within the context of several limitations, which may offer directions for future research. A first limitation of this thesis is the fact that it relied solely on self-reported questionnaires and qualitative research to assess various aspects, including perceived stress, well-being, mindfulness skills, emotion regulation, self-compassion, teacher self-efficacy, pupil-teacher relationships, and classroom climate quality. While these methods offer valuable insights into participants' perceptions and experiences, they also introduce the possibility of social desirability bias (Caputo, 2017). Participants may provide responses that align with societal norms or expectations rather than their true feelings or behaviors, thus compromising the validity of the findings. To address this limitation and further advance the understanding of the impact of MBSR, future research should incorporate additional observer-rated measures alongside self-reported questionnaires and qualitative research methods (Klingbeil and Renshaw, 2018). By including observer-rated measures, researchers can obtain objective assessments of the abovementioned outcomes. This approach would help mitigate the above mentioned limitations and provide a more comprehensive and nuanced understanding of the effects of MBSR on these factors. Additionally, exploring the interplay between self-reported and observer-rated measures can offer valuable insights into the discrepancies and convergences between subjective perceptions and objective observations. While the protocol outlined a framework for integrating pupils' perspectives on the pupil-teacher relationship and classroom climate quality, the difficulty in obtaining active parental consent for participation has made this impossible. Future research should consider incorporating the pupil perspective on the pupil-teacher relationship and classroom climate quality to assess the quality of classroom climate and pupil-teacher relationships more comprehensively (Opdenakker, 2014). Incorporating qualitative research methods alongside quantitative approaches could offer deeper insights into pupils' emotions, experiences, and perceptions within the classroom environment, shedding light on stress and the dynamics of pupil-teacher relationships. In addition, expanding these measures to assess the extent to which teachers consciously transmit or teach mindfulness skills to their pupils could offer further valuable insights as well. Ultimately, adopting a multi-method approach to assessment can enhance the rigor and validity of research findings.

A second limitation relates to the mediation research and lies in its restricted scope of assessments. We solely incorporated three assessments - pre, post, and follow-up - omitting a mid-treatment assessment. This absence limits our ability to discern the sequential progression within the mediation process and thereby partly hinders the

testing of the theoretical model. To address this limitation, future research should consider integrating a mid-treatment assessment. Such an inclusion would offer a more nuanced understanding of the order of changes within the mediation process, thereby enhancing the comprehensiveness and validity of our findings.

An aspect to consider for further research is the homogeneity of the study population, as all groups in the current study consisted of teachers from urban-centric schools. This may constrain the generalizability of our findings, considering the potential regional variations in perceived stress (Abel and Sewell, 1999). Additionally, all groups were taught by the same mindfulness teacher which further limits the generalizability of our results. To address these limitations, future research should aim to diversify the geographical regions from which teachers are recruited and include more mindfulness teachers.

Last, given the limited research focusing on stress reduction among elementary school teachers, dedicated studies addressing their unique stressors are needed. Research should delve into methods specifically designed to alleviate stress in this population, such as ACT, which could provide valuable insights. Comparing different therapeutic approaches, such as ACT, CBT, and meditation, could help identify the most effective methods for stress reduction among elementary school teachers. Specific attention could also be given to starting elementary school teachers. These teachers often perceive themselves as ill-prepared for their roles, heightening their concerns and fears (Richardson, 2014). Starting teachers often grapple with feelings of confusion, self-doubt, and uncertainty (Buckwort, 2017; Le Cornu, 2013), which contributes to their increased vulnerability to job-related stress. Although exploratory moderation analyses within this thesis have not found any indications that newer teachers (< 5 years) benefit more from MBSR, possibly due to limited statistical power, the research by Roeser et al. (2022) does provide some indications of this.

Implications for practice

Opportunities and obstacles in teaching mindfulness to elementary school teachers

Teaching mindfulness to teachers has shown remarkable potential for enhancing teacher well-being and fostering a positive classroom climate. Both our pilot research and RCT study have revealed a strong willingness among teachers to voluntarily participate in mindfulness programs, highlighting a perceived need for such initiatives and demonstrating low drop-out rates. While numerous studies have delved into the impact of voluntary versus mandatory participation in training on motivation and outcomes, our study concerned only voluntarily participating elementary school teachers. Previous research shows that voluntary participants demonstrated higher levels of autonomous motivation compared to their mandated counterparts (e.g., Curado et al., 2015; Yardley, 2003). However, other research also suggests that mandatory training leads to increased motivation levels and effectiveness (e.g., Baldwin et al., 1991; Tsai and Tai, 2003), with

participants perceiving its importance. Additionally, the theory of basic psychological needs (Deci & Ryan, 2012) posits that autonomy in training attendance fosters higher intrinsic motivation and performance. An intriguing question arises concerning whether teachers should be obliged to participate in MBSR. According to Baldwin et al. (1991) and Tsai and Tai (2003), mandatory participation could yield optimal benefits from the training if participants perceive its importance. Thus, when teachers possess sufficient knowledge about the significance of MBSR and its potential benefits, mandatory participation could be considered a viable option. However, this leads us to a notable observation made during the recruitment process for this research.

When recruiting participants for the pilot and RCT study, it was noted that individuals' preconceptions and beliefs about mindfulness and meditation terminology could present obstacles to initially engaging in mindfulness courses. Providing informative flyers, presentations, and thorough explanations was essential to equip teachers with the necessary information before signing up. Similar findings have been reported in other study populations (Williams et al., 2012), as well as in research by Todd et al. (2019), both identifying misconceptions and perceptions as primary barriers to engaging in meditation-related practices. While scientists widely discuss the benefits of mindfulness, it's crucial to provide more evidence to make it more appealing to teachers (Todd et al., 2019). University staff in a workplace mindfulness program also stressed the importance of evidence, believing it was essential for initiating change (Todd et al., 2019). This underscores the importance of effective communication and comprehensive information tailored to the target population to encourage participation in the MBSR training. The research by Todd et al. (2019) also highlights the influence of the venue and the person delivering the MBSR training on its acceptance. According to literature (Krueger, 1994), careful consideration of the venue for group work is crucial, with preference for a location accessible to all participants but removed from immediate 'business' to minimize interruptions. Therefore, MBSR training should opt for a venue near the school (but not within it) that provides a relaxed and comfortable atmosphere with minimal distractions. Research by Todd et al. (2019) suggests that facilitators with teaching backgrounds play a vital role in enhancing the delivery of MBSR, as their understanding and experience within participants' professional contexts significantly contribute to acceptability. Conversely, facilitators lacking this insight may diminish acceptability, underscoring the importance of selecting facilitators with relevant expertise. To make participation in MBSR more accessible and to enable elementary school teachers to fully benefit from the program, it would therefore be preferable to utilize a mindfulness trainer with a teaching background. Informal feedback from teachers who participated in the studies presented in this thesis often highlighted the importance of the educational background of the trainer, as well as the quiet and comfortable training location outside their own school, contributing to a positive experience. In addition, the range of MBSR training courses is large and it is recommended to examine to what extent providers have followed accredited training courses and are aware of current research. (Wassink, 2015).

How can we further integrate mindfulness into the classroom and school?

The integration of mindfulness into classrooms can be approached through various methods. Research suggests that teachers who have undergone mindfulness training themselves are better equipped to teach mindfulness effectively (Felder et al., 2016; Meikljohn et al., 2012; Roeser et al., 2012; Weare, 2019; Zenner et al., 2014). When teachers practice mindfulness, they can model techniques, manage stress, and create supportive environments for pupils (Roeser et al., 2012; Weare, 2019). According to Jennings “It is how they teach, not just what they teach, and if a teacher is mindful in a classroom, the kids learn to be mindful” (as cited in Osten Gerszberg, 2017).

As demonstrated in this thesis, implementing MBSR training solely for elementary school teachers has yielded positive effects on both teachers and pupils. For example, it has led to improvements in classroom climate quality, increased teacher awareness during teaching, and better adaptation of teaching to the needs of pupils. This suggests that teaching MBSR to teachers can indirectly benefit pupils without adding mindfulness to the curriculum.

Another scenario entails teachers completing both MBSR/MBI-teacher training and pupil-focused mindfulness training, tailored to pupils' ages. While there is a growing availability of such programs, research in the Netherlands has mainly focused on MindfulKids, a method designed for pupils aged 9 to 12 (Weijer-Bergsma et al., 2014). Additionally, some schools also use the Eline Snel Method (www.elinesnel.com), which offers a school-wide program. However, integrating such programs into the curriculum poses challenges, including financial and time constraints, sustainability of implementation, and the need for patience to acknowledge that progress may not follow a linear path (Weare, 2019). Additionally, fostering shared understandings within the school community is essential (Weare, 2019). It therefore needs supportive leadership and positive teacher attitudes (Braun et al., 2024). Further research into program quality and school preferences is necessary to address these challenges.

Alternatively, specialized teachers from within the school team, trained in a pupil-focused mindfulness program, can deliver instructions to pupils while their regular teacher remains present to follow-up on lessons. This approach ensures continuity and facilitates the integration of mindfulness into daily teaching, thereby enhancing its effects. Research by Zenner et al. (2014) confirms that the more mindfulness practice, the greater the impact on pupils. Integrating mindfulness into the regular curriculum offers benefits such as continuity, integration with other socio-emotional learning goals, and fostering rapport with pupils (Black & Fernando, 2014; Roeser et al., 2012).

Additionally, external mindfulness trainers can provide mindfulness education in schools, although their qualifications and teaching skills must be carefully considered (Wassink, 2015). Elementary school teachers often possess a deeper comprehension of child

development and the suitability of classroom practices compared to external trainers (Jennings, 2016). Ongoing research compares the effectiveness of regular classroom teachers versus external mindfulness instructors. Optimum results are achieved by programs delivered by teachers within the school, provided they have a solid mindfulness practice (Weare, 2019). However, if teachers lack such practice, a well-educated outside facilitator with personal experience may be more effective (Carsley et al., 2017). Motivating all teachers to prioritize mindfulness may be challenging. Therefore, schools can consider a whole-school approach where teachers explore various resilience skills, including mindfulness, aligned with their preferences (Seligman et al., 2009; van Zundert, 2017).

Research related to mindful school leadership supports and encourages professional practice in schools that are informed by and directed towards being present and mindful (Schonert-Reichl and Roeser, 2016). That suggests that another possibility to promote mindfulness for teachers is to integrate it into the school organization in various ways. For example, this could involve organizing a professional development day focused on mindfulness, arranging MBSR return sessions for colleagues, and incorporating mindfulness exercises such as the 3-minute exercise or a shortened body scan before starting meetings. Integrating MBSR into teacher training or professional development courses is another option. Offering it as part of the Pedagogische Academie voor Basis Onderwijs (Pabo) curriculum could equip students with coping mechanisms during their studies and internships, helping them better manage stress before entering the education field. Students generally experience high levels of stress and Pabo students in particular (Bakker, 2021). Additionally, many teachers experience increased stress during their first years of employment compared to their more experienced colleagues (Bakker, 2021). In such cases, offering MBSR through employers could promote good employment practices that prioritize the well-being of teachers.

In conclusion, successful integration of mindfulness in classrooms and schools requires supportive leadership, positive teacher attitudes, and tailored training approaches (Braun et al., 2024; Monteiro-Marin et al., 2023). By prioritizing teachers' support and intrinsic motivation, schools can effectively promote mental resilience among both teachers and pupils.

Whole-school approach

Research indicates that whole-school approaches are more effective than individual curricula (Weare & Nind, 2011). It is an integrated approach in which a broad combination is made of initiatives, actions and measures that together ensure a high-quality school environment (Kleinjan et al., 2016; Weare & Nind, 2011). They contribute to reducing behavioral problems (De Nobile et al., 2015), enhancing social-emotional skills, positive behavior, and academic performance (Payton et al., 2008). Integrating initiatives and measures ensures a high-quality school environment, with each element reinforcing the others (Weare, 2015). The theoretical foundation for whole-school well-being approaches

is well-established, endorsed by experts and organizations like Schools for Health in Europe and WHO (Van den Essenburg, 2022). While the precise effectiveness is not fully determined, research results are promising (Van den Essenburg, 2022). However, most whole-school approaches mainly focus on increasing the well-being of pupils and often lack a focus on empowering teachers' well-being. In addition to paying attention to the well-being of the pupils, it is also important that the well-being of the teachers is monitored. Teachers who are not feeling well cannot be good for their pupils (Van den Essenburg, 2022). Welbevinden op School (Well-being at School) is a Dutch national knowledge and support program that provides schools and their partners with valuable guidelines and strategies to promote well-being using an integral, whole-school approach (welbevindenopschool.nl). Examples of whole-school approaches in the Netherlands are Leer- & Veerkracht (van Zundert, 2017), Positive Education Project (Elferink et al., 2017), De Vreedzame school (Pauw, 2013), School Wide Positive Behavior Support (Fallon et al, 2012), Gezonde School and Gezonde Basisschool van de Toekomst (Bartelink et al., 2020). However, within these programs, there are significant differences in the emphasis placed on explicitly resilience skills for the benefit of teachers' well-being. A good example of how mindfulness can be integrated within a whole-school approach can be found in the Leer- & Veerkracht trajectory (van Zundert, 2017). In the first year, all team members of a school participate in several introductory sessions on resilience-promoting skills (e.g., growth mindset, connecting communication, mindfulness). Following these sessions, they can choose a specialized training such as the standard MBSR program. By integrating well-being into school policy, these initiatives can be implemented more effectively and have a longer and deeper impact on both pupils and teachers.

Mindfulness for pupils

The field of mindfulness for pupil interventions is expanding rapidly, and current evidence indicates that carefully planned and executed mindfulness programs have demonstrated modest to moderate effects on a range of pupil/student outcomes. The evidence draws from 13 published systematic reviews, including six meta-analyses in mixed student populations (K-1 to young adults) over the past 15 years (Education-based Mindfulness: Evidence And Outcomes, 2023). The strongest evidence is found in three main areas: a) Mental health, including stress, anxiety, burnout, and depression; b) Cognition and learning, encompassing executive function, self-regulation, attention, metacognition, and cognitive flexibility; and c) Social and emotional skills, such as self-regulation, emotional regulation, resilience, motivation, persistence, self-concept, empathy, compassion, caring, kindness, and relationship skills. However, some more recent reviews and a large-scale randomized control trial (MYRIAD, Monte-Marin et al., 2023) have found less evidence for impacts on young adults regarding mental well-being, including depression. Future research will need to determine whether mindfulness interventions for young adults actually have limited effects compared to what we currently understand about their effects on elementary school pupils.

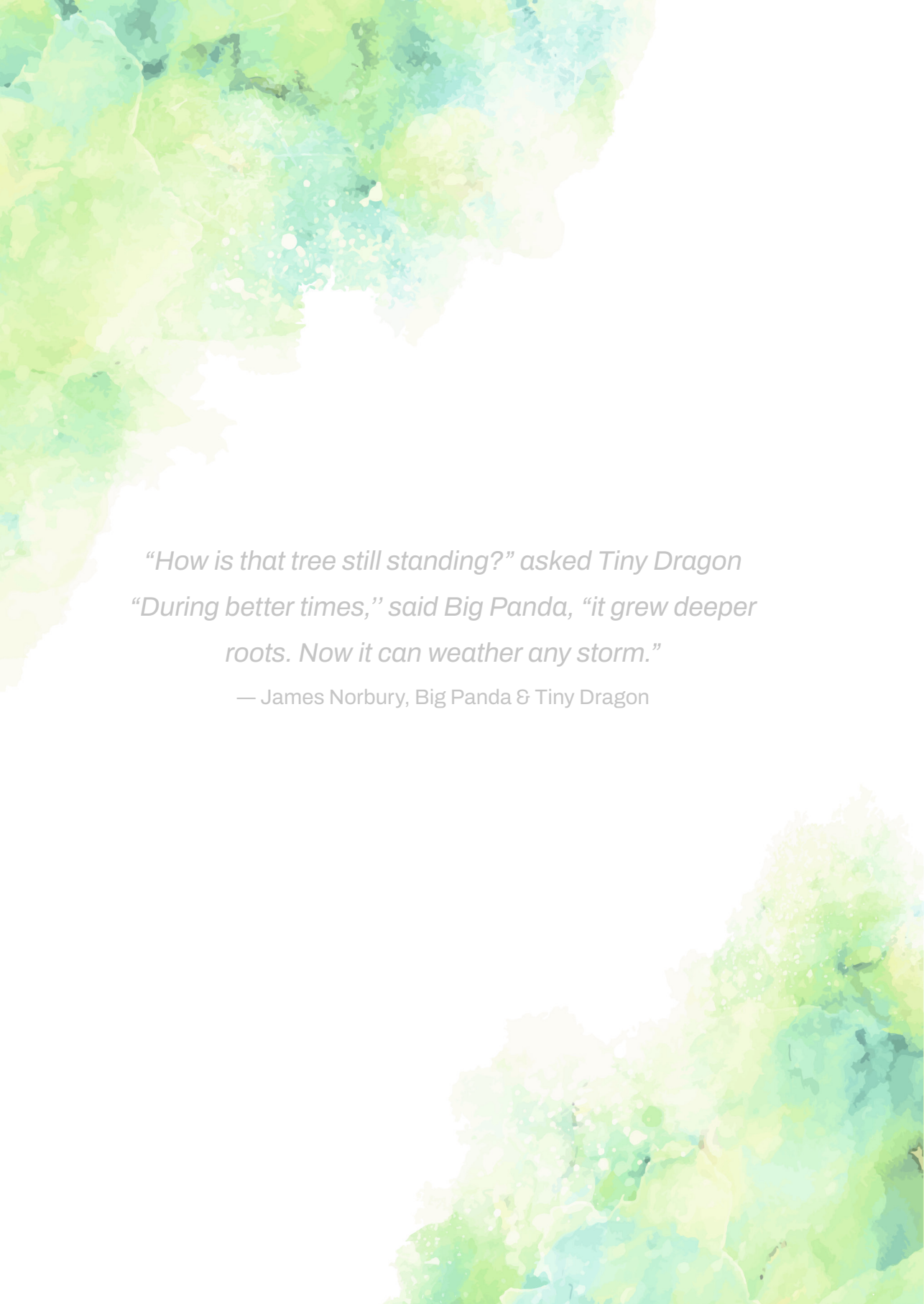
An important finding from the study by Zenner et al. (2014) is the direct relationship between the amount of mindfulness training pupils receive and its effects. The major advantage of an elementary school as a setting for mindfulness practice is that pupils spend a significant portion of their day in school with the same teacher. Implementing mindfulness techniques, known to have positive effects, can be seamlessly integrated into the daily school routines with relatively little effort. By incorporating mindfulness practices throughout the day, elementary school teachers could potentially provide a multiple of the training hours reported in the study (Zenner et al., 2014) over the course of a pupil's entire school career.

An interesting fact that emerged from the qualitative research is that participating teachers were often intrinsically motivated to integrate mindfulness practices into their classrooms. This finding aligns with the research of Todd et al. (2019), in which elementary and secondary school teachers commented that after participating MBSR they had used mindfulness-based approaches with children to some extent. This motivation becomes particularly evident when teachers seamlessly incorporate mindfulness into their daily routines without disrupting the curriculum. However, a drawback of this voluntary approach is that the knowledge and skills gained may be limited to certain teachers in the school. While advantageous in nurturing motivated teachers, this voluntary approach may pose limitations in reaching all teachers within a school.

CONCLUSION

This thesis explores the impact of standard MBSR on Dutch elementary school teachers, revealing significant reductions in perceived stress and improvements in well-being, mindfulness skills, emotion regulation, self-compassion, teacher self-efficacy, and classroom climate quality. The findings underscore the potential of integrating MBSR into teacher training to enhance both personal and professional functioning. However, further research is needed to fully understand its effectiveness, particularly focusing on components targeting self-compassion, self-efficacy, and emotion regulation. Given the predicted rise in stress-related diseases (WHO, 2011), integrating MBSR into the teacher and pupil curricula could be vital, especially in education.

Whole-school approaches also emphasize the importance of integrating well-being initiatives into school policies, not only for pupils but also for teachers. By embracing these approaches, schools can create environments conducive to the flourishing of both teachers and pupils, ensuring a longer-lasting and more profound impact on overall well-being. Prioritizing teacher well-being is essential, challenging the prevailing acceptance of stress as normal. Introducing mindfulness practices, whether or not interwoven in a whole-school approach, can foster supportive environments where educators can thrive, benefiting both teachers and pupils.



*“How is that tree still standing?” asked Tiny Dragon
“During better times,” said Big Panda, “it grew deeper
roots. Now it can weather any storm.”*

— James Norbury, Big Panda & Tiny Dragon

Chapter 8

Miscellaneous

References

Nederlandse Samenvatting

Research Data Management and Privacy

Dankwoord

About the author

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NEDERLANDSE SAMENVATTING

Lesgeven is één van de meest uitdagende beroepen, zeker voor leerkrachten in het basisonderwijs in Nederland, waar de burn-out en het ziekteverzuim hoog zijn (Lomas et al., 2017; Statistics Netherlands, 2022). Daarnaast verlaat één op de vijf leerkrachten in het basisonderwijs het beroep binnen vijf jaar, wat de noodzaak van stress verlagende interventies benadrukt (Statistics Netherlands, 2022; Ministerie van onderwijs, cultuur en wetenschap, 2022). Ondanks de aanzienlijke impact van stress op het welzijn en de prestaties van leerkrachten (de Carvalho, 2021; Emerson et al., 2017; Lomas et al., 2017; McIntyre et al., 2017), ontbreekt het voor deze doelgroep aan onderzoek naar stressinterventies (Jennings et al., 2017). Mindfulness-Based Stress Reduction (MBSR) laat in algemene populaties veelbelovende resultaten zien in het verminderen van waargenomen stress (Khoury et al., 2015; Goldberg et al., 2018), maar onderzoek naar de inzet bij basisschoolleerkrachten, vooral buiten de Verenigde Staten, is beperkt. Deze thesis onderzoekt de effectiviteit van de standaard MBSR-training in het verminderen van ervaren stress bij basisschoolleerkrachten in Nederland.

Hoofdstuk 2 beschrijft een pilotstudie waarin 71 basisschoolleerkrachten uit een stedelijke omgeving deelnemen aan een MBSR-training. Vragenlijsten werden zowel voor als na de training afgenomen. De resultaten tonen een significante afname van de door de leerkrachten waargenomen stress na de MBSR-training, vergezeld door een aanzienlijke verbetering van het mentale, emotionele en sociale welzijn. Daarnaast werd een toename van mindfulnessvaardigheden en zelfcompassie waargenomen bij de deelnemers. Bovendien zijn er aanwijzingen gevonden dat de training mogelijk een groter effect heeft op leerkrachten die momenteel of in het verleden symptomen van psychische problemen vertonen, en/of op leerkrachten die werkzaam zijn op scholen met complexere leerlingpopulaties.

Hoofdstuk 3 beschrijft het studieprotocol voor een vooraf geregistreerde gerandomiseerde gecontroleerde studie (RCT) en een exploratief kwalitatief onderzoek. In de RCT werden deelnemers willekeurig toegewezen aan een MBSR-interventiegroep of een wachtlijstcontrolegroep. Er werden digitale vragenlijsten afgenomen voor en na de interventie en bij de follow-up na drie maanden. Inclusiecriteria voor deelname waren: a) minimaal twee dagen per week lesgeven in dezelfde jaargroep, b) de mogelijkheid om tijdens een schooljaar driemaal digitale Nederlandse vragenlijsten in te vullen, en c) flexibiliteit om de MBSR in september of maart te kunnen starten. Uitsluitingscriteria omvatten eerdere deelname aan Mindfulness-Based Cognitive Therapy, MBSR-training of een mindfulness-workshop van drie uur of langer. De kwalitatieve studie rekruteerde deelnemers uit de RCT studie voor semi-gestructureerde interviews 8 tot 10 weken na de interventie, met de nadruk op de vraag: Hoe heeft het MBSR programma uw functioneren als leerkracht beïnvloedt?

Hoofdstuk 4 presenteert de bevindingen van een RCT waaraan 146 basisschoolleerkrachten hebben deelgenomen en die willekeurig werden toegewezen aan ofwel de MBSR-groep ($n = 72$) of een wachtlijstcontroleconditie ($n = 74$). De resultaten laten zien dat de MBSR-interventie significant effectiever was dan de controleconditie in het verminderen van de door de leerkracht waargenomen stress naar verloop van de periode tussen pre-meting en 3 maanden follow-up. Direct na afronding van de interventie waren er grote effecten in het voordeel van de MBSR-groep, bij de follow-up na 3 maanden was er een matig effect waarneembaar. Bijna alle secundaire uitkomstmaten lieten bij de interventiegroep significante veranderingen zien in vergelijking met de controlegroep, gedurende de periode van de voor-, na- en follow-upmeting. Ten eerste bij de uitkomstmaat welbevinden maar ook bij alle proximale uitkomstmaten: mindfulnessvaardigheden, emotieregulatie en zelfcompassie. Dit zijn de uitkomstmaten die direct verband houden met de waargenomen stress. Bij de distale uitkomstmaten, factoren die later effect kunnen hebben of indirect verband houden met de waargenomen stress, gold dit voor zowel het geloof in eigen kunnen als voor de door de leerkracht waargenomen kwaliteit van het klasklimaat. Er werd gedurende de periode van voor-, na- en follow-upmeting geen verschil gevonden op de door de leerkracht ervaren leerling-leerkracht relatie.

Om nader te onderzoeken waar de significante verschillen tussen de groepen precies lagen zijn er post-hoc tests afgenomen. Deze lieten in de loop van de follow-upperiode significante resultaten zien voor de meeste uitkomstmaten. Hoewel de door de leerkracht ervaren kwaliteit van het klasklimaat ook verbeterde, was dit net niet significant. Daarbij werden er bescheiden effectgroottes gevonden voor de door de leerkracht waargenomen kwaliteit van het klasklimaat en grote effecten op het geloof in eigen kunnen van de leerkracht direct na de interventie en follow-up na 3 maanden. Er werd geen effect gevonden van de interventie op de leerling-leerkrachtrelatie. Er zijn verkennende moderatie analyses uitgevoerd om te kijken of bepaalde factoren van invloed zijn op het effect van de interventie op de ervaren stress bij basisschoolleerkrachten. Er werden echter geen significante effecten gevonden voor de gekozen moderatoren: psychologische problemen in verleden/heden, schoolgewicht (wat in relatie wordt gebracht met de complexiteit van de leerlingpopulatie), het aantal jaren werkervaring en de leeftijd van de leerkracht. Concluderend toont deze studie aan dat de standaard MBSR-training een positieve invloed kan hebben op de mentale gezondheid van basisschoolleerkrachten. Door de training ervaren zij minder stress en een verbeterd welzijn. Bovendien zijn belangrijke aspecten van de professionele ontwikkeling van de leerkracht, zoals het geloof in eigen kunnen en de door de leerkracht ervaren kwaliteit van het klasklimaat, significant verbeterd. Daarnaast zijn ook de mindfulnessvaardigheden, emotieregulatie en zelfcompassie aanzienlijk toegenomen als gevolg van de training.

Hoofdstuk 5 beschrijft de effecten van de MBSR-training op vier potentiële mediators: mindfulnessvaardigheden, zelfcompassie, emotieregulatie en het geloof in eigen kunnen van basisschoolleerkrachten. Er wordt beschreven in hoeverre veranderingen in deze

processen verband houden met de effectiviteit van de MBSR-training. Het mediatiemodel onthulde dat veranderingen in zelfcompassie en emotieregulatie tijdens de training de effecten van de MBSR-training op de door de leerkracht waargenomen stress medieerden na een follow-up van 3 maanden. Daarnaast bleek dat veranderingen in zelfcompassie het effect op het welzijn medieerden, terwijl veranderingen in het geloof in eigen kunnen van de leerkracht het effect op de verbetering van de door de leerkracht ervaren kwaliteit van het klasklimaat medieerden, eveneens na een follow-up van 3 maanden. Deze bevindingen suggereren dat het integreren van interventiecomponenten die gericht zijn op zelfcompassie, emotieregulatie en het geloof in eigen kunnen, de effectiviteit van MBSR verder kan vergroten bij het verminderen van de door de leerkracht waargenomen stress en het verbeteren van zowel het welzijn als de door de leerkracht ervaren kwaliteit van het klasklimaat.

Hoofdstuk 6 beschrijft een exploratief kwalitatief onderzoek ($N = 46$). Basisschoolleerkrachten die tussen september 2020 en april 2021 aan de RCT hebben deelgenomen, zijn uitgenodigd voor deze kwalitatieve studie. Twintig leerkrachten uit de interventiegroep namen 16 weken na het voltooien van de MBSR-training deel aan semi-gestructureerde focusgroepen. Daarnaast werden 26 leerkrachten uit de controlegroep, die na de follow-up vragenlijsten in maart 2021 aan de MBSR-training deelnamen, gevraagd de training tijdens de laatste sessie te evalueren. Uit de analyses kwamen drie hoofdthema's naar voren: (a) veranderingen die de leerkracht persoonlijk beïnvloedden, (b) veranderingen die de leerkracht professioneel beïnvloedden, en (c) veranderingen die de leerlingen beïnvloedden, zoals waargenomen door de leerkracht. Deze thema's zijn verder onderverdeeld in subthema's. Een aanzienlijk deel van de deelnemers meldde meer bewustzijn en inzicht in niet-helpende patronen, zowel op persoonlijk vlak als tijdens het lesgeven. Ze ervoeren een positief effect op hun emotieregulatie, waarbij ze konden overschakelen van een automatische stressreactie naar een bewuste stressrespons. Bovendien bleken de verworven vaardigheden op persoonlijk vlak een positieve invloed te hebben op hun professionele vaardigheden, waardoor leerkrachten hun onderwijs beter konden aanpassen aan de behoeften van hun leerlingen. Daarnaast merkten leerkrachten op dat ze hun houding, gedrag en lesinhoud veranderden, bijvoorbeeld door korte mindfulness-oefeningen gedurende de dag in te voegen. Dit had een positieve invloed op de door de leerkracht ervaren kwaliteit van het klasklimaat. De MBSR-training zou dus een waardevolle bijdrage kunnen leveren aan zowel het persoonlijke en professionele functioneren van leerkrachten in het basisonderwijs, als aan de door de leerkracht ervaren kwaliteit van het klasklimaat.

Hoe verhouden de resultaten zich tot het theoretische model?

In deze thesis hebben we een theoretisch kader geformuleerd (zie inleiding en hoofdstuk 4) om het effect van een standaard 8-weekse MBSR-training op de mentale gezondheid van basisschoolleerkrachten te onderzoeken met stress als primaire uitkomstmaat. De RCT bevestigt de effectiviteit van MBSR-training in het verminderen van waargenomen stress

en het verbeteren van de secundaire uitkomstmaat welzijn, evenals van de secundaire proximale uitkomstmaten: mindfulnessvaardigheden, zelfcompassie en emotieregulatie. Wat betreft de distale uitkomsten, laten de resultaten aanzienlijke verbeteringen zien in het geloof in eigen kunnen van de leerkracht en de door de leerkracht ervaren kwaliteit van het klasklimaat maar geen opmerkelijke effect als het gaat om de leerling-leerkracht relatie. Onderzoek in gemengde leerkrachtpopulaties toont wisselende resultaten voor geloof in eigen kunnen, bescheiden effecten op kwaliteit van het klasklimaat en kleine effecten op de leerling-leerkracht relatie. Eén van de weinige Europese studies gericht op basisschoolleerkrachten (Carvalho et al., 2021) toont echter veelbelovende effecten op het klasklimaat middels observaties. Mede gezien de resultaten in deze thesis, zou dit kunnen suggereren dat MBSR een groter positief effect zou kunnen hebben op de door basisschoolleerkrachten ervaren kwaliteit van het klasklimaat in vergelijking met andere leerkrachtpopulaties. Het feit dat basisschoolleerkrachten zich gedurende het hele schooljaar voortdurend bezighouden met dezelfde groep leerlingen, zou bij kunnen dragen aan dit grotere effect. Het gebrek aan effecten op de door de leerkracht waargenomen leerling-leerkrachtrelaties en de grotere impact die wordt waargenomen bij de door leerkrachten waargenomen kwaliteit van het klasklimaat, zouden kunnen worden toegeschreven aan het idee dat veranderingen in het gedrag van de leerkracht tijdens het lesgeven een directer effect kunnen hebben op de door de leerkracht ervaren kwaliteit van het klasklimaat dan op de leerling-leerkrachtrelatie. Sutton et al. (2009) suggereren dat leerkrachten emoties gebruiken om een harmonieus klasklimaat te creëren. Shewark et al. (2018) tonen aan dat leerkrachten hun emoties als cruciaal beschouwen voor de kwaliteit van het klasklimaat en benadrukken het belang van emotieregulatie om positief gedrag te modelleren wat mogelijk verklaart waarom in deze thesis de leerkracht als eerste verbeteringen in de kwaliteit van het klasklimaat ervaart en mogelijk pas later bewust de focus zou kunnen gaan verleggen naar waarnemingen in de kwaliteit van individuele leerling-leerkracht relatie. Het mediatioonderzoek laat zien dat mindfulnessvaardigheden, zelfcompassie, emotieregulatie en geloof in eigen kunnen de effectiviteit van het programma beïnvloeden. Zelfcompassie en emotieregulatie mediëren de effecten van het MBSR-programma op waargenomen stress. Zelfcompassie beïnvloedt het welzijn, en het geloof in eigen kunnen van de leerkracht verbetert het klasklimaat. Dit ondersteunt het model van proximale naar distale uitkomsten. Het doelgericht gebruik van zelfcompassie, emotieregulatie en geloof in eigen kunnen kan de effectiviteit van het programma vergroten bij het verminderen van de door de leerkracht ervaren stress, het verbeteren van het welzijn en het bevorderen van een positief klasklimaat. De kwalitatieve studie legt verder de nadruk op de onderlinge verbondenheid tussen de persoonlijke en professionele vaardigheden van de leerkracht en de impact daarvan op de kwaliteit van het klasklimaat, hetgeen de bevindingen van de kwantitatieve analyses weerspiegelt.

Implicaties voor de praktijk: Kansen en obstakels

Bij het werven van deelnemers voor de pilot- en RCT-studie bleken vooroordelen over mindfulness obstakels voor deelname. Informatieve flyers, presentaties en uitleg waren

essentieel om leerkrachten te informeren voordat ze zich aanmelden. Eerdere studies (Williams et al., 2012; Todd et al., 2019) toonden vergelijkbare barrières. Effectieve communicatie en uitgebreide informatie zijn cruciaal om deelname aan MBSR-trainingen te stimuleren. Daarnaast hebben de locatie en de trainer invloed op de acceptatie van MBSR-training. Een rustige en comfortabele trainingslocatie buiten de school draagt bij aan een positieve ervaring (Krueger, 1994; Todd et al., 2019). Trainers met een onderwijsachtergrond verbeteren de aanvaardbaarheid van de training, terwijl trainers zonder deze expertise dit kunnen verminderen (Todd et al., 2019). Gezien het grote aanbod aan MBSR-programma's is het wenselijk om te onderzoeken in hoeverre aanbieders geaccrediteerde opleidingen hebben gevolgd en op de hoogte zijn van het huidige onderzoek (Wassink, 2015).

Hoe kunnen we mindfulness verder integreren in de klas en school?

Zoals in deze thesis is aangetoond, heeft de invoering van MBSR-training zowel positieve effecten gehad op basisschoolleerkrachten als op hun leerlingen. Het heeft bijvoorbeeld geleid tot een verbetering van het klasklimaat, een grotere bewustwording van de leerkrachten tijdens het lesgeven en een betere aanpassing van het onderwijs aan de behoeften van de leerlingen. Dit wijst erop dat MBSR-training aan basisschoolleerkrachten indirect ten goede kan komen aan leerlingen zonder dat het curriculum wordt aangevuld met mindfulness-educatie. "It is how they teach, not just what they teach, and if a teacher is mindful in a classroom, the kids learn to be mindful" (Jennings zoals geciteerd in Osten Gerszberg, 2017). Integratie van mindfulness in de klas, gericht op het bewust aanleren van mindfulnessvaardigheden aan leerlingen kan op verschillende manieren worden benaderd. Onderzoek wijst uit dat leerkrachten die zelf mindfulness-training hebben gevolgd beter toegerust zijn om mindfulness effectief te onderwijzen (Felder et al., 2016; Meikljohn et al., 2012; Roeser et al., 2012; Weare, 2019; Zenner et al., 2014). Onderzoek door Zenner et al. (2014) bevestigt dat hoe meer mindfulnessaanbod er door de dag heen in de klas is, hoe groter de impact op leerlingen is, waarbij de voorkeur dus uitgaat naar aanbod door de eigen leerkracht. Het integreren van mindfulness in het reguliere curriculum biedt voordelen zoals continuïteit, integratie met andere sociaal-emotionele leerdoelen en het bevorderen van een goede verstandhouding met leerlingen (Black & Fernando, 2014; Roeser et al., 2012). De sterkste effecten van mindfulness aanbod voor leerlingen worden gezien op drie gebieden: a) geestelijke gezondheid (stress, angst, burn-out, depressie); b) cognitie en leren (executieve functies, zelfregulering, aandacht, metacognitie, cognitieve flexibiliteit); en c) sociale en emotionele vaardigheden (emotionele regulering, veerkracht, empathie, relatievaardigheden) (Education-based Mindfulness: Evidence and Outcomes, 2023). Recent onderzoek, zoals de MYRIAD-studie (Monte-Marin et al., 2023), toont echter minder effecten op het geestelijk welzijn van jongvolwassenen, waaronder depressie. Toekomstig onderzoek moet nagaan of mindfulnessinterventies voor jongvolwassenen minder effectief zijn dan voor basisschoolleerlingen.

Mindfulness voor leerkrachten in opleiding en startende leerkrachten?

Een mogelijke optie is het aanbieden van MBSR als onderdeel van het curriculum van de Pedagogische Academie voor Basis Onderwijs (Pabo). Dit zou studenten kunnen voorzien van veerkrachtvaardigheden/mechanismen tijdens hun studie en stage, waardoor ze beter kunnen omgaan met stress voordat ze het onderwijsveld betreden. Studenten in het algemeen en Pabo-studenten in het bijzonder ervaren over het algemeen hoge niveaus van stress (Bakker, 2021). Daarnaast ervaren veel leerkrachten tijdens hun eerste jaren voor de klas meer stress dan hun meer ervaren collega's (Bakker, 2021). Het aanbieden van MBSR via werkgevers zou dus goed werkgeverschap tonen, waarbij het welzijn van leerkrachten prioriteit krijgt.

Heleschoolbenadering

Onderzoek wijst uit dat heleschoolbenaderingen effectiever zijn dan losse programma's als het gaat om welbevinden in school (Weare & Nind, 2011). Een heleschoolbenadering is een geïntegreerde aanpak waarbij een brede combinatie van initiatieven, acties en maatregelen wordt gevormd die samen een kwalitatief hoogwaardige schoolomgeving garanderen (Kleinjan et al., 2016; Weare & Nind, 2011). Ze dragen bij aan het verminderen van gedragsproblemen (de Nobile et al., 2015), het verbeteren van sociaal-emotionele vaardigheden, positief gedrag en leerprestaties (Payton et al., 2008). De theoretische basis voor de heleschoolbenaderingen is goed verankerd, ondersteund door deskundigen en organisaties zoals Schools for Health in Europe en de World Health Organisation en onderzoeksresultaten zijn veelbelovend (WHO, van den Essenburg, 2022). Welbevinden op School is een Nederlands nationaal kennis- en ondersteuningsprogramma dat scholen en hun partners voorziet van waardevolle richtlijnen en strategieën om het welbevinden te bevorderen door middel van een integrale, hele-schoolaanpak (welbevindenopschool.nl). Voorbeelden van heleschoolbenaderingen in Nederland zijn Leer- & Veerkracht (van Zundert, 2017), Positive Education Project (Elferink et al., 2017), de Vreedzame School (Pauw, 2013), School Wide Positive Behavior Support (Fallon et al., 2012), Gezonde School en Gezonde Basisschool van de Toekomst (Bartelink et al., 2020). Binnen deze programma's zijn er echter aanzienlijke verschillen onder andere in de nadruk die wordt gelegd op expliciete veerkrachtvaardigheden ten behoeve van het welbevinden van leerkrachten. Een goed voorbeeld van zowel zorg voor de leerkracht als voor de leerling waarbij mindfulness geïntegreerd kan worden binnen een heleschoolbenadering is te vinden binnen het Leer- & Veerkrachtraject (van Zundert, 2017).

Conclusie

Deze thesis onderzoekt de impact van standaard MBSR op Nederlandse basisschoolleerkrachten en onthult significante verminderingen in waargenomen stress en verbeteringen in welzijn, mindfulnessvaardigheden, emotieregulatie, zelfcompassie, geloof in eigen kunnen en de kwaliteit van het klasklimaat. De bevindingen ondersteunen het potentieel van de integratie van MBSR in de lerarenopleiding om zowel het persoonlijke als het professionele functioneren te verbeteren. Er is echter verder onderzoek nodig om de

effectiviteit ervan volledig te begrijpen, met name voor wat betreft componenten die gericht zijn op zelfcompassie, geloof in eigen kunnen en emotieregulatie. Gezien de voorspelde toename van stressgerelateerde ziekten (WHO, 2011) kan het van groot belang zijn om MBSR in de curricula van leerkrachten en leerlingen te integreren en juist een start te maken met het aanleren en inzetten van veerkrachtvaardigheden in de basisschool. De heleschoolbenaderingen benadrukken ook het belang van integratie van welzijnsinitiatieven in het schoolbeleid, niet alleen voor leerlingen, maar ook voor leerkrachten. Door deze benaderingen te omarmen, kunnen scholen een omgeving creëren die bevorderlijk is voor groei van zowel leerkrachten als leerlingen, waardoor een langduriger en diepgaander effect op het algehele welzijn wordt gewaarborgd. Het is van essentieel belang om prioriteit te geven aan het welzijn van leerkrachten en de heersende acceptatie van stress als 'normaal' in twijfel te trekken. De invoering van mindfulnessbeoefening, al dan niet verweven in een heleschoolbenadering, kan een ondersteunende omgeving bevorderen waarin opvoeders kunnen gedijen, wat zowel leerkrachten als leerlingen ten goede komt.



RESEARCH DATA MANAGEMENT AND PRIVACY

All the studies within this dissertation were part of an external PhD studentship of the Radboud University. Research Data Management was conducted according to the data management policy of the Radboud University (<http://www.ru.nl/rdm/>) and the Behavioural Science Institute (BSI) and in accordance with the General Data Protection Regulation (GDPR: <https://www.ru.nl/privacy/english/protection-personal-data/general-data-protection-regulation-gdpr/>). The paragraphs below specify in detail how this was achieved, following the FAIR principles (Findable, Accessible, Interoperable, Reusable). The Ethical Committee of the faculty of Social Sciences (ECSS) has given a positive advice to conduct the studies as mentioned in Chapters 4, 5, and 6 to the Dean of the Faculty, who formally approved the conduct of these studies (ECSW-2019-029). The trial was registered in the Dutch Trial Register (Trial 21817). This research was not funded.

The privacy of participants has been warranted using random individual participant IDs. Encrypted pseudonymization key files linking these random participant IDs with identifiable personal information were stored on a secure network drive and were only accessible to the principal investigators. The key files for Chapters 2, 4, 5, and 6 were destroyed within one month after data processing was completed.

Radboud University and the Behavioural Science Institute (BSI) have set strict conditions for the management of research data. Research Data Management was conducted according to the FAIR principles. All research data resulting from this dissertation were handled in accordance with the university's research data management policy (<https://www.ru.nl/rdm/>) and the BSI's research data management protocol (<https://www.radboudnet.nl/bsi/rdm>). To enhance open science and transparent research practices, all publication packages associated with the publications in this dissertation were registered in the Research Information Services (RIS) system of Radboud University and deposited in the Radboud Data Repository (<https://data.ru.nl>). The anonymized data and analyses scripts are available upon request at the Radboud Data Repository.

Table 1.1 *Overview of the publication packages in this dissertation*

Chapter	Name of Chapter	DOI
2	Mindfulness-Based Stress Reduction for elementary school teachers: a pilot study	https://data.ru.nl/collections/ru/bsi/dp_2024_bl_pilot_mf_leerkrachten_dsc_684
4	Mindfulness-Based Stress Reduction for elementary school teachers: a randomized controlled trial	https://data.ru.nl/collections/ru/bsi/dp_2024_bl_rct_mf_teachers_dsc_706
5	What makes Mindfulness-Based Stress Reduction programs effective among Dutch elementary school teachers? The mediating role of mindfulness skills, self-compassion, emotion regulation and teacher self-efficacy	https://data.ru.nl/collections/ru/bsi/dp_2024_bl_mediation_mf_trimbos_dsc_298
6	Mindfulness-Based Stress Reduction for elementary school teachers: a qualitative study	https://data.ru.nl/collections/ru/bsi/dp_2024_bl_qualitative_mf_interviews_dsc_927

DANKWOORD

A journey of a thousand miles begins with a single step (Laozi).

And what a journey it was!

Wanneer je mij een beetje kent, weet je dat ik het heerlijk vind om de wandelschoenen aan te trekken en met of zonder geplande route eropuit te trekken. Wel... Het voelt voor mij een beetje alsof ik afgelopen jaren op een uitdagende expeditie ben geweest in voor mij redelijk onontgonnen gebied met bij de start een rugzak waarbij ik geen idee had of de inhoud voldoende was voor dit avontuur. Echter, vergezeld door vier zeer ervaren expeditieleiders werden mij gedurende deze expeditie allerlei tools en vaardigheden aangereikt die nodig waren om uiteindelijk die top te bereiken. Met in de onderstroom altijd het onderling vertrouwen, de waardering en de veiligheid waardoor ik mijn eigen pad veilig kon lopen en ik het gewicht van de zich steeds verder vullende rugzak goed kon blijven dragen. Ron, Anne, Marloes en Sabine, mijn vier expeditieleiders met allen een eigen (enorme) expertise, persoonlijkheid en zo complementair, het was een eer om dit avontuur met jullie te beleven. Zeer dankbaar voor het feit dat ik met jullie heb mogen werken, maar bovenal van jullie heb mogen leren.

“The path ahead looks difficult” said big Panda. “No matter how hard it gets”, said tiny Dragon, “we’ll face it together.” — James Norbury, Big Panda & Tiny Dragon

Anne, ik begin bij jou omdat het met jou ooit begonnen is toen ik in 2014 van jou en Nicole het groene licht kreeg om toegelaten te worden tot jullie postacademische opleiding. Er ging een wereld voor mij open. De interesse voor de combinatie praktijk en wetenschap groeide uit tot een niet te stuiten passie voor en interesse in toepassing van mentale veerkrachtvaardigheden binnen het onderwijsdomein. Dank Anne, voor het vertrouwen destijds, maar vooral ook voor het moment tijdens deze expeditie waarop jij het voortouw nam om van koers te veranderen. Het zorgde voor wanhoop en lood in mijn schoenen op een toch al uitdagend pad, maar het leidde uiteindelijk tot een mooi en gepubliceerd artikel (en het allerbelangrijkste) waarbij je in het moeilijkste stuk echt naast mij liep. Je was gedurende de expeditie een ware life-line van tijd tot tijd. Stiekem weet ik dat er voor jou meer tijd in deze expeditie is gaan zitten dan je eigenlijk vooraf aangegeven en bedacht had. Weet dat ik je enorm dankbaar ben voor het feit dat je toch altijd weer ergens de tijd vond.

Ron, de expeditieleider die het druk heeft, maar nooit stress heeft, zoals je zelf altijd zegt. Je bent voor mij het altijd vriendelijke rustpunt in de drukte. Ons eerste contact was een mail van mij aan jou na een conferentie in Amsterdam in 2015 waar jij een presentatie gaf die indruk op mij maakte. Ik was daar onder andere met Ton Groot-Zwaaftink (lid van het college van bestuur RVKO), in de hoop interesse te wekken voor het belang van mentale veerkrachtvaardigheden in het onderwijs. Tot mijn grote verrassing kreeg ik van

jou een zeer uitgebreide, vriendelijke mail terug en een kopie van jouw presentatie. Dat jouw naam naast die van Anne naar voren kwam toen de RVKO mij vroeg of ik interesse had om te promoveren, was dan ook geen toeval. Wanneer je met jou op expeditie mag, weet je in ieder geval dat je veel kennis bij je hebt, toegang tot een groot netwerk krijgt, je gezien voelt en serieus genomen wordt. Ik heb altijd jouw vertrouwen in mij gevoeld en hoe druk je ook was, tussendoor was er altijd even tijd om de (altijd veel te uitgebreide) mailtjes van mij te beantwoorden.

Sabine, door Ron benaderd om mijn dagelijkse begeleider te zijn op de expeditie. Ik kan alleen maar zeggen: alle promovendi wens ik een 'Sabine'. Op de momenten dat ik gevoelsmatig boven een ravijn hing (bijvoorbeeld bij 71 vragen na een review door een gerenommeerd internationaal journal waardoor je toch weer voor de volgende upload gaat) namen we samen die afslag, mocht ik het eerste stuk van het pad even enorm mopperen en panieken, was je begripvol, sprak jij vervolgens relativerende woorden en leidde je mij op de gevoelsmatige uitzichtloze route 'gewoon' naar het einde. Het gemak waarmee jij dan soms een antwoord formuleerde was indrukwekkend en daar heb ik enorm veel van geleerd. Overall was jij mijn steun en toeverlaat met op elke vraag een antwoord tot het moment dat jij zelf weer een vervolgstudie oppakte en Marloes haar intrede deed binnen het expeditieteam.

Marloes, ik weet nog dat Anne na de eerste kennismaking zei: "Dit is wel een heel mooie toevoeging van expertise aan het team, hoe kom je aan haar?". Wel, dat antwoord volgt later, maar het bleek in ieder geval een waarheid als een koe als het gaat om de expertise die jij tijdens deze expeditie hebt toegevoegd. Naast het feit dat het ook heel fijn en snel schakelen was met jou en ik bewondering heb voor de constructieve manier waarop je mij aan het denken kon zetten en mij hier en daar een zetje gaf, hebben we via jouw connecties onder andere ook Jannis en Marieke kunnen betrekken bij onze tocht. Het was dan ook een hard gelag toen bleek dat jij door persoonlijke omstandigheden de expeditie tijdelijk moest verlaten en Sabine gelukkig de rugzak weer even op kon pakken en jouw plek tijdelijk kon overnemen. Eind goed al goed, want die laatste etappes richting de top, heb jij zelf mij weer goed gezekerd op het moment dat het hele expeditieteam mij 'overstijgend' wilde laten kijken. Nou, dat is mede dankzij jou goed gelukt, wat ertoe leidde dat ik na 6 jaar de vlag op de top heb mogen plaatsen en nu even van het uitzicht mag gaan genieten.

Een uitzicht waarbij ik, als ik de ene kant op kijk, prachtig zicht heb op welke bijdrage ik tot op heden aan het onderwijs heb kunnen leveren en als ik de andere kant op kijk, de mist langzaam op zie trekken en er zich een steeds scherper wordend toekomstbeeld vormt. Hoe dan ook, dit was voor mij een onvergetelijke expeditie die ik met niemand anders had willen beleven.

En dan nog een woord van dank in een andere hoek, want...

Geen expeditie zonder RVKO-Basiskamp alwaar enorm veel bevrogen onderwijs-professionals zich dagelijks inzetten voor niet alleen de leerprestaties maar bovenal ook het welbevinden van al die leerlingen en waar ik binnen de diverse geledingen support heb gevoeld voor deze expeditie... Allereerst wil ik Ton Groot-Zwaaftink bedanken voor deze kans en het feit dat hij ooit is ingegaan op mijn uitnodiging om mee te gaan naar de eerder genoemde conferentie in Amsterdam waar Mindfulness in het onderwijs centraal stond en waar wellicht een zaadje gepland is. Maar bovenal voor het feit dat op dit moment veerkracht en welbevinden voor zowel leerkrachten als leerlingen ondertussen een belangrijke pijler is geworden binnen het strategisch beleidsplan van de RVKO.

Maar ook dank aan ooit mijn waardevolle expeditieleider op het leidinggevende traject, Peter, die als bovenschoolsmanager destijds de aanloop naar deze promotie mogelijk heeft gemaakt met goedkeuring voor het volgen van de postacademische opleiding bij Anne en Nicole. Toen Eveline, voorheen bovenschoolsmanager RVKO, het stokje van Peter overnam, was zij het die de alles veranderende vraag heeft gesteld "Zou jij niet willen promoveren?" en die mij het rotsvaste vertrouwen gaf. Dank Eveline voor het mede-creëren van deze ongelooflijk leerzame ervaring.

Daarnaast zijn er nog twee kanjers binnen het RVKO-Basiskamp waar ik intens dankbaar voor ben: Annemarie en Martijn waarmee ik jarenlang en met heel veel plezier de directie van de Nicolaasschool heb gevormd en die mij tijdens mijn studiejaren de tijd, ruimte en support gaven wanneer nodig. Met daarachter de rest van het warme Nicolaasteam wat ik uiteindelijk met moeite los heb kunnen laten toen ik de kans kreeg om mijn verworven expertise breder in te kunnen gaan zetten.

In datzelfde Basiskamp hebben zich uiteindelijk 146 deelnemende basisschoolleerkrachten gemeld om deel te nemen aan het onderzoek, waarvoor enorm veel dank want zonder jullie was er überhaupt niet eens een expeditie geweest!

Behalve een goed uitgerust basiskamp heb je gedurende langdurige, uitdagende expedities als deze ook plekken nodig waar je onderweg even op adem kunt komen, bij kunt tanken, het zweet van je af kunt spoelen, blaren liefdevol kunt laten verzorgen en waar je ongegeneerd je leuke en minder leuke ervaringen kunt vertellen aan een oprecht luisterend oor. Deze plekken varieerden van gezellige berghutten met haardvuur, lekker eten en veel gelach tot plekken waar experts zich geïnstalleerd hadden om mij te voorzien van specifieke kennis en materiaal dat nodig was om een volgende etappe van de route goed te kunnen doorstaan.

Te beginnen bij mijn paranimfen, Imke en Rinka, jullie hebben zelf een dergelijke expeditie voltooid en het 'feest' van herkenning onderweg was altijd weer fijn voor mij, omdat ik niet veel mensen in mijn directe omgeving heb die deze uitdaging ooit hebben voltooid. Imke, dat Anne jou op mijn pad heeft gezet is voor mij een waar cadeau geweest. Jij was voor

mij de EHBO-er (eerste hulp bij onderzoek) langs mijn route, die er altijd gelijk stond als het nodig was, ongeacht de plek op de route en altijd de rust zelve, geduldig en kundig. Ik vermoed dat jij niet in de gaten hebt gehad hoe belangrijk jij voor mij bent geweest en ik jou daarom naast EHBO-er ook heel graag als paranimf zie!

Rinka, onze paden kruisten in 2015 in Rotterdam op een bijeenkomst over mentale fitheid. Er was direct een klik en we waren enthousiast over elkaars expertise en werkveld. Door jou heb ik meerdere kanten van de wetenschap ontdekt. Met jou heb ik niet alleen een heel mooi mens leren kennen, maar ook de wetenschap achter de positieve psychologie en de door jou ontwikkelde heleschoolbenadering waarmee het team van de Nicolaasschool in 2020 zelfs het predicaat 'Excellente School' toegekend kreeg. Wij delen de gezamenlijke passie en visie om, kort gezegd, de wereld middels het aanleren van veerkrachtvaardigheden een beetje mooier te maken met als startpunt al die waardevolle onderwijsprofessionals. Jij was het ook die Marloes aan het begin van deze expeditie op mijn pad zette en die, zoals eerder beschreven, één van mijn vier belangrijke expeditieleiders werd. Met jou heb ik tevens mijn eerste 'schrijfweekend' ervaren, toen nog niet wetende dat er ook nog heel veel 'solo-schrijfweekenden' zouden volgen toen ik in de gaten kreeg hoeveel werk deze intense expeditie met zich meebracht.

En daarmee heb ik gelijk een mooie touwbrug te pakken naar hen die ik tot mijn vriendengroep reken. Dank voor jullie begrip waarbij ik tijdens de expeditie-jaren al onze afspraken altijd 'onder voorbehoud' maakte, want mijn standaard zin was veelal "Maar misschien moet ik aan mijn onderzoek werken hoor". Maar ook 'sorry' en 'bedankt' voor alle momenten waarop ik in mijn enthousiasme voor mijn onderzoek en werk misschien iets te lang, te fel, te enthousiast een waterval aan verhalen, visies, ideeën, updates, frustraties en successen heb gedeeld. Ik heb altijd jullie support en aanmoediging gevoeld als warme onderstroom in de vriendschap.

De volgende specialisten langs dit expeditiepad wil ik eveneens bedanken: Ad (Orthopraktijk Donkers), dank voor je tijd, uitleg en gebruik van de Klimaschaal. Nanja, voor je taalhulp. Félix (Radboud UMC), voor de eerste Castor-hulp. Renée (Radboud UMC) voor het feit dat ik altijd met jou als supervisor kon schakelen als ik iets wilde voorleggen naar aanleiding van een training. Nicole (Radboud UMC) voor de mooie basis die je mij hebt meegegeven. Rob en Meta (BSI) voor het feit dat ik met al mijn data en praktische vragen altijd bij jullie terecht kon. Annemieke (Hogeschool Leiden) voor het feit dat jij bereid bent geweest om interviews af te nemen. Florance (BSI) voor de leuke en leerzame tijd waarin we samen ontdekt hebben hoe kwalitatief onderzoek opgezet en geanalyseerd kan worden en we alles gelijk hebben kunnen toepassen. Emma (EHERO) voor je luisterende oor en steun in de breedste zin van het woord. Judith, Sem en Sofie (studenten Radboud Universiteit) voor het feit dat jullie mijn onderwerp voor jullie master gebruikt hebben en ik daar ook mijn voordeel mee heb kunnen doen. Romy, Emmi en Carlijn (studenten Universiteit Utrecht) voor het opnemen en transcriberen van de

interviews. Marieke (Trimbos Instituut), voor het feit dat jij als eerste auteur het voortouw hebt willen nemen bij het mediatieartikel, we steeds snel konden schakelen en ik dit artikel als tweede auteur ook nog mee kon nemen in mijn proefschrift. Maar bovenal dank aan specialist Jannis (Universiteit Twente), wat ben ik blij dat jij je als statisticus hebt willen verbinden aan ons onderzoek. Je bent van onschatbare waarde geweest met jouw kennis en kunde van 'R' een gebied dat in mijn brein net ontwaakt is (en na deze expeditie ook weer heel graag gaat slapen). Vervolgens twee specialisten van een heel ander kaliber: Fred en Aad, jarenlang mijn trainers in de verdedigingsport Taekwondo alwaar ik in mijn tienerjaren de kracht van focus, adem en discipline als eerste heb leren kennen wat in mijn 'twintigers' leidde tot de zwarte band en een Nederlands kampioenschap. Jullie hebben, nu ik terugkijk, eigenlijk het zaadje gepland voor de huidige interesse in (en de wetenschap achter) mindfulness en mentale veerkracht in het algemeen.

Als laatste een dankwoord voor hen die de gehele tocht in weer en wind, zichtbaar en onzichtbaar met bemoedigende woorden en daden maar bovenal met de altijd voelbare liefde er voor mij waren en zijn.

Om bij het onzichtbare te beginnen. Vanaf een wolk kijken er twee ongelooflijk trotse mensen naar beneden. Pa en ma, jullie hebben mij altijd meegegeven dat wanneer je ergens voor werkt dit zijn vruchten afwerpt. Maar ook dat het belangrijk is dat ik 'mijn eigen broek op kan houden'. Beide zo waar weet ik nu. De kansen die jullie door omstandigheden niet kregen kwamen mede door jullie toedoen wel op mijn pad en heb deze dan ook vaak met beide handen aangegrepen. Wie had gedacht dat ik een expeditie als deze ooit zou voltooien en daarmee een bijdrage zou kunnen leveren aan het onderwijs. Jullie support en vertrouwen in mij heeft daar ongetwijfeld aan bijgedragen!

Sterre, heerlijke dochter. Lopend op en soms ook zoekende naar jouw eigen pad. Volop in het (studie)leven staande, bouwend aan een eigen leven. Zo mooi om te zien hoe jij je ontwikkelt. Ik geniet van ons contact, wij beiden stoeiende met en genietende van een studie. Daarbij is het fijn dat jij mij af en toe de wake-up call geeft "Hallo, geniet, je hebt ook nog een leven naast je werk en studie, mam!". Waarbij ik jou dan af en toe subtiel (maar nooit subtiel genoeg natuurlijk) probeer te herinneren aan het feit dat je tussen al het feesten door ook nog zoiets hebt als een studie. Hoe dan ook, jouw extraverte wervelwind trekt mij vaak even uit de serieusheid en laat mij dan weer even de andere kant van het leven zien.

Merel en Sterre, als 6- en 8-jarige stapten jullie mijn leven binnen en ik dat van jullie. Nu 18 jaar verder kan ik alleen maar zeggen dat ik het ongelooflijk getroffen heb met jullie. Ondanks dat wij nooit in één huis hebben gewoond, hebben we zo'n mooie band opgebouwd. Een band waarin ik ook altijd jullie steun en support heb gevoeld en die gaat twee kanten op, dat weet ik, dat voel ik en dat koester ik.

En dan de meest bijzondere 'supporter' in de breedste zin van het woord: Ton. Onvoorwaardelijke liefde is het woord wat als eerste bij mij opkomt. Ik mag en kan zijn wie ik ben, met al mijn mitsen en maren die tijdens een dergelijke expeditie soms flink ten tonele kwamen. Hoe vaak jij niet naar mijn werkplek kwam, mij dan vroeg: "Over hoelang neem jij even pauze denk je?" en ik dan gemeend zei: "Minuutje of 10?..." en dan, als ik er weer eens helemaal lekker in zat, pas na twee uur verscheen. Jij maakte er nooit een probleem van, hooguit dat je je zorgen even uitte, want mijn gedrevenheid vertroebelde de blik soms behoorlijk...jij viste mij dan altijd precies op het goede moment van het traject als ik zelf niet meer zag dat ik over mijn grens dreigde te gaan. Maar jij kon ook precies het goede doen of zeggen om weer op te starten als ik eindeloos uitstelgedrag kon vertonen. Je luisterend oor, je altijd weer rake vragen die mij aan het denken zetten, jouw relativerend vermogen, jouw rotsvaste vertrouwen, jouw rust, jouw...alles eigenlijk. Zonder jou aan mijn zijde had ik dit niet gekund.

Ik doe mijn rugzak af, mijn wandelschoenen uit en wil met volle aandacht, zonder oordeel, in dit huidige moment, graag samen met jou even genieten van het uitzicht en ons samenzijn .

ABOUT THE AUTHOR

Bernadette Lensen was born in Schoonhoven on September 14, 1968. During her studies in Rotterdam, she moved to Schiedam and continues to work in education in Rotterdam to this day.

As a child, Bernadette had a broad range of interests, which is part of the reason why she has always continued to learn alongside her working life. She was an avid athlete, earning a black belt in Tae Kwon Do and winning the Dutch championship in this discipline. This is where she first discovered and learned the power of focus and breath, skills that would later resurface in her practice of mindfulness. Her love for sports, creativity, and music led her to become an elementary school teacher in 1990 at the Rotterdam Association for Catholic Education (RVKO). She aimed to convey her enthusiasm for learning and discovery to young children, especially those needing extra support.



During the first ten years of her teaching career in Rotterdam, Bernadette worked in special education with children who had learning and/or behavioral problems. To better serve these children, she completed a two-year post-HBO study in Special Educational Needs. She continued to develop in the field of education through numerous courses and short training programs. She developed her management skills alongside her teaching duties, completing various courses, including a two-year post-HBO school leadership study. In 1999, she became vice principal at one of the largest elementary schools of the RVKO, the Nicolaasschool, a school in one of the most vulnerable areas of Rotterdam with about 700 pupils. From 2005 to 2020, she was co-principal of the school, during which her interest in resilience and well-being skills for both educational professionals and pupils grew. Between 2016 and 2020, she was trained by Dr. van Zundert (Radboud University) in positive psychology, and from 2014 to 2016, she completed the postgraduate mindfulness trainer study at the Radboud University Medical Center Expertise Center for Mindfulness under Prof. dr. Speckens.

Since 2016, Bernadette has also provided Mindfulness-Based Stress Reduction (MBSR) training courses to elementary school teachers in Rotterdam and the surrounding area, alongside her role as co-principal. The enthusiastic reactions of participating teachers led to her thesis, a collaboration between the RVKO, Radboud University, UMC Radboud Expertise Center for Mindfulness, and the Trimbos Institute. As an external PhD candidate (2018-2024), Bernadette discovered that the bridging function between science and the

daily workplace suited her well. Through her research, she was able to make a significant contribution to the well-being of educational professionals.

In 2016, the implementation of an innovative whole-school program resilience and well-being (Leer- & Veerkracht) was embraced by the Nicolaasschool team, ultimately leading to its designation as an 'excellent school' by the Dutch education inspectorate in 2020. For Bernadette, this confirmed that focusing on promoting resilience and well-being for teachers and pupils is important and should be better known within the educational field. After leaving the Nicolaasschool in July 2020, Bernadette continued to work as a policy advisor for resilience & well-being for the RVKO, where she contributes to promoting resilience and well-being in the 67 elementary schools, in total comprising more than 20,000 pupils, and 2,400 educational professionals associated with the RVKO.

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