

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

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Summary

This study aimed to test the effectiveness of mindfulness-based stress reduction (MBSR) combined with an organizational health intervention. A cluster randomized controlled trial was conducted in five Dutch secondary vocational schools. Teachers were assigned to Intervention Group 1 (IG1; MBSR) or 2 (IG2; MBSR and an organizational health intervention), or to the Waiting List Group. The primary outcome variable was mindfulness. Secondary outcomes included other mental health outcomes, work performance, personal competencies, and work-related perceptions. Data was collected before (T_0), immediately after (T_1), and three (T_2) and nine months (T_3) after the MBSR training and analyzed applying repeated measures between-subjects designs. As the additional intervention showed no effects, IG1 and IG2 were merged (IG). MBSR had positive short-term effects on the total mindfulness score, its dimensions 'observing' and 'non-reactivity', and the work engagement dimension 'dedication'. Long-term effects were found for the total mindfulness score, its dimensions 'observing', 'non-reactivity', and 'non-judging', sleep quality complaints, negative emotions, and negative work-home interaction. IG displayed a larger short- and long-term decrease in organizational commitment. No significant differences were found for work performance, personal competencies, and work-related perceptions. Although teachers did not perceive a decrease in job demands after the training, they felt more mindful and lowered their organizational commitment. Their mental health improved and their dedication during work increased. These findings may suggest that enhanced mindfulness enabled them to mentally disengage from work during their leisure time, which allowed them to experience fewer symptoms of psychological strain. The trial is registered with the Dutch Trial Register (www.trialregister.nl): NL5581 (July 2016).

Key words: mindfulness-based stress reduction, organizational health intervention, mental health, work-related perceptions, teachers

INTRODUCTION

Maintaining and improving the quality of education requires healthy teachers (Van der Steeg and Gerritsen, 2013). In 2017, stress or burnout complaints were reported by almost one in six Dutch employees, and more than one in five in the educational sector (Douwes and Hooftman, 2019). Teachers have demanding jobs (e.g. high workload, emotional strain) in combination with few job resources and little professional autonomy (Douwes and Hooftman, 2019). The situation is especially troublesome in Dutch secondary vocational schools, due to the poor capacity to implement interventions, the organizational culture, and policy changes by the Ministry of Education (Schelvis et al., 2016).

Work-related stress is associated with negative organizational outcomes like increased absenteeism and early retirement (Douwes and Hooftman, 2019). In 2017, the absenteeism rate in the educational sector was relatively high (5.3%) (Douwes and Hooftman, 2019) and its associated costs per employee were the highest on the labour market as a whole: almost €6000 (number of days × costs per day) (Boonstra, 2015). Organizations strongly rely on the (mostly serendipitous) availability of colleagues to cover for absent teachers. Consequently, colleagues are overloaded with work while the job resources they can draw from remain the same at best. This creates a pattern of imbalance that can jeopardise teachers' well-being (Schelvis et al., 2013). The imbalance between job demands and resources, and the associated risk for one's well-being, may be an important reason why many novice teachers leave the educational sector in the first 5 years of their career (Pas et al., 2012) and why many experienced teachers retire early. In fact, 45–70% of early retirements in the educational sector can be attributed to psychosomatic and psychological problems (Schelvis et al., 2013). Therefore, it is extremely important to reduce and prevent stress and absenteeism in this sector and to develop effective mental health management interventions that are both person- and organization-focused. In their meta-analysis about the effectiveness of interventions aimed at reducing teacher burnout, Iancu et al. (2018) reported that mindfulness interventions had significant effects on the burnout dimensions exhaustion and personal accomplishment.

The current study aimed to test the short- and long-term effectiveness of mindfulness-based stress reduction

(MBSR) on teachers' mindfulness (as the primary outcome), other mental health aspects, and work performance. We hypothesized that MBSR would improve these outcomes (Janssen et al., 2020). We also investigated the effect of MBSR on mediating factors such as personal competencies (occupational self-efficacy and taking distance) and work-related perceptions (job demands, job resources, and negative work–home/negative home–work interaction) (Janssen et al., 2020), and we investigated the effects of a participatory, preventive, organizational health intervention (i.e. a participatory action approach). We hypothesized that this intervention, among other outcomes, would positively influence teachers' occupational self-efficacy (Bandura, 1998; Janssen et al., 2020). We hoped that its implementation would generate tailored work solutions that positively influence the balance between job demands (work pressure and work–life balance) and job resources (autonomy, feedback, relationships) for teachers in the participating schools.

METHODS

Study design

The short- and long-term effectiveness of the intervention(s) was tested in a cluster randomized controlled trial (CRCT) that used an online questionnaire on a secured website. Data were collected at baseline, before the MBSR training (T₀), immediately after the training (T₁), 3 months later (T₂), and 9 months after the training (T₃).

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

Participation was voluntary and participants signed informed consent forms. They could withdraw at any moment without consequence. The methods used have been described extensively elsewhere (Janssen et al., 2020).

Study population

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

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

Cluster randomization

Cluster randomization (Bland, 2004) was performed at the school level. At the first school, participating teachers from one course (either Care, Technology or Economy) were assigned to Intervention Group 1 (IG1: MBSR), teachers from one of the other two courses were assigned to Intervention Group 2 (IG2: MBSR and an organizational health intervention), and teachers from the remaining course were assigned to the Waiting List Group (WLG). The allocation was different at each school (see Table 2). An independent researcher, not involved in this study, prepared concealed, consecutively numbered, sealed opaque envelopes. Every envelope contained a paper indicating the treatment assignment at the school level (Type 1, 2, or 3; see Table 2). A representative from each school received an envelope from the researcher (who was unaware of the randomization sequence) and opened it in the presence of the researcher.

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

Table 1: Eligibility criteria

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

Blinding and sample size

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

Interventions

MBSR: main intervention

The MBSR programme was primarily based on Kabat-Zinn's curriculum (Kabat-Zinn, 1990), but it also contained elements of mindfulness-based cognitive therapy (Segal *et al.*, 2002) (i.e. a 3-minute breathing space and psychoeducation about the nature of thoughts). The programme consisted of eight 2.5-hour weekly group sessions, each with 4–15 participants per group, daily homework involving 45 minutes of exercise for 6 days a week, and one 7-hour day of silence. The sessions were supervised by one of the four recruited qualified mindfulness trainers, who received a training script. Each session consisted of meditation exercises (like the breathing space), enquiry, a discussion of homework, psychoeducation and a specific theme. The specific content of the MBSR group sessions has been described extensively elsewhere (Janssen *et al.*, 2020).

Additional organizational health intervention

The organizational health intervention consisted of two phases (see Janssen *et al.*, 2020 for all details as well). In

Table 2: Cluster randomization

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

^aIG1: Intervention group 1 [Mindfulness-Based Stress Reduction (MBSR)].

^bIG2: Intervention Group 2 (MBSR and an organizational health intervention).

^cWLG: Waiting List Group (control group that received MBSR 1 year later).

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

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

Waiting list group

The participants on the waiting list were invited to participate in MBSR training 1 year after the study’s intervention. To enable comparison between the study groups and the control group, WLJ members could not attend a mindfulness training course or stress reduction training (e.g. cognitive therapy or relaxation training) until T₃.

Outcome measures and data collection

Just before cluster randomization (T₀) and at the start of the intervention(s), participants completed the online baseline questionnaire on a secured website. They received follow-up questionnaires at T₁, T₂ and T₃.

The psychometric properties of the measurement instruments included in the questionnaire have been discussed extensively elsewhere (Janssen *et al.*, 2020). Table 3 shows the variables, the measurement instruments used and the ranges of their response scales. For all scales, higher scores indicate higher levels/intensity of the measured construct. For the scales on The Questionnaire on the Experience and Evaluation of Work (VBBA), higher scores indicate more problems.

Statistical analyses

Baseline characteristics of participants are presented in terms of means and standard deviations (SDs) for metric variables, and in terms of frequencies and percentages for categorical variables. One-way analyses of variance (ANOVAs) were conducted at T₀ to detect significant

differences at baseline between the three groups (IG1, IG2 and WLJ).

The survey data were compared at T₀, T₁, T₂ and T₃. Per-protocol analyses were performed using the treatment-adherent sample (i.e. participants in IG1 and IG2 had to attend at least four of the nine MBSR sessions, and participants in WLJ could not attend an MBSR programme or stress reduction training).

Effects over time of the measures (i.e. T₀, T₁, T₂ and T₃ differences) between the three groups (IG1, IG2 and WLJ) were examined using a repeated-measures between-subjects design [general linear model (GLM)], with simple contrasts for short-term (T₀ versus T₁) and long-term (T₀ versus T₃) effects (Liang and Zeger, 1986; Wang, 2014).

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

RESULTS

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

Merging IG1 and IG2

The two intervention groups mentioned in the study protocol (Janssen *et al.*, 2020) were merged into one intervention group for three main reasons.

First, the repeated-measures design (GLM) only showed differences between IG1 and IG2 for emotional exhaustion ($p = 0.04$) and contextual performance ($p = 0.01$). In addition, participants evaluated the quality of the needs assessment and the implementation of actual action plans stemming from the organizational health intervention as moderate (other data can be obtained upon request from the first author).

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

Third, similar results were achieved in a study by Schelvis *et al.* (2017), which dealt with the effects of an organizational health intervention on work-related stress and well-being in secondary vocational schools. In particular, it found no significant effects on the primary

Table 3: Measurement instruments used

Variables	Measurement instrument	Range of the response scale
Baseline characteristics (demographic data)	Online questions about gender, age, family situation, education level, nature of employment/course, years of work experience, number of working hours per week	
Primary outcome Mindfulness skills	FFMQ-NL total: Dutch version of the Five Facet Mindfulness Questionnaire (Baer <i>et al.</i> , 2008; De Bruin <i>et al.</i> , 2012) Subscales: <ul style="list-style-type: none"> • Observing • Describing • Acting awareness • Non-judging • Non-reactivity 	1 (never or almost never) to 5 (very often or always)
Secondary mental health outcomes Burn-out	UBOS-L Utrechtse Burn-Out Schaal-Leerkrachten (Utrecht Burn-Out Scale—Education) (Maslach and Jackson, 1981; Schaufeli <i>et al.</i> , 1996; Schaufeli and Van Dierendonck, 2000) Subscales: <ul style="list-style-type: none"> • Emotional exhaustion • Mental distance • Personal accomplishment 	0 (never) to 6 (always/daily)
Stress	DASS stress: subscale stress of the Depression, Anxiety, Stress Scales (Nieuwenhuijsen <i>et al.</i> , 2003)	0 (not at all or never applicable) to 3 (certainly or mostly applicable)
Sleep quality complaints	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (no) to 1 (yes)
Positive emotions	Job-related Affective Well-being (JAWS) Scale, positive emotions subscale (Van Katwyk <i>et al.</i> , 2000; Schaufeli and Van Rhenen, 2006)	1 (never) to 5 (often)
Negative emotions	JAWS Scale, negative emotions subscale (Van Katwyk <i>et al.</i> , 2000; Schaufeli and Van Rhenen, 2006)	1 (never) to 5 (often)
Work engagement	UWES Utrecht Work Engagement Scale (Dutch; UBES) (Schaufeli <i>et al.</i> , 2002; Schaufeli and Bakker, 2003) Subscales: <ul style="list-style-type: none"> • Vigour • Dedication • Absorption 	0 (never) to 6 (always/daily)
Perceived general health	SF-36v2, perceived general health: Short-Form 36 Health Survey, version 2 (Van der Zee and Sanderman, 2012)	1 (poor) to 5 (excellent)
Organizational commitment	ACS: Affective Commitment Scale, subscale of the Organizational Commitment Questionnaire (OCQ) (Smeenk <i>et al.</i> , 2006)	1 (I totally disagree) to 5 (I totally agree)
Work performance Work performance and work behaviour	IWPQ: Individual Work Performance Questionnaire (Koopmans <i>et al.</i> , 2014)	0 (rare) to 4 (always)

(continued)

Table 3: (Continued)

Variables	Measurement instrument	Range of the response scale
	Subscales: <ul style="list-style-type: none"> • Task performance • Contextual performance • Counter-productive work behaviour 	
Personal competencies		
Occupational Self-Efficacy	Occupational Self-Efficacy scale (Rigotti <i>et al.</i> , 2008)	1 (totally disagree) to 6 (totally agree)
Taking distance	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Work-related perceptions/job demands		
Work pace and workload	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Emotional demands	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Negative work–home interaction	Survey Work-home Interaction-NijmeGen (SWING), negative work-home interaction subscale (Geurts <i>et al.</i> , 2005)	0 (never/almost never) to 3 (always/almost always)
Negative home–work interaction	SWING, negative home-work interaction subscale (Geurts <i>et al.</i> , 2005)	0 (never/almost never) to 3 (always/almost always)
Work-related perceptions/job resources		
Autonomy	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Feedback	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Relationship with colleagues	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Relationship with superior	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Relationship with students	VBBA subscale (Van Veldhoven <i>et al.</i> , 2014)	0 (never) to 3 (always)
Other		
Evaluation of the additional organizational health intervention. Only for IG2.	Four online questions about chosen problem, method of working, joint approach, achieved results	1 (very bad/certainly not) to 5 (very good/certainly)

outcomes (need for recovery and vitality) or secondary outcomes (like occupational self-efficacy).

Effectiveness of the MBSR training intervention

One-way ANOVAs showed two significant differences between the IG and WLG groups at T₀; for negative work–home interaction ($p = 0.03$) and for feedback ($p = 0.04$).

Table 5 shows the results of the repeated-measures design (GLM) using simple contrast analysis. In comparison to WLG, IG appeared to have a significantly higher short- and long-term increase in the total mindfulness score ($p = 0.01$; $p < 0.01$) and in the mindfulness dimensions ‘observing’ ($p = 0.03$; $p = 0.02$) and ‘non-reactivity’ ($p = 0.03$; $p < 0.01$). Significantly higher long-term scores in the mindfulness dimension ‘non-judging’ ($p = .04$) were reported as well.

In comparison to WLG, IG showed a significantly higher short-term increase in the work engagement dimension ‘dedication’ ($p = 0.04$), and a significantly higher short- and long-term decrease in organizational

commitment ($p = 0.04$; $p = 0.01$). In addition, IG had significantly lower long-term scores for sleep quality complaints ($p = 0.03$), negative emotions ($p = 0.02$) and negative work–home interaction ($p = 0.03$) (despite differences at T₀). The effect sizes for all outcomes were small, except for the medium to large effect size for negative emotions ($\eta = 0.40$).

DISCUSSION

This study aimed to evaluate the short-term (T₀ versus T₁) and long-term (T₀ versus T₃) effects of MBSR training, a person-focused intervention for strengthening the individual capacity of teachers in secondary vocational schools to help them cope with stress and enhance their mental health. The study confirmed the results of previous RCT studies among teachers (Jennings *et al.*, 2013; Roeser *et al.*, 2013; Frank *et al.*, 2015; Taylor *et al.*, 2016): a significant increase in the primary outcome ‘mindfulness total’ and its dimensions ‘observing’ and ‘non-reactivity’.

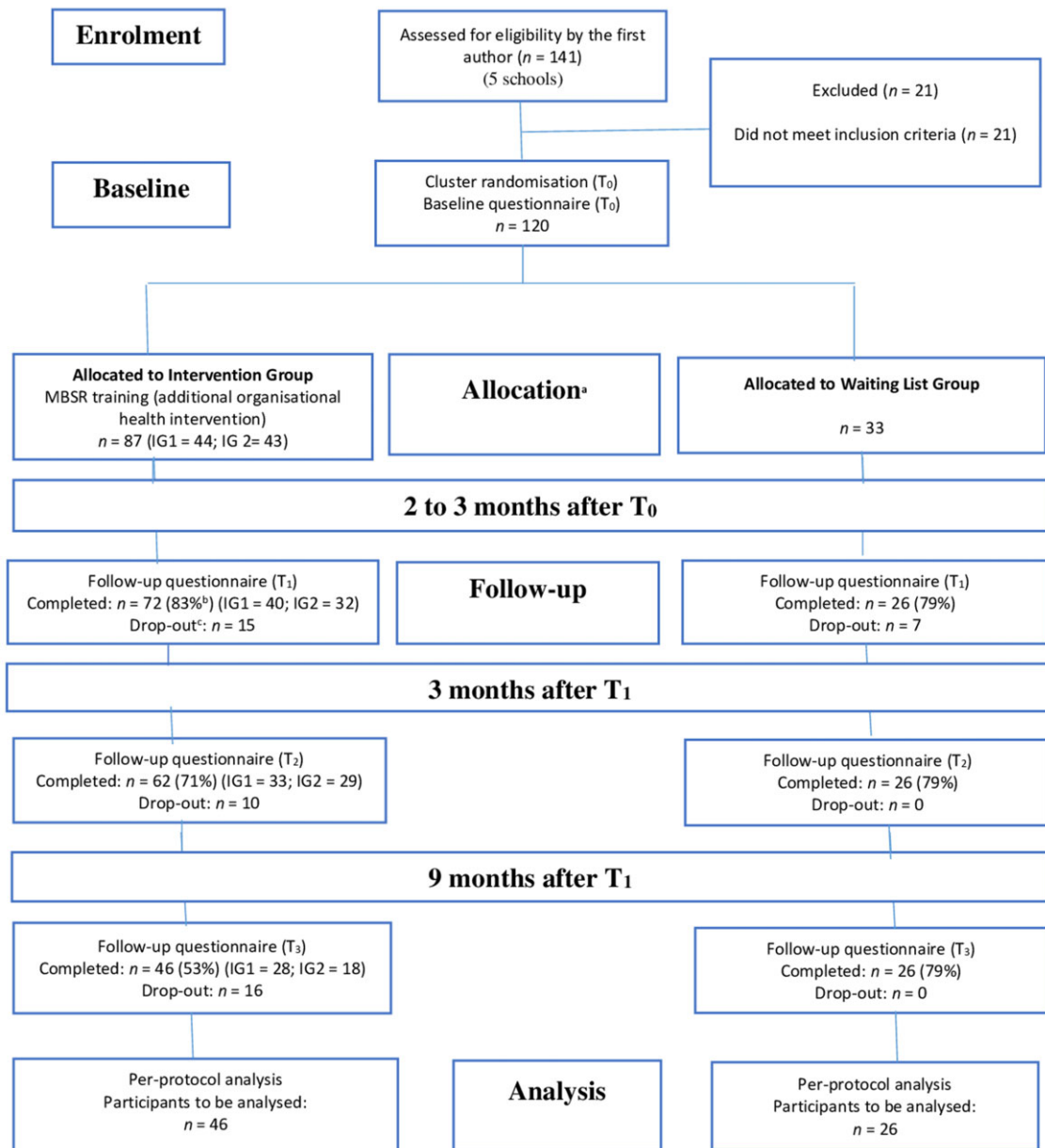


Fig. 1: Flow diagram of the participants through the measurement moments of the trial. ^aAllocation was based on eligibility criteria. ^bPercentages are response percentages compared to baseline/allocation. ^cReasons given for drop-out: lack of time, personal circumstances, not fulfilling expectations, lack of motivation.

Our study among teachers is the only one, as a result of MBSR, in which organizational commitment decreased, the work engagement dimension ‘dedication’ improved, and negative emotions and negative work-home interaction significantly diminished. Decreased organizational commitment and improved dedication during work may indicate that teachers detached from their

work during their leisure time (as indicated by a decrease in negative work-home interaction), which allowed them to experience fewer symptoms of psychological strain (as indicated by a decrease in negative emotions).

MBSR seems not to have changed the perceived balance between job demands and job resources.

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

Characteristics	Intervention Group (IG1) (<i>n</i> = 44)	Intervention Group (IG2) (<i>n</i> = 43)	<i>p</i> ^a IG1 vs IG2	Intervention Group (IG) (<i>n</i> = 87)	Waiting List Group (WLG) (<i>n</i> = 33)	<i>p</i> IG vs WLG
Gender			0.19			0.24
Female	27 (61.4)	32 (74.4)		59 (67.8)	26 (78.8)	
Male	17 (38.6)	11 (25.6)		28 (32.2)	7 (21.2)	
Age ^b , mean (SD) in years	49 (11.1)	50 (12.0)	0.29	49 (11.5)	49 (11.1)	0.81
Family situation			0.06			0.65
Single without resident children	9 (20.5)	6 (14.0)		15 (17.2)	4 (12.1)	
Single with resident children	1 (2.3)	6 (14.0)		7 (8.0)	3 (9.1)	
Married or cohabitating without resident children	14 (31.8)	18 (41.9)		32 (36.8)	10 (30.3)	
Married or cohabitating with resident children	20 (45.5)	11 (25.6)		31 (35.6)	16 (48.5)	
Other	0 (0.0)	2 (4.7)		2 (2.3)	0 (0.0)	
Level of education			0.64			0.36
Lower	1 (2.3)	0 (0.0)		1 (1.1)	1 (3.0)	
Medium	3 (6.8)	3 (7.0)		6 (6.9)	3 (9.1)	
General	0 (0.0)	0 (0.0)		0 (0.0)	1 (3.0)	
Higher	32 (27.7)	28 (65.1)		60 (69.0)	20 (60.6)	
Academic	7 (15.9)	9 (20.9)		16 (18.4)	8 (24.2)	
Other	1 (2.3)	3 (7.0)		4 (4.6)	0 (0.0)	
Course			0.01*			0.02*
Care	21 (47.7)	18 (41.9)		39 (44.8)	23 (69.7)	
Technology	18 (40.9)	7 (16.3)		25 (28.7)	2 (6.1)	
Economy	4 (9.1)	16 (34.0)		20 (23.0)	8 (24.2)	
Other ^c	1 (2.3)	2 (4.7)		3 (3.4)	0 (0.0)	
Years of work experience			0.42			0.09
0–2	2 (4.5)	0 (0.0)		2 (2.3)	1 (3.0)	
3–5	4 (9.1)	2 (4.7)		6 (6.9)	0 (0.0)	
6–10	4 (9.1)	5 (11.6)		9 (10.3)	0 (0.0)	
>11	34 (77.3)	36 (83.7)		70 (80.5)	32 (97.0)	
Number of working hours per week			0.48			0.10
<24	5 (12.5)	2 (5.3)		7 (9.0)	6 (20.0)	
25–32	8 (20.0)	10 (26.3)		18 (23.1)	10 (33.3)	
≥33	27 (67.5)	26 (68.4)		53 (67.9)	14 (46.7)	

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

^aCrosstabs and Chi-square tests were used, except for 'Age' for which the Mann–Whitney U-test was used because of non-normality of the data.

^bAge was calculated at the start of the intervention. The starting date of the interventions differed across schools.

^c'Other' are teachers working for more than one course, e.g. Technology and Economy.

Strikingly, however, was that teachers appeared to respond better to mental processes that contribute to emotional distress and maladaptive behaviour after the MBSR course. They might psychologically detach (Sonntag, 2012) or dis-identify themselves by the mechanism of willingness to experience, awareness and observation (Janssen *et al.*, 2018), as reflected in the increase of mindfulness total, its dimensions observing, non-reactivity and non-judging, and in the decrease of

organizational commitment and negative work–home interaction. Our results also suggest that the teachers' psychological functioning improved, as reflected in fewer sleep quality complaints and negative emotions, and more dedication.

We hypothesized that participating in the organizational health intervention would positively influence occupational self-efficacy (Janssen *et al.*, 2020). Similar to the study by Schelvis *et al.* (2017), our organizational

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

Outcome measures	Experi- mental group	Internal consistency						N	Scores at the four measuring moments						Effectivity							
		α		α		α			T ₀	M (SD)	T ₁	M (SD)	T ₂	M (SD)	T ₃	M (SD)	df	F	p ^a	Effect size ^b	Short- term effect	Long- term effect
		T ₀	T ₁	T ₂	T ₃	T ₀	T ₁															
Primary outcome																						
FFMQ-NL	IG	0.90	0.89	0.89	0.91		39	3.25 (0.45)	3.53 (0.38)	3.52 (0.38)	3.52 (0.43)	3.56 (0.39)	2.88, 164	3.73	0.01*	0.06	0.01*	<0.01**				
Total	WLG						20	3.29 (0.27)	3.37 (0.34)	3.34 (0.27)	3.34 (0.27)	3.36 (0.36)										
FFMQ-NL	IG	0.82	0.82	0.80	0.80		39	3.16 (0.68)	3.40 (0.63)	3.41 (0.64)	3.41 (0.64)	3.47 (0.60)	2.77, 158	2.42	0.04*	0.04	0.03*	0.02*				
Observing	WLG						20	3.40 (0.47)	3.37 (0.57)	3.34 (0.53)	3.44 (0.42)											
FFMQ-NL	IG	0.90	0.88	0.88	0.94		39	3.53 (0.66)	3.76 (0.57)	3.70 (0.59)	3.70 (0.66)	3.70 (0.66)	2.79, 159	0.49	0.34	0.01	0.14	0.25				
Describing	WLG						20	3.46 (0.61)	3.54 (0.72)	3.51 (0.64)	3.53 (0.80)											
FFMQ-NL	IG	0.86	0.83	0.85	0.89		39	3.11 (0.68)	3.40 (0.49)	3.33 (0.61)	3.39 (0.52)	3.39 (0.52)	2.93, 167	0.41	0.37	<0.01	0.27	0.16				
Acting awareness	WLG						20	3.14 (0.64)	3.33 (0.61)	3.29 (0.66)	3.26 (0.73)											
FFMQ-NL	IG	0.88	0.88	0.87	0.85		39	3.44 (0.69)	3.74 (0.69)	3.88 (0.62)	3.87 (0.59)	2.94, 168	1.72	0.08	0.03	0.15	0.04*					
Non-judging	WLG						20	3.26 (0.40)	3.40 (0.61)	3.40 (0.50)	3.39 (0.60)											
FFMQ-NL	IG	0.76	0.76	0.76	0.78		39	2.99 (0.64)	3.30 (0.52)	3.28 (0.58)	3.37 (0.51)	2.97, 169	2.87	0.02*	0.05	0.03*	<0.01**					
Non-reactivity	WLG						20	3.17 (0.44)	3.18 (0.44)	3.15 (0.47)	3.16 (0.48)											
Secondary mental health outcome																						
UBOS-L	IG	0.83	0.86	0.90	0.90		38	2.23 (1.06)	2.15 (1.10)	1.92 (1.18)	1.79 (1.09)	2.76, 155	1.00	0.20	0.02	0.10	0.09					
UBOS-L	IG	0.62	0.72	0.76	0.72		38	1.06 (0.69)	0.92 (0.67)	0.95 (0.73)	0.93 (0.75)	3.00, 168	0.45	0.36	<0.01	0.13	0.43					
Mental distance	WLG						20	1.14 (0.73)	1.16 (0.78)	1.05 (0.68)	1.04 (0.70)											
UBOS-L	IG	0.78	0.77	0.79	0.78		38	4.26 (0.89)	4.33 (0.76)	4.30 (0.72)	4.34 (0.71)	2.83, 158	0.52	0.33	0.01	0.21	0.46					
Personal accomplishment	WLG						20	4.42 (0.62)	4.34 (0.60)	4.29 (0.76)	4.47 (0.55)											
DASS	IG	0.92	0.93	0.94	0.95		38	0.61 (0.56)	0.58 (0.55)	0.62 (0.65)	0.60 (0.60)	2.95, 165	0.33	0.40	0.01	0.31	0.24					
Stress	WLG						20	0.83 (0.48)	0.71 (0.47)	0.69 (0.37)	0.70 (0.44)											
VBBA	IG	0.82	0.87	0.90	0.91		41	0.35 (0.25)	0.29 (0.27)	0.31 (0.32)	0.28 (0.29)	2.90, 174	1.28	0.14	0.02	0.19	0.03*					
Sleep quality complaints	WLG						21	0.34 (0.29)	0.34 (0.31)	0.36 (0.33)	0.40 (0.33)											
JAWS	IG	0.83	0.86	0.90	0.88		38	3.83 (0.64)	3.84 (0.64)	3.76 (0.75)	3.82 (0.70)	2.98, 167	0.85	0.23	0.02	0.20	0.23					
Positive emotions	WLG						20	3.89 (0.63)	3.76 (0.65)	3.81 (0.74)	4.02 (0.71)											
JAWS	IG	0.78	0.78	0.78	0.87		38	2.18 (0.64)	2.16 (0.63)	2.01 (0.64)	2.00 (0.73)	2.77, 155	2.33	0.04*	0.40	0.18	0.02*					
Negative emotions	WLG						20	2.08 (0.44)	2.22 (0.65)	2.13 (0.55)	2.38 (0.80)											
UWES	IG	0.79	0.81	0.89	0.88		37	4.03 (1.06)	4.05 (1.13)	3.97 (1.18)	4.06 (1.19)	3.00, 165	0.10	0.47	<0.01	0.32	0.39					
Vigour	WLG						20	4.47 (0.99)	4.38 (1.07)	4.28 (1.09)	4.43 (1.00)											
UWES	IG	0.90	0.90	0.93	0.88		37	4.39 (1.03)	4.47 (1.29)	4.25 (1.33)	4.51 (1.16)	2.85, 157	0.99	0.20	0.02	0.04*	0.11					
Dedication	WLG						20	4.87 (0.99)	4.60 (0.92)	4.67 (1.02)	4.65 (0.96)											

(continued)

Table 5: (Continued)

Outcome measures	Experi- mental group	Internal consistency						N	Scores at the four measuring moments						Effectivity						
		α		α		α			T ₀		T ₁		T ₂		T ₃		F	p ^a	Effect size ^b	Short- term effect	Long- term effect
		T ₀	T ₁	T ₂	T ₃	T ₀	T ₁		T ₂	T ₃	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)					
UWES	IG	0.77	0.79	0.83	0.82	37	3.80 (1.09)	3.94 (1.22)	3.87 (1.28)	4.00 (1.16)	3.00, 165	0.41	0.37	0.01	0.33	0.33					
Absorption	WLG					20	4.43 (1.10)	4.35 (0.99)	4.27 (0.86)	4.42 (1.09)											
SF-36-v2	IG	0.71	0.68	0.74	0.72	38	3.65 (0.55)	3.76 (0.60)	3.62 (0.65)	3.63 (0.65)	3.00, 168	1.01	0.19	0.02	0.21	0.37					
Perceived general health	WLG					20	3.75 (0.54)	3.76 (0.48)	3.85 (0.50)	3.77 (0.50)											
Emotional exhaustion	WLG					20	2.14 (0.88)	2.36 (0.99)	2.11 (1.16)	2.11 (1.19)											
ACS	IG	0.81	0.87	0.87	0.88	41	3.71 (0.84)	3.58 (0.90)	3.58 (0.92)	3.62 (0.95)	2.95, 177	2.41	0.04*	0.04	0.04*	0.01*					
Organizational commitment	WLG					21	3.51 (0.77)	3.64 (0.85)	3.73 (0.84)	3.77 (0.86)											
Work performance																					
IWPQ task performance	IG WLG	0.82	0.78	0.75	0.81	37	2.15 (0.71)	2.21 (0.68)	2.27 (0.70)	2.27 (0.73)	2.91, 160	0.13	.47	<0.01	0.34	0.39					
						20	2.38 (0.61)	2.37 (0.81)	2.38 (0.66)	2.44 (0.74)											
IWPQ	IG	0.87	0.87	0.90	0.90	37	2.29 (0.87)	2.40 (0.76)	2.16 (0.89)	2.36 (0.91)	2.94, 162	0.09	0.48	<0.01	0.46	0.36					
Contextual performance	WLG					26	2.47 (0.72)	2.56 (0.65)	2.38 (0.66)	2.61 (0.58)											
IWPQ	IG	0.78	0.79	0.81	0.77	37	1.62 (0.56)	1.38 (0.64)	1.28 (0.71)	1.41 (0.60)	3.00, 165	0.73	0.27	0.01	0.22	0.39					
Counter-productive work behaviour	WLG					20	1.60 (0.65)	1.48 (0.58)	1.50 (0.51)	1.44 (0.53)											
Personal competencies																					
IWPQ	IG	0.78	0.78	0.82	0.87	38	4.61 (0.53)	4.77 (0.54)	4.73 (0.67)	4.80 (0.64)	3.00, 168	0.23	0.44	<0.01	0.31	0.22					
Occupational Self-Efficacy	WLG					20	4.68 (0.58)	4.78 (0.44)	4.77 (0.51)	4.76 (0.55)											
Scale																					
VBBA	IG	0.80	0.84	0.77	0.83	38	1.40 (0.61)	1.28 (0.56)	1.21 (0.56)	1.15 (0.56)	2.71, 152	0.63	0.29	0.01	0.37	0.15					
Taking distance	WLG					20	1.43 (0.58)	1.35 (0.64)	1.28 (0.52)	1.35 (0.41)											
Work-related perceptions/job demands																					
VBBA	IG	0.82	0.85	0.83	0.88	41	1.28 (0.50)	1.38 (0.50)	1.31 (0.56)	1.20 (0.49)	2.90, 174	0.62	0.30	0.01	0.30	0.10					
Work pace and workload	WLG					21	1.27 (0.35)	1.43 (0.52)	1.35 (0.46)	1.34 (0.52)											
VBBA	IG	.64	.67	0.76	0.77	40	1.24 (0.38)	1.18 (0.40)	1.10 (0.44)	1.14 (0.41)	2.80, 165	2.37	0.04*	0.04	0.23	0.11					
Emotional demands	WLG					21	1.19 (0.20)	1.18 (0.33)	1.25 (0.28)	1.20 (0.29)											
SWING	IG	0.86	0.86	0.89	0.90	36	1.01 (0.55)	0.98 (0.59)	0.79 (0.56)	0.79 (0.50)	2.95, 162	1.94	0.06	0.03	0.13	0.03*					
Negative work-home interaction ^c	WLG					21	0.87 (0.38)	0.99 (0.42)	0.91 (0.47)	0.89 (0.42)											
SWING negative home-work interaction	IG WLG	0.84	0.81	0.77	0.76	36 21	0.47 (0.71)	0.28 (0.38)	0.29 (0.37)	0.28 (0.37)	2.03, 112	0.23 ^d	0.40	<0.01	0.28	0.35					
							0.43 (0.38)	0.35 (0.40)	0.26 (0.32)	0.31 (0.34)											

(continued)

Table 5: (Continued)

Outcome measures	Exper- mental group	Internal consistency						N	Scores at the four measuring moments						Effectivity							
		α		α		α			T ₀	T ₁	T ₂	T ₃	M (SD)	M (SD)	M (SD)	M (SD)	df	F	p ^a	Effect size ^b	Short-term effect	Long-term effect
		T ₀	T ₁	T ₂	T ₃	T ₀	T ₁															
Work-related perceptions/job resources																						
VBBA	IG	0.80	0.80	0.83	0.86	41	1.20 (0.62)	1.24 (0.58)	1.28 (0.56)	1.29 (0.59)	2.97, 178	0.44	0.36	0.01	0.19	0.45						
Autonomy	WLG					21	1.19 (0.47)	1.31 (0.41)	1.24 (0.48)	1.26 (0.46)												
VBBA	IG	0.74	0.73	0.77	0.85	41	1.48 (0.54)	1.48 (0.63)	1.46 (0.57)	1.48 (0.64)	2.86, 172	0.77	0.25	0.01	0.18	0.06						
Feedback ^c	WLG					21	1.23 (0.43)	1.35 (0.40)	1.35 (0.40)	1.44 (0.58)												
VBBA	IG	0.77	0.79	0.78	0.82	41	0.69 (0.44)	0.73 (0.45)	0.74 (0.45)	0.69 (0.45)	3.00, 177	0.42	0.37	0.01	0.43	0.17						
Relation colleagues	WLG					21	0.64 (0.35)	0.70 (0.42)	0.69 (0.33)	0.72 (0.34)												
VBBA	IG	0.86	0.84	0.87	0.92	41	0.71 (0.49)	0.83 (0.58)	0.82 (0.54)	0.75 (0.55)	2.78, 167	0.44	0.35	0.01	.16	.44						
Relation superior	WLG					21	0.52 (0.45)	0.52 (0.43)	0.62 (0.56)	0.54 (0.47)												
VBBA	IG	0.66	0.65	0.70	0.72	41	0.82 (0.34)	0.82 (0.31)	0.80 (0.39)	0.77 (0.33)	3.00, 180	0.41	0.37	0.01	0.31	0.28						
Relation students	WLG					21	0.96 (0.09)	0.93 (0.14)	0.94 (0.21)	0.95 (0.22)												

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

^a Cronbach's alpha.

^b *p* is one tailed.

^c *p* < 0.05;

^d *p* < 0.01.

^e Effect size is reported as partial eta squared: small ($\eta = 0.04$), medium ($\eta = 0.25$) and large ($\eta = 0.64$) effect sizes.

Short-term effect: *p* between T₀ and T₁; Long-term effect: *p* between T₀ and T₃.

^f Significant difference on T₀ between IG and WLG.

^g Huynh-Feldt's F is reported because Greenhouse-Geisser correction is in almost all cases >0.75; except 2: Greenhouse-Geisser.

health intervention was unsuccessful: there were no effects on occupational self-efficacy.

The conceptual model—as suggested in our earlier article (Janssen *et al.*, 2020)—could not be tested due to limited data, which might also have influenced the conclusiveness of our results. However, several reasons may partly explain the non-significant and small effect sizes for the other mental health outcomes, work performance, personal competencies, job demands and job resources.

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

Second, given that one in five employees in the educational sector reported stress or burnout complaints in 2017 (Douwes and Hoofman, 2019), the exceptionally low score for stress at baseline for the IG is remarkable. It seems that the target group for our intervention(s)—teachers with the highest stress scores—did not participate in our study. Many participants were women with a relatively high average age and many years of work experience (see Table 4). Therefore, we may be dealing with a healthy worker effect (Li and Sung, 1999) and an absence of younger workers who are too busy for the MBSR training. Possible barriers to participation were limited time availability, low expectations, low motivation, lower levels of perceived health, and lower perceptions of their organization's commitment to employee health (Toker *et al.*, 2015). This leads us to ask how the core target group can be reached in future scholarly work in this field, and how non-participation can be reduced. Participation might be stimulated by a genuine understanding of employees' needs by the management team and cooperation within the organization, by a careful selection of participants, using criteria such as the extent of stress/burnout complaints, presenteeism and absenteeism rate, and by reducing possible barriers (in the context of a health programme: more commitment and the possibility to participate in the training during working hours).

Third, the lack of effects by the organizational health intervention could be caused by poor implementation (Jenny *et al.*, 2015). The intervention may not have been fully implemented as planned, which might have limited its potential impact (Schelvis *et al.*, 2017). There may be several possible explanations for this. Maybe the preparation phase (establishment of a participatory group, commitment of management, communication to the teachers) (Janssen *et al.*, 2020), which is a requirement

of utmost importance in the light of creating readiness for change by management and employees, was too brief. Employees' perception and appraisal of the organizational intervention may not be really affected by a serious communication strategy. After all, the present organizational culture of Dutch secondary vocational schools and the sometimes authoritarian leadership—marked by controlling, top-down communication and the belief that 'employees' point of view is of limited value'—may not have facilitated the implementation of the intervention. Consequently, we detected no increase in occupational self-efficacy and no change in job demands or job resources.

Strengths and limitations of this study

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

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

Second, a CRCT, which the organizational health intervention required, entails a greater complexity in design and analysis than an RCT. It also requires more participants (based among others on the amount of groups, type of measurements and the nature of the statistical tests) to achieve adequate statistical power (Campbell *et al.*, 2004).

Third, as the organizational health intervention took place at different schools with differing organizational conditions, treatment fidelity, i.e. the reliability of the administration of the intervention, may have been less optimal (Klingbeil and Renshaw, 2018).

Fourth, all data were self-reported and may therefore be biased (Brock *et al.*, 1996; Klingbeil and Renshaw,

2018). De Waal (2019) posited that human beings are insufficiently aware of their inner state and may therefore mislead themselves and others. However, as this study was designed as a CRCT, this bias is likely to have occurred to the same extent in the IG and the WLG. In addition, Schnittker and Bacak (2014) reported that the predictive value for self-rated health is increasing, among others caused by the exposure to more health information. Consequently, the current study may have been less prone to this type of bias.

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

Recommendations for future research

This study followed up on some important recommendations from previous review studies in this field (Janssen *et al.*, 2020).

There are at least five possible avenues for future research. *First*, reaching the core target group (teachers with a high level of stress) would require a careful selection of participants before T_0 , based on their mental health outcomes. *Second*, future research could pay attention to the conditions under which the intervention should take place: during working hours and with good facilities. Otherwise, MSBR training could actually add a stressor to the work environment. *Third*, more scholarly work is needed to determine which settings are particularly suitable for which types of mindfulness courses. Mindfulness training needs to be implemented with care, because it cannot be assumed that it works for everyone and under all circumstances. *Fourth*, possible causal relationships and reversed causations between the outcomes need to be analyzed to explore the working mechanisms of MBSR (Zapf *et al.*, 1996). *Fifth*, we recommend an integrated approach that combines both an individual-focused intervention and an organization-focused intervention while simultaneously abiding by the determinants of successful implementation (Schelvis *et al.*, 2017).

Based on the results discussed, we can conclude that although teachers did not perceive a decrease in their job demands after the training, they felt more mindful and lowered their organizational commitment. Moreover, their mental health improved, as reflected in fewer sleep quality complaints, less negative emotions, reduced negative work-home interaction and more dedication during work. These findings may suggest that the enhanced mindfulness enabled them to mentally disengage from work during leisure time (Sonnentag, 2012), which allowed them to experience fewer symptoms of psychological strain.

AUTHORS' CONTRIBUTIONS

M.J., Y.H. and J.E. acquired the funding. M.J., Y.H., B.v.d.H., P.P. and J.E. designed the study. M.J. and Y.H. were responsible for the acquisition of data. M.J., Y.H., B.v.d.H., H.K., P.P. and J.E. were responsible for the analysis and interpretation of data. M.J. drafted the manuscript. All authors were involved in revising the manuscript. All authors read and approved the final version of the manuscript. All authors have agreed to publication.

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CONFLICT OF INTEREST STATEMENT

All authors declare that they have no competing interests.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Ethics Committee on Practice-Based Research at HAN University of Applied Sciences and the Medical Ethics Committee (METC) at Radboud University Medical Centre, both located in Nijmegen, The Netherlands, approved the research proposal (Registration no. ACPO 07.12/15; File number CMO: 2019-5266). Both committees stated that the research complied with the requirements of ethical conduct of research as set out in the Netherlands Code of Conduct for Research Integrity and that it fulfilled the criteria of the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects. The study was carried out in the Netherlands in full compliance with the applicable rules concerning the review of research ethics committees. Participation was voluntary and participants could withdraw at any moment with no consequences. Participants signed informed consent forms before participating in this study.

The trial is registered with the Dutch Trial Register (www.trialregister.nl): NL5581 (September 2016). The first schools were randomly assigned in September 2016.

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