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ORIGINAL PAPER

The Unilever Study: Positive Effects on Stress and Risk for Dropout from Work after the Finding Peace in a Frantic World Training

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Abstract

Organizations are confronted with a constant need for efficiency, which affects the working atmosphere, often typified by velocity, time pressure, competition, job insecurity, and information overload, which may lead to stress, burnout, work-life disbalance, and lowered work functioning. This study evaluated an 8-week, 1.5 h-per-week group-based standardized mindfulness program ("Finding peace in a frantic world"), applied on-site in a large multinational company. In a naturalistic longitudinal design self-selected employees ($n = 150$) completed measurements at wait-list, pre-test, post-test, and 2 and 6 months follow-up. Nearly all participants followed at least five out of eight sessions, were highly satisfied with the training (8.3 out 10), and almost 90% intended to continue with mindfulness practices. Primary outcomes were stress and risk for dropout from work. Using multilevel analyses, mean pre-test scores were compared to the other measurement occasions, and the rate of change in the training period ($M = 67$ days; SD = 12) was compared to the rate of change in the wait-list period ($M = 29$ days; SD = 8). Direct and long-term positive effects on risk for dropout from work ($p < .001$; effect size (ES) = 0.67, 0.73, and 0.88, respectively) and stress ($p < .001$; ES = 0.72, 0.86, and 1.02, respectively) were found. The risk for dropout from work declined from 54.4% at wait-list (45.8% at pre-test) to 16.4% at 6 months follow-up, and declined significantly faster ($p < .001$) during the training than during the wait-list period, but stress did not. In addition, positive effects on secondary measures of psychological well-being and functioning at work were found. In conclusion, a standardized mindfulness training in a multinational company reduces stress and risk for dropout and improves well-being and functioning at work, also in the long term, but a comparison of the training against alternative stress-reducing interventions is needed.

Keywords Mindfulness · Well-being · Business world

Companies and their employees are confronted with continuous transformation, globalization, growing cultural changes, and a constant need for efficiency (e.g., Houtman et al. 2007). This influences the work atmosphere, which is often typified by velocity, time pressure, competition, job insecurity, and facing an overload of stimuli on a daily basis. Constant availability has become a defining characteristic of our work situation, primarily due to social media and modern telecommunication.

Work-related pressure is the main source of stress in the USA, representing a serious threat to employee health and well-being (Aikens et al. 2014). A significant number of people state that stress has a very strong negative impact on their physical (25%) or mental health (28%) (APA 2015). Between 2009 and 2014, the number of sick days due to serious mental health complaints has doubled; in the UK, 70 million sick days, which is more than half of the total of the annual 130 million sick days, are due to mental health problems such as stress, depression, and anxiety (Davies 2014). Verhue et al. (2014) found that employees of larger companies (more than

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100 employees) experience more occupational stress than employees of smaller companies. This indicates that stress regulation among employees in larger or multinational companies may need special attention.

Occupational stress and stress in general are associated with headaches, higher incidence of cardiovascular disease, stroke, autoimmune disorders, cancer, diabetes, fatigue, obesity, and musculoskeletal pain (Aikens et al. 2014). In fact, stress and its accompanying chronic inflammatory response have been involved in nearly all chronic illnesses (Wolever et al. 2012). Furthermore, long-term stress can lead to anxiety, depression, and burnout (Leone et al. 2011; Netterstrøm et al. 2008).

Employees with elevated stress levels show decreased work performance and lower job satisfaction (Kalia 2002; Gilboa et al. 2008; Zangaro and Soeken 2007). Moreover, (occupational) stress frequently results in poor morale, absenteeism from work, more compensation claims, and high staff turnover (Aikens et al. 2014). Decreased work performance and increased health care utilization lead to considerable costs (e.g., Thygeson 2010). The International Labour Organization estimated that the annual financial loss caused by stress-induced disorders is 9.2 billion euros in Europe, and USD$6.6 billion in the USA (Mino et al. 2006).

Mindfulness has been proposed as a means of reducing stress and increasing resilience and work-life balance. Mindfulness has its roots in Buddhist traditions and its aim is to deepen conscious awareness of the present moment (Kabat-Zinn 2005). A common definition of mindfulness is "paying attention in a particular way; on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn 1994, p. 4). Mindfulness can also be defined as the process of paying attention to what is happening in the moment—both internally (thoughts, emotions, bodily sensations) and externally (the environment)—and perceiving these stimuli without evaluation or judgment, and without assigning meaning to them (Glomb et al. 2011).

Recently, a variety of mindfulness-based programs (MBPs) has been developed for use in organizational settings (e.g., Huang et al. 2015; Klatt et al. 2009). One of the main objectives of mindfulness in the workplace is reducing the effects of stress in employees (e.g., Chaskalson 2011). Other objectives of mindfulness in occupational settings are improving employee well-being, emotional intelligence, or performance (Reb and Choi 2014). Mindfulness has also become increasingly popular in a variety of multinational companies, such as Google, General Mills, Apple, and McKinsey (Hansen 2012; Mindfulnet 2011).

The effects of MBPs have been extensively investigated in clinical and non-clinical populations. Most relevant with respect to the current study are systematic reviews and meta-analyses about the effects of MBPs on stress, anxiety, and depression. In 2010, meta-analytic data showed medium effects of MBPs on symptoms of anxiety (effect size (ES) = .63) and mood symptoms (effect size = .59) at post-test, and large effects in patients with full diagnoses of anxiety and mood disorders (effect size = .97 for anxiety and ES = .95 for mood). Effects were maintained at follow-up (Hofmann et al. 2010). In line, a recent meta-analysis showed that compared to no treatment, effects of MBPs on depression and anxiety were medium to large at post-test (effect size = .59 and .89, respectively) and at follow-up (effect size = .55 for depression, insufficient data for long-term effects on anxiety) (Goldberg et al. 2018). Further, two meta-analytic reviews showed that MBPs are effective in the treatment of psychological problems, particularly depression, stress, and anxiety. Pre-post studies showed medium to large effects for depression (effect size = .68), stress (effect size = .83), and anxiety (effect size = .55), and between group studies showed medium to large effects for depression (effect size = .80), stress (effect size = .74), and anxiety (effect size = .64) (Khoury et al. 2013, 2015). Moreover, neuroscientific studies and reviews show emerging evidence that mindfulness meditation positively influences brain activity and regions involved in the regulation of attention, emotion regulation, and self-awareness, and that these changes in the brain are in turn related to improved well-being, and reduction of mental and physical distress (e.g., Tang et al. 2015; Treadway and Lazar 2009). In addition to many studies showing the positive effects of MBPs, critical notions on the hype of mindfulness have surfaced over the past years, and should be taken into account (e.g., the lack of consensus on its definition, the methodological shortcomings in research designs; Van Dam et al. 2018).

Despite significant interest in the effects of MBPs in occupational settings, only limited research investigated the effects of mindfulness in the workplace. Huang et al. (2015) carried out an RCT ($n = 144$) and found that employees of manufacturing factories with poor mental health in the 8-week mindfulness group, improved significantly on psychological distress, fatigue, and perceived stress, whereas the employees in the wait-list control group did not. One meta-analysis investigated the effects of MBPs in working adults (Virgili 2015); however, this study did not differentiate between mindfulness training provided at the worksite or externally. The results indicated medium to large effects on psychological distress, and were largely maintained during 1 month follow-up but not assessed at longer follow-up. Interestingly, Virgili (2015) also found that brief versions of MBPs (4 to 6 weeks and/or less than 3-h sessions) for use in organizational settings were equally effective as the standard 8-week versions originally developed for clinical settings.

The limited amount of studies that have been conducted suggest that, at the individual level, mindfulness training improves employee well-being, focus, self-awareness, emotion, and stress regulation (Stanley et al. 2011), job satisfaction (Hülsheger et al. 2013), and work engagement (Leroy et al. 2013). At the group level, results indicate that mindfulness training enhances team communication and unit cohesion (Stanley et al. 2011).

Overall, research shows well-established positive effects of MBPs on physical and psychological well-being in both clinical and non-clinical groups. While mindfulness is becoming increasingly popular in the corporate world, most of the existing research has been conducted outside the work environment, with little attention being paid to the contextual characteristics of work and lacking work-related measures (Glomb et al. 2011). However, most mindfulness research that did include work-related measures shows promising results.

The aim of the current study was to evaluate the acceptability and feasibility, as well as the effects of the 8-week mindfulness program "Finding peace in a frantic world" developed by Williams et al. (2013), in a naturalistic longitudinal study with waiting time before training as the control condition. The training targeted employees of Unilever, a multinational company, and was offered on-site during the workday, paid by the company. We hypothesized that (1) stress and risk for dropout from work (primary outcomes) would improve, (2) psychological well-being and functioning at work (secondary outcomes) would improve, and (3) Improvements in stress would correlate positively with intensity of (home) practice and with number of attended sessions. We expected no changes between the averages at wait-list and pre-test measurement, and improvements in the averages at post-test, and at 2 and 6 months follow-up measurements as compared to pre-test. In addition, we expected the rate of change over time in both primary and secondary outcomes to be larger during the training period as compared to the wait-list period.

Method

Participants

Seven (4.2%) participants did not want to fill out the questionnaires and only took part in the training and another 11 (6.5%) dropped out before the training (for different reasons such as timing issues), resulting in a final sample of 150 participants (mean age = 43.71, SD = 8.14, range 28–61, 111 females). School levels of the participants were the following: secondary school (2.0%, $n = 3$); higher professional education (28.7%, $n = 43$); university (30%, $n = 45$); PhD (22%, $n = 33$); other (6.7%, $n = 10$); and 10.7% ($n = 16$) did not report about their educational background. Of all participants, 52% ($n = 78$) were married, 20.7% ($n = 31$) were in a relationship, 11.3% ($n = 17$) were single, 5.3% ($n = 8$) were divorced or widowed, and 10.7% ($n = 16$) did not report about their marital status. The majority of participants were born in the Netherlands (62.6%, $n = 94$), 20.7% ($n = 31$) were from another country inside the European Union, and the remaining 16.7% ($n = 25$) were born in a country outside the European Union. Of all participants, 16% ($n = 24$) worked for a period of less than 5 years at Unilever, 41.3% ($n = 62$) worked between 5 and 15 years, 38% ($n = 57$) worked 15 years or longer at Unilever, and 4.7% ($n = 7$) did not report how long they worked at Unilever.

Procedure

Two keynotes about mindfulness and its effects (by SB), at the Unilever sites in Vlaardingen and Rotterdam, were attended by approximately 350 people. The keynotes and subsequent mindfulness trainings were advertised through flyers, through internal company mails, and placed on internal (online) notice boards. Recruitment procedures were carried out within the company, and eventually, 168 employees expressed their interest and were further contacted by e-mail by the research team. A standardized e-mail was sent to them explaining that the mindfulness training was intended for employees who want to learn to deal better with stress or improve the quality of their life, work, and relationships (also with themselves). Further, in a motivational letter, participants answered four questions: What is the reason you would like to participate?; What do you hope to learn?; During the training you will be requested to practice 6 of the 7 days (preferably daily) at home for 20 min, is this feasible for you?; You are expected to always be present during the training (the maximum to miss out on, is one session), is this feasible for you?

Measurements were administered online around 4 weeks before the training (wait-list), a few days before the training (pre-test), directly after the training (post-test), and 2 and 6 months after the training (follow-up 1 and 2). Research assistants made a summary of results per group based on measurements before and after the training, which were communicated back to the participants. This study was approved by the Ethical Committee of the University of Amsterdam (number 2014-CDE-3865).

Intervention The mindfulness training "Finding peace in a frantic world" was developed by Williams et al. (2013) and was based on the handbook "Mindfulness: a practical guide to finding peace in a frantic world" by Williams and Penman (2011). We followed the exact outline of this program, 8 weeks, 1.5 h per week, with daily formal home practices of around 20–30 min (e.g., breathing space, body scan). Williams and Cullen used this program to train the UK Parliament; currently 115 Parliamentarians and 80 staff members of the UK Parliament have participated (Loughton and Morden 2015). With their permission, the training was used by the Academic Training Centre UvA minds You in Amsterdam, the Netherlands. The sessions were provided in groups of 15 to 20 employees. Groups were facilitated by van der Meulen, Formsma, and Bögels; psychotherapists/ psychologists and certified MBSR trainers, trained in national and international mindfulness training centers, further specialized in mindfulness training for children with psychiatric

disorders and mindful parenting training for their parents. All three facilitators had their own regular mindfulness practice and took part in several (inter)national retreats over the past 10 years or more. During the course, the trainers met weekly for intervision, and monthly for supervision, to discuss the group process and to ensure treatment integrity.

Participants received the handbook "Mindfulness: a practical guide to finding peace in a frantic world," a workbook, and meditation tracks, all to support the home practice. They were also asked to practice informal meditation exercises, such as opening e-mails at work mindfully, mindful listening to colleagues, or mindful walking on the way to a meeting. Furthermore, participants read one chapter every week from the handbook about the theme of the last session. For an overview of the most important exercises and session themes, see Table 1.

Measures

Feasibility and Acceptability Feasibility was measured as attendance rates during training sessions and home practice was registered retrospectively at each measurement occasion (minutes of meditation practice and other homework). Acceptability was further expressed as intervention satisfaction in terms of responses to the evaluation questionnaire administered after the training ("How did you rate the training, the trainers, the sessions, and the exercises?").

Stress and Risk for Dropout from Work Stress was assessed by the 10-item version of the Perceived Stress Scale (PSS; Cohen et al. 1983). Reliability (Cronbach's α) at pre-test was .85. The Checklist Individual Strength (CIS) assessed risk for dropout from work, by measuring different aspects of chronic fatigue and burnout and is validated for the working population (Beurskens et al. 2000). The CIS consists of 20 items and is divided over four domains: fatigue, motivation, activity, and concentration. A cutoff point of ≥ 76 has been established for employees who are at increased risk for dropout (long-term) from work because of illness (Bültmann et al. 2000). Reliability at pre-test for the total scale was .88, and for the successive sub scales .90, .56, .46, and .86. The sub scales motivation and activity were removed from further analyses based on low reliabilities. For the dichotomized scores based on the cutoff, Cronbach's alpha (KR-20) was .69 for the repeated observations.

Psychological Well-being Participants were asked to formulate their own goals with respect to the training (e.g., "A better work-life balance," "Improving sleep quality," "Finding peace in my life," "Feeling more confident"). The Goal Attainment Scale (GAS) was originally developed as an individualized method of evaluating mental health treatment outcomes (Kirusek et al. 1994). Symptoms of combined depression, anxiety, and stress were assessed by the Depression, Anxiety, and Stress scale (DASS-21) which consists of 21 statements representing three sub scales: depression, anxiety, and stress (Lovibond and Lovibond 1995). Reliability of the full scale at pre-test was .86 and for the successive subscales .78, .66, and .83. Happiness was assessed by the widely used 4-item Subjective Happiness Scale (SHS; Lyubomirsky and Lepper 1999). Reliability of the SHS total score at pre-test was .86. Positive and negative affect were further assessed with the Positive And Negative Affect Scale (PANAS), which consists of 20 words that describe different positive and negative feelings and emotions (Watson et al. 1988). Reliabilities of the positive and negative affect sub scales at pre-test were good, $\alpha = .89$ and $\alpha = .84$, respectively.

Functioning at Work Workability was assessed by the 2-item version of the Work Ability Index (WAI; Tuomi et al. 1997), in which one rates his/her own current physical and mental workability. Cronbach's alpha for the repeated observations was .67 for both items. Work engagement was further examined by the Utrecht Work Engagement Scale (UWES; Schaufeli and Bakker 2004). The UWES consist of the sub scales vigor, dedication, and absorption. Reliability for the full scale at pre-test was .95, and for the respective subscales, .84, .91, and .85. Positioning and functioning within the company was further assessed by 12 self-formulated items designed specifically for this study (e.g., "Communication within organization," "Sense of belonging to company"). The items were summed and reliability was found to be good at pre-test, $\alpha = .88$. Reliability remained $> .80$ when items were deleted; therefore, we proceeded with one sum score. Further, leadership and communication styles were assessed by the Communication Styles Profile (CSP; Douglas 1998). The CSP consists of four different communication styles: director style, $\alpha = .79$ at pre-test; expresser style, $\alpha = .86$ at pre-test; thinker style, $\alpha = .77$ at pre-test; and harmonizer style, $\alpha = .66$ at pre-test.

Data Analyses

Treatment effectiveness on dimensional outcomes was examined by multilevel analyses because these analyses account for dependencies between measurements in participants, who reported five times. All cases that had at least completed one measurement, and followed at least one group session (and thus received the book) were included in the analyses (intent-to-treat analyses). Thus, the analyses were based on all available data, i.e., including incomplete cases and based on the assumption that the missing observations were missing at random (MAR). This implies that missingness is random given the observed data. Dependent variables were the outcome measures (e.g., PSS, CIS). Standardized scores of the continuous variables were used (with a mean of 0 and standard deviation of 1), so parameter estimates (pes) could be

interpreted as a measure of effect (Cohen's *d*). An effect size of .20 was considered small, of .50 medium, and an effect size of .08 was considered large (Cohen 1988). Measurement occasions were included as predictors in a multilevel model for fixed occasions with an unconstraint covariance matrix (Snijders and Bosker 2012, pp. 255–260), comparing the pre-test measurements to the other occasions (wait-list, post-test, and both follow-up measurements).

To further unravel the process of change over time, we compared the change in the dependent variables during the training period to the change during the pre-training (wait-list) period. For all dependent variables, change over time was estimated with linear splines in a multilevel model for variable measurement occasions (Snijders and Bosker 2012, pp. 270–276) with random intercepts for the participants at pre-test. The coefficient for the spline between pre- and post-test indicates the difference from the change in the training period. However, since wait-list measurement was only filled out by $n = 68$ participants (as compared to $n = 122$ for the pre-test and $n = 95$ for the post-test measurement), and the pre-training period was substantially shorter (less than half) than the training period, the probability of finding significant differences for these additional analyses is reduced. McNemar tests were carried out to compare CIS cutoff scores at pre-test to other measurement occasions. Further, Pearson's correlations were calculated to assess relationships between intensity of home practice, number of attended sessions, and improvements in stress (PSS). All analyses were performed with SPSS version 22 (IBM Corp. 2013).

Results

Feasibility At least five out of the total of eight training sessions were followed by 96.4% ($n = 145$) of the participants. They retrospectively reported to have practiced an average of 73.6 min of meditation (SD = 53.29, range = 0–210) per week at home during the training period, in addition to another average of 46.7 min (SD = 31.64, range = 0–120) per week of other home work (e.g., reading hand-outs) during the training. On average, they were still practicing 41.7 min of meditation (SD = 58.8, range = 0–300 min) per week in the first 8 weeks after the training, with 42% ($n = 63$) indicating more than zero minutes. Six months after the training, this was on average 24.2 min of meditation (SD = 33.1, range = 0–180 min), with 33% ($n = 49$) indicating more than zero minutes.

Acceptability Ratings about how useful the different sessions (range means = 2.54–2.84; range SDs = .42–.60; range scales = 1–3) and exercises (range means = 2.09–2.83; range SDs = .38–.72; range scales = 1–3) were for the participants are presented in Table 1. Overall, the mindfulness training received a grade of 8.3 (scale 1–10; SD = 1.1; range = 3–10), and trainers a grade of 8.4 (scale 1–10; SD = 1.1; range = 3–10). The grade of 3 was given by only one person, the other participants ranged from grades 6 to 10 for the trainers, and from grade 5 to 10 for the training. After the training, the majority of participants ($n = 88$; 58.7%) indicated they intended to continue practicing mindfulness. A further six (4.0%) maybe wanted to continue and four participants (2.7%) indicated not to have any intention to continue with mindfulness practices. Another 52 people (34.7%) did not answer this question. Thus, of the people that answered this question, 89.8% intended to keep up a mindfulness practice.

Primary Outcomes

Stress PSS total score remained unchanged from wait-list to pre-test measurement occasion ($p = .431$; $d = .08$), as expected, while stress was significantly lower at post-test ($p < .001$; $d = .72$), follow-up 1 ($p < .001$; $d = .86$), and follow-up 2 ($p < .001$; $d = 1.02$) as compared to pre-test. However, when the rate of change in stress over time during the training period (pre-test to post-test) was compared to the rate of change during the wait-list period (wait-list to pre-test), there was no significant difference ($p = .487$; $pe = .00$). Further details can be found in Table 2.

Risk for Dropout from Work The risk for dropout from work (CIS) at wait-list did not differ from pre-test measurement as expected ($p = .468$; $d = .07$), while significant decreases at post-test ($p < .001$; $d = .67$), follow-up 1 ($p < .001$; $d = .73$), and follow-up 2 ($p < .001$; $d = .88$) as compared to pre-test were revealed. Further, there was a significant additional improvement over time during the training period, as compared to the pre-training period ($p < .001$; $pe = .20$). In addition, at wait-list measurement, 54.4% of the participants scored above the cut-point for being at risk for dropout from work. At pre-test, this was still 45.8%. Directly after the training (post-test), 22.1% of the participants still fell within this critical range, 2 months later (follow-up 1) this was 17.9%, and 6 months later (follow-up 2) 16.4%. At post-test, follow-up 1, and follow-up 2, the number of participants that scored within this critical range was significantly lower than at pre-test ($p < .001$ for the comparisons with post-test and follow-up 1, $p = .007$ for the comparison with follow-up 2). From wait-list to pre-test, the reduction was not significant, $p = 1.00$. Further details are presented in Table 2.

In the figures, it seems that the slope difference is larger for the PSS (Fig. 1a) than for the CIS (Fig. 1b); however, it is only significant for the CIS, caused by the somewhat larger standard deviations of the PSS as compared to the CIS. For the PSS, a significantly less steep change in the training period

Table 1 Outline and evaluation of the eight sessions and exercises of the mindfulness program "Finding Peace in a Frantic World"

Themes of sessions	Ratings (1–3)
Session 1—Waking up to the autopilot Recognizing tendency to be on automatic pilot, learning to step out of it	$M = 2.84$ (SD = .42)
Session 2—Keeping the body in mind Body sensations as radar, ally in not getting swept away by mind's chatter	$M = 2.76$ (SD = .43)
Session 3—The mouse in the maze Learn to weave mindfulness into one's daily life	$M = 2.54$ (SD = .57)
Session 4—Moving beyond the rumor mill Relating differently to thoughts and worries	$M = 2.69$ (SD = .49)
Session 5—Turning towards difficulties Learn to move from reacting to responding	$M = 2.59$ (SD = .60)
Session 6—Practicing kindness Relating to yourself and the world with kindness and compassion	$M = 2.64$ (SD = .58)
Session 7—When did you stop dancing? Making choices that support well-being	$M = 2.74$ (SD = .52)
Session 8—Your wild and precious life Weaving your parachute, what are you going to practice?	$M = 2.71$ (SD = .53)
Exercises	
Breath and body meditation	$M = 2.83$ (SD = .38)
Mindfulness of a routine activity	$M = 2.61$ (SD = .56)
The body scan	$M = 2.55$ (SD = .63)
Three-minute breathing space	$M = 2.84$ (SD = .40)
Mindful movement meditation	$M = 2.09$ (SD = .72)
Sounds and thoughts meditation	$M = 2.32$ (SD = .67)
Exploring difficulty meditation	$M = 2.38$ (SD = .67)
Befriending meditation	$M = 2.53$ (SD = .70)

Program was derived (with permission) from: Williams et al. (2013). *Mindfulness: A practical path to finding peace in a frantic world. Trainer's manual*. Internal publication, based on the book: Williams et al. (2011), *Mindfulness: a practical guide to finding peace in a frantic world*. London, UK: Piatkus. 1 = Not useful; 2 = A little useful; 3 = Very useful (as rated by participants)

was found for subjects with missing observations at follow-up 2 (difference = .003, $t(383) = 2.73$, $p = .007$).

Secondary Outcomes

Psychological Well-being When pre-test scores were taken as a reference point, participants reported no significant changes on personal goals (GAS) from wait-list to pre-test (effect size could not be estimated due to wait-list measurement being exactly zero), as expected. Very large improvements were found at post-test ($p < .001$; $d = 1.29$), follow-up 1 ($p < .001$; $d = 1.46$), and follow-up 2 ($p < .001$; $d = 1.25$). However, the rate of change over time during the training period was no different from the rate of change over time during the wait-list period ($p = .291$; $pe = .01$).

For the combined score of depression, anxiety, and stress (DASS-21), an unexpected significant improvement was already seen between wait-list and pre-test measurement ($p = .20$; $d = .29$). However, the effects at post-test ($p < .001$; $d = .66$), and 2 months ($p < .00$; $d = .73$) and 6 months ($p < .001$; $d = .87$) later as compared to pre-test were larger. Also unexpectedly, the rate of change over time in the combined score of depression, anxiety, and stress during the training period was significantly smaller ($p = .05$; $pe = .01$) than the rate of change during the pre-training period. It should be noted that these estimates are based on mixed models that take into account individual (baseline) differences. For the DASS-21, the individual differences (standard deviations, see Supplementary Table 1) are relatively large. Therefore, the estimated average effects are only indicative for the individuals to a limited extent.

No significant change in happiness occurred from wait-list to pre-test ($p = .351$; $d = .08$), while significantly higher scores for happiness (SHS) occurred at post-test ($p < .001$; $d = .40$), follow-up 1 ($p < .001$; $d = .37$), and follow-up 2 ($p < .001$; $d = .47$) as compared to pre-test, indicating participants felt happier after the training. In line, no change occurred from wait-list to pre-test on the PANAS-positive affect ($p = .428$; $d = .09$), whereas significantly increased scores were demonstrated at post-test ($p < .001$; $d = .59$), follow-up 1 ($p < .001$; $d = .65$), and follow-up 2 ($p < .001$; $d = .74$). On PANAS-negative affect, also no significant change occurred from wait-list to pre-test measurement ($p = .387$; $d = .11$), while significant decreases were found at post-test ($p < .001$; $d = .56$), follow-up 1

Table 2 Effectiveness of mindfulness training on primary outcomes stress, and risk for dropout from work, and on secondary outcomes psychological well-being (personal goals, depression and anxiety, happiness, and affect) and functioning at work (workability, work engagement, positioning and functioning within the company, and communication styles)

	WL-Pre (p; pe)	Pre-Post (p; pe)	Pre-FU-1 (p; pe)	Pre-FU-2 (p; pe)	Change rate[a] (p; pe)
Primary outcomes					
PSS	$p = .431$; pe = − .08	$p < .001$; pe = − .72	$p < .001$; pe = − .86	$p < .001$; pe = − 1.02	$p = .487$; pe = − .00
CIS-total score	$p = .468$; pe = − .07	$p < .001$; pe = − .67	$p < .001$; pe = − .73	$p < .001$; pe = − .88	$p < .001$; pe = − .20
Secondary outcomes: psychological well-being					
GAS	−; −[b]	$p < .001$; pe = .29	$p < .001$; pe = 1.46	$p < .001$; pe = 1.25	$p = .291$; pe = .01
DASS-total score	$p = .020$; pe = − .29	$p < .001$; pe = − .66	$p < .001$; pe = − .73	$p < .001$; pe = − . 87	$p = .050$; pe = .01
SHS	$p = .351$; pe = .08	$p < .001$; pe = .40	$p < .001$; pe = .37	$p < .001$; pe = .47	$p = .581$; pe = .00
PANAS-positive	$p = .428$; pe = .09	$p < .001$; pe = .59	$p < .001$; pe = .65	$p < .001$; pe = .74	$p = .814$; pe = .00
PANAS-negative	$p = .387$; pe = − .11	$p < .001$; pe = − .56	$p < .001$; pe = − .63	$p < .001$; pe = − .67	$p = .820$; pe = .00
Secondary outcomes: functioning at work					
WAI-physical	$p = .335$; pe = .12	$p = .002$; pe = .33	$p = .003$; pe = .37	$p = .004$; pe = .38	$p = .448$; pe = − .00
WAI-mental	$p = .838$; pe = .02	$p < .001$; pe = .62	$p < .001$; pe = .68	$p < .001$; pe = .81	$p = .095$; pe = .01
UWES-total score	$p = .083$; pe = .14	$p = .008$; pe = .20	$p = .002$; pe = .29	$p = .013$; pe = .25	$p = .716$; pe = .00
Posit. and funct.	$p = .431$; pe = .06	$p < .001$; pe = .53	$p < .001$; pe = .66	$p < .001$; pe = .61	$p = .539$; pe = .00
CSP-director	$p = .938$; pe = .00	$p < .001$; pe = .25	$p < .001$; pe = .25	$p < .001$; pe = .26	$p = .377$; pe = .00
CSP-expresser	$p = .653$; pe = −.06	$p < .001$; pe = .19	$p < .001$; pe = .19	$p = .022$; pe = .12	$p = .247$; pe = .00
CSP-thinker	$p = .971$; pe = .00	$p = .681$; pe = −.02	$p = .887$; pe = −.01	$p = .821$; pe = .02	$p = .994$; pe = .00
CSP-harmonizer	$p = .577$; pe = .04	$p < .001$; pe = .46	$p < .001$; pe = .51	$p < .001$; pe = .49	$p = .569$; pe = .00

Parameter estimates (pe's) can be interpreted as Cohen's d effect sizes (dependent variables were standardized into Z scores)

CIS Checklist Individual Strength; *CSP* Communication Styles Profile; *DASS* Depression, Anxiety, Stress Scale; *FU-1* Follow-Up 1 (2 months after training); *FU-2* Follow-Up 2 (6 months after training); *GAS* Goal Attainment Scale; *PANAS* Positive And Negative Affect Scale; *PSS* Perceived Stress Scale; *UWES* Utrecht Work Engagement Scale; *WAI* Work Ability Index

[a] Difference between the rate of change during the training period (from pre-test to post-test) and the rate of change during the wait-list period (from wait-list to pre-test)

[b] pe could not be estimated due to wait-list measurement being exactly zero. Means and standard deviations for all five measurement occasions are presented in the Online Supplementary Material, as well as sub scale scores of the CIS, DASS, and UWES

($p < .001$; $d = .63$), and follow-up 2 ($p < .001$; $d = .67$). However, for both happiness, positive, and negative affect, the rate of change over time during the training period did not differ from the rate of change during the wait-list period ($p = .581$; $pe = .00$, $p = .814$; $pe = .00$ and $p = .82$; $pe = .00$ respectively).

Functioning at Work As compared to pre-test measurement, indices of workability (WAI-physical and WAI-mental) showed no significant changes from wait-list measurement as expected ($p = .335$; $d = .12$ and $p = .838$; $d = .02$, respectively). Scores on WAI-physical significantly increased at post-test

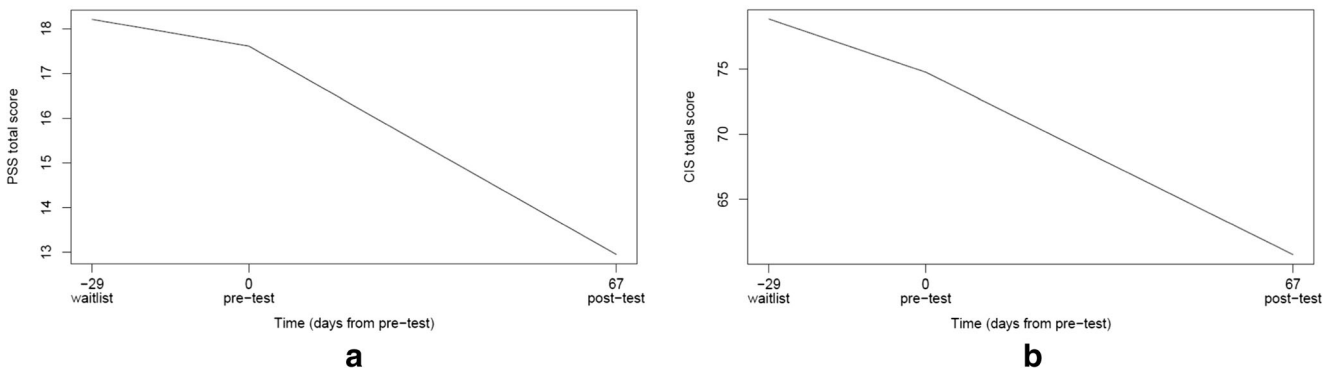

Fig. 1 **a** Change in primary outcome measure stress, as measured by the Perceived Stress Scale (PSS), during the wait-list period versus the mindfulness training period. **b** Change in primary outcome measure risk for dropout as measured by the Checklist Individual Strength (CIS), during the wait-list period versus the mindfulness training period

($p = .002$; $d = .33$), follow-up 1 ($p = .003$; $d = .37$), and follow-up 2 ($p = .004$; $d = .38$). Scores on the WAI-mental showed a similar pattern, with significant improvements at post-test ($p < .001$; $d = .62$), follow-up 1 ($p < .001$; $d = .68$), and follow-up 2 ($p < .001$; $d = .81$). For both physical and mental workability, the rate of change in the wait-list period did not differ from the rate of change in the training period ($p = .448$; $pe = .00$ and $p = .095$; $pe = .01$, respectively).

With respect to work engagement (UWES), no significant change occurred from wait-list to pre-test measurement ($p = .083$; $d = .14$), but as expected, significant improvements in work engagement were found at post-test ($p = .008$; $d = .20$), and at both follow-up measurements ($p = .002$; $d = .29$ and $p = .013$; $d = .25$, respectively). However, the rate of change over time during the training period did not differ from the rate of change during the wait-list period ($p = .716$; $pe = .00$).

Positioning and functioning within the company did not change significantly from wait-list to pre-test ($p = .431$; $d = .06$), but showed significant increases at post-test ($p < .001$; $d = .53$), follow-up 1 ($p < .001$; $d = .66$), and follow-up 2 ($p < .001$; $d = .61$), indicating that communication within the organization, and a sense of belonging to the company increased. However, there was no difference in rate of change over time in the training versus the pre-training period ($p = .539$; $pe = .00$).

Last, all four communication styles (CSP) showed no significant change from wait-list to pre-test measurement as expected (director style: $p = .938$, $d = .00$; expresser style: $p = .653$, $d = .06$; thinker style: $p = .971$, $d = .00$; and harmonizer style: $p = .577$, $d = .04$). Director and expresser styles increased significantly at post-test ($p < .001$; $d = .25$ and $p < .001$; $d = .19$, respectively), follow-up 1 ($p < .001$; $d = .25$ and $p < .001$; $d = .19$, respectively), and follow-up 2 ($p < .001$; $d = .26$ and $p = .022$; $d = .12$, respectively) as compared to pre-test. For the harmonizer style, significant improvements were found at post-test ($p < .001$; $d = .46$), follow-up 1 ($p < .001$; $d = .51$), and follow-up 2 ($p < .001$; $d = .49$). For the thinker style, however, no significant changes after the mindfulness training were found ($p = .681$; $d = .02$, $p = .887$; $d = .01$ and $p = .821$; $d = .02$, respectively). For the expresser style, significantly higher pre-test scores were observed for subjects with missing observations at follow-up 2 (difference = 1.16, $t(99) = 2.51$, $p = .014$). For the thinker style, a significantly less steep change in the training period was found for subjects with missing observations at follow-up 2 (difference = .002, $t(306) = 2.32$, $p = .021$). Further, the rate of change over time did not differ between the training and the pre-training period for either of the sub scales (director style: $p = .377$, $pe = .00$; expresser style: $p = .247$, $pe = .00$; thinker style: $p = .994$, $pe = .00$; and harmonizer style: $p = .569$, $pe = .00$). For further details (means, standard deviations, and sub scale scores), please see Table 2, and Supplementary Tables 1 and 2.

Relation with Meditation Practice and Session Attendance

Although changes in stress (PSS) were not correlated with intensity of home practice (during the training period, and during the first follow-up phase), number of attended sessions was significantly correlated with reduced stress at follow-up 1 ($r = .34$; $p = .03$) and follow-up 2 ($r = .37$; $p = .04$). Thus, the more sessions were attended, the more the stress was reduced 2 and 6 months after the training, and vice versa.

Discussion

This study assessed feasibility, acceptability and effects of an 8-week standardized group-based mindfulness program "Finding peace in a frantic world" (Williams et al. 2013), applied on-site in a multinational company. The training proved highly feasible and acceptable in an organizational context, and effects of the training were substantial in all domains and lasted up to 2 and 6 months follow-up. In addition, the rate of change over time for the primary outcome risk for dropout from work showed a significantly stronger decline during the training period as compared to the wait-list period. However, this was not the case for the other primary outcome stress or any of the other outcomes; the change during treatment was not different from the change during wait-list. Nearly all participants followed at least five out of eight sessions, which is a substantial part of the training, and the training was rated very highly (8.3). In addition, nearly 90% intended to continue with mindfulness practices in their lives. Perhaps this is an overestimation since it might be that the responders are the ones experiencing most benefits and are the ones that are still meditating.

Since the training was advertised as a means for "stress relieve" and people who felt they suffered from a certain degree of (work-related) stress, self-selected for this training, stress reduction was one of the primary outcomes of this study. Compared to an average PSS score of 15.83 (SD = 7.5, theoretical range of PSS is from 0 to 40) for the general population (Cohen and Janicki-Deverts 2012) this study sample indeed scored a little higher before the training (18.21 at wait-list and 17.61 at pre-test). As expected, stress levels substantially declined and effects remained up to half a year later. Reductions in stress as a result of mindfulness training have been shown in many previous studies (e.g. Goldberg et al. 2018; Khoury et al. 2015).

Although the current sample had no "clinical population," a high risk for dropout from work was present in about half the participants. A very large improvement was found as an effect of the training, and at 6 months follow-up, only 16% of employees still scored above this threshold. The current sample with a CIS score around 76 (average between wait-list and

pre-test), was at higher risk for dropout as compared to "healthy white and blue collar workers" who have an average CIS score of around 47, but at lower risk than working people with a mental reason for dropout from work who have an average CIS score of around 90 (Beurskens et al. 2000).

The relatively high pre-training risk for dropout may be related to the large size of the multinational company, since it is suggested that employees from larger companies have to deal with more occupational stress, due to the higher complexity of the organization, job insecurity, and higher performance demands, compared to employees from smaller companies (e.g. Verhue et al. 2014). The relatively high pre-training dropout risk could also be related to the self-selected sample. Perhaps, employees experiencing higher work-related stress would more often self-select for mindfulness training than employees experiencing lower stress. Other important factors contributing to work-related stress are working long (and irregular) hours, lack of job control, job insecurity, and particularly high work pressure, of which some might apply to the current study population too. Nearly 50% of people feel that they work at least three fourths of their time under very high time pressure (Milczarek et al. 2009).

We further found improvements on all secondary outcomes related to psychological well-being and functioning at work. Overall, very large effects were found on people's idiosyncratic goals such as a better work-life balance, less stress (at work), sleep better, heightened well-being, or more (quality) time with family. Note that although the mindfulness training was shown to be effective on a variety of well-being and work-related measures, effects on people's own goals were substantially larger. Standardized outcome measures are needed to evaluate treatment efficacy, but as people may participate in a mindfulness training for diverse reasons, adding the individualized approach, that is participant's personal goals, may make people feel more empowered and motivated to take part in the training.

Although on average, baseline levels of combined depression, anxiety, and stress were in the "normal" range, as would be expected in this non-clinical sample, improvement was still demonstrated. Unexpected improvements were found between wait-list and pre-test measurement, but improvements were larger directly after and at longer term after the training. Perhaps the anticipation of knowing that a training aimed at stress relieve was starting soon, already had a relieving effect, or the awareness resulting from completing assessments about well-being already led to changes in behavior such as work-life balance adaptations, resulting in lower feelings of depression, anxiety, and stress.

With respect to happiness and affect, which both increased substantially, it is known that changing situations in one's life like career, marital status, or income does not necessarily lead to greater well-being and happiness (Lyubomirsky et al. 2005). These authors showed that someone's degree of happiness actually is largely under one's own control, and is defined by the activities one chooses to do in life, and how one relates and responds to those. This might explain why effects of MBPs often show an increased sense of well-being and happiness since one of the core features in mindfulness is that participants learn that they have a choice in how to relate to events and experiences. In mindfulness practice, one learns to decenter, that is, observing thoughts and feelings from a distance instead of being swamped and carried away with them. A high(er) sense of happiness in employees is important from the employer's perspective too, since happiness has repeatedly been shown to be positively correlated to a variety of job-related outcomes such as job satisfaction, and productivity (e.g., Luybomirsky et al. 2005).

Overall, the positive effects on psychological well-being in the current study are somewhat higher than the average effects of stress management interventions at the workplace. In a meta-analysis of 36 studies comparing mindfulness training to control groups, Richardson and Rothstein (2008) found an overall weighted effect size of .53 (Cohen's *d*) on psychological outcomes in employees. Average effect size of well-being measures in the current study ranged from .58 at after training, .68 2 months later, to .70 6 months later. To compare, in a recent meta-analysis, pre-post comparisons yielded medium to large effects (Hedges's $g = .68$ on average) of MBPs on psychological distress in working adults and when MBPs were compared to inactive controls, similar medium to large overall effects were reported (Hedges's $g = .68$). However, evidence of MBPs being more effective than other stress management interventions was limited (Virgili 2015).

With respect to functioning at work, as expected, no changes in workability occurred from wait-list to pre-test. However, directly after the training, as well as 2 and 6 months later, physical and mental workability even more so, increased. Moreover, increased engagement at work directly after the training, and also at 2 and 6 months follow-up, was found. Outcomes as such may be interesting from an employer's perspective, as is the finding that employees experienced an increased sense of positioning and functioning within the company. They felt that communication and relationships between colleagues and with their supervisors were improved, as were feelings of work competence, creativity, feeling acknowledged at work, and a sense of belonging to the larger work community in the company. With respect to communication styles, participants increased on characteristics such as making quick decisions, talking about feelings, and ideas, being more creative, and listening and being kind to others. The thinking style (e.g., like to solve problems, and a high sense of details; Douglas 1998) did not change, which was perhaps due to this score already being very high before the training. From the employer's perspective, a balanced team, having all communication styles evenly presented might be most important.

Subsequently, the more sessions one attended, the more stress was reduced 2 and 6 months later. However, we do not know the direction of the relationship, that is, it might (also) be that participants who benefited most from the training were most motivated to attend, which in turn reinforced the effects. Further, changes in stress were not related to the amount of meditation home practice. This finding is not uncommon. Bränström et al. (2012) also found no significant correlation between intensity of meditation practice and changes in stress. A recent meta-analysis about the relationship between amount of home practice and outcomes in MBSR and MBCT showed only a small, but significant ($r = .26$) correlation between the two (Parsons et al. 2017). The lack of association in the current study might partly be explained by the difficulties in measuring home practice. We asked participants to report retrospectively how much they meditated (instead of keeping a daily diary), and did not differentiate between formal and informal practice. People may not accurately remember this, and the term "home practice" might have been somewhat ambiguous. Some might have interpreted this as formal meditations (i.e., practice of a daily body scan) whereas others as covering both formal and informal meditations (i.e., walking to work mindfully).

Methodological strengths were the relatively large sample and therefore the large power to detect effects, the addition of a wait-list measurement, the combination of measures of well-being, functioning at work, as well as personal goals, and the 2 and 6 month follow-up assessments. Clinical strengths were that experienced and internationally trained mindfulness trainers provided the internationally acknowledged and standardized mindfulness program that was first used in the UK Parliament, and attendance rate was high. Weaknesses were that no active control group or randomization was used, recruitment procedures were not fully explicit, and the pre-training period was substantially shorter than the training period (but controlled for). Further, no recordings of the sessions were made, and although trainers met for supervision to ensure treatment fidelity, treatment adherence could not be checked without recordings. For future studies, it is recommended to improve from a wait-list within subject design to a RCT with an active comparison group, for example another stress reduction intervention like relaxation, yoga, or physical exercise. It is further recommended to formalize stricter inclusion criteria, and to record sessions and subsequently rate treatment fidelity.

To summarize, the 8-week, 1.5 h per week, standardized mindfulness training "Finding peace in a frantic world," offered on-site to groups of 15–20 employees in a multinational company, has shown to be highly feasible, and acceptable. When measurement occasions were compared to pre-test measurement, substantial improvements were shown for all primary (stress, and risk for dropout from work) and secondary outcomes (psychological well-being, and functioning at work), lasting up to 2 and 6 months after the training. The risk for dropout from work declined significantly faster during the training period as compared to the wait-list period. However, for all other measures, the rate of change during training was not different from the rate of change during the wait-list period.

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Authors' contributions Esther de Bruin: designed and executed the study, and wrote the paper. Rachel van der Meulen: collaborated in writing of the study. Jorien de Wandeler: assisted with executing the study, and assisted with the data analyses. Bonne Zijlstra: analyzed the data and wrote part of the results. Anne Formsma: collaborated in the writing and editing of the manuscript. Susan Bögels: collaborated in designing the study, the data analyses and writing of the study.

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Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The Ethical Committee of the University of Amsterdam approved the study (number 2014-CDE-3865).

Conflict of Interests Susan Bögels is the co-owner, and holds shares in UvA minds You, Amsterdam, the Netherlands.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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