

Mindful2Work the next steps: Effectiveness of a program combining physical exercise, yoga and mindfulness, adding a wait-list period, measurements up to one year later and qualitative interviews

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ABSTRACT

Background: Mindful2Work is a 6-week program combining physical activity, yoga and mindfulness meditations, targeting (work-related) stress complaints from a body-mind perspective.

Materials and methods: We combined a top-down approach (researcher-driven outcome measures) with a bottom-up approach (personal goals and interview data) to investigate the effects on 98 employees with at least moderate (work-related) stress. Effects on personal goals, well-being (stress, anxiety, depression, sleep, affect, happiness), functioning at work (dropout, mental and physical workability, work satisfaction), and training-specific aspects (mindful awareness, self-compassion, emotion regulation strategies) were assessed.

Results: Nearly all measures showed no change during the wait-list period, with only negative affect and physical workability showing small statistically significant improvements. Medium to large effect size improvements directly after training and at all follow-ups were found on primary outcomes stress (0.62–1.17), and risk for dropout from work (0.55–1.00), and largest effects occurred on personal goals (0.98–1.46). Improvements in well-being and functioning at work were medium directly after training, and at follow-up 1 (six weeks later) and 2 (six months later), and large at follow-up 3 (one year later). The training-specific measures showed small to medium effects after training and at follow-up 1. Further, from the interviews ($n = 9$), two main categories of effects emerged: well-being and acquired insights.

Conclusion: Mindful2Work showed substantial and long-lasting improvements according to researcher-driven measures as well as participants' own reports.

1. Introduction

According to the World Health Organization (WHO) our daily work life has become more and more emotionally and mentally demanding in the past decades [1]. The American Institute of Stress states that 75–90% of all visits to general practitioners is related to stress [2], and according to data of the American Psychological Association (APA), more than two thirds of the general population suffer from stress-related symptoms, such as fatigue, being touchy or angry easily, or changes in sleeping patterns [3].

In the short-term, stress may cause headache, muscle pain, increased heartbeat and blood pressure, sleeping problems and feeling mentally unstable (e.g. Ref. [4]). In the long-term, exposure to stress may lead to chronic exhaustion, burn-out, anxiety, depression, a decline in cognitive, somatic complaints and cardiovascular disorders (e.g. Ref. [5,6]). The prolonged exposure to stress also leads to negative work-related outcomes such as decreased productivity, falling ill easier, more use of drugs and alcohol, making errors, and interpersonal problems or conflicts [7].

Of all psychological occupational illnesses, burn-out is the most

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frequently occurring, with 76% [8]. People that suffer from burn-out are characterized by feeling fatigued, sleeping restlessly, being irritable, having difficulty with loud sounds, worrying, feeling rushed, and having difficulties concentrating or being forgetful. As a result, there are significant impairments in daily functioning at work and/or at home. Moreover, as (work-related) stress symptoms and burn-out are highly prevalent, may have severe consequences, there is a need for effective strategies.

A meta-analysis showed that stress management interventions including relaxation or meditation techniques are the most popular with employees [9]. Mindfulness meditation has become very popular over the last decades in the Western world but originates from the 2500 years old Buddhist traditions. Mindfulness is defined as the awareness that arises through deliberately paying attention in the present moment, non-judgmentally [10]. During a meditation, the mind is observed without trying to change it. One practices with noticing that all states are transient, e.g., a low or stressed mood is observed, but will also pass again, in the same way that a happy mood is also temporary. Instead of being spiraled into negative thoughts, or trying to cling on to positive ones, one practices observing feelings and thoughts, or bodily sensations, from a distance (decentering). Although mindfulness will not lead to the removal of all stress and suffering, one learns to react calmer, with more awareness and (self-)compassion, which positively affects the body and mind and the relationship with oneself and others (e.g. Ref. [11]). The effects of Mindfulness-Based Programs (MBPs) have been studied extensively. For instance, an overview of 23 systematic reviews and meta-analyses comparing Mindfulness Based Stress Reduction (MBSR [11]) and Mindfulness Based Cognitive Therapy (MBCT [12]) to control interventions in different populations showed that MBCT and MBSR had a significantly larger effect on symptoms of depression (effect size = 0.37), anxiety (effect size = 0.49), stress (effect size = 0.51), quality of life (effect size = 0.39), and somatic functioning (effect size = 0.27) [13], with other meta-analytic reviews showing similar positive effects of MBPs [14–16]. Note, however, that another meta-analysis of 19 studies found that although MBPs are more effective than no treatment (effect size = 1.07) for common mental disorders (CMD) such as anxiety and depression, they are not necessarily more effective than other active treatments (effect size = 0.01) such as cognitive behavior therapy [17]. Overall, most evidence is available for the effectiveness of MBCT for (the relapse of and current) depression (e.g. Ref. [14,18]), and as a result, MBCT is incorporated in the international guidelines of the National Institute of Care and Excellence for the treatment of depression [19].

In the last decade, more knowledge about MBPs specifically designed for employees targeting (work-related) stress symptoms has become available. These MBPs are often somewhat different from the more classical MBPs for clinical populations (i.e., shorter sessions, fewer sessions), and therefore their effectiveness needs to be determined separately. A meta-analysis showed an overall medium effect of MBPs on (work-related) stress (effect size = 0.68) as compared to wait-list groups. In line, another meta-analysis showed significant stress reductions in health care workers (effect size = 0.73) as an effect of different forms of MBPs, where effects remained a few months later (effect size = 0.60) [20]. The effects of MBPs in occupational settings are comparable to those of the longer original versions of mindfulness (i.e., MBCT and MBSR), and effects are comparable across different occupational groups [21].

Although mindfulness techniques cover the main part of the Mindful2Work program, the emphasis in this study lies on examining the long-term effects of a combined program consisting of mindfulness, yoga and physical exercise, based on the assumption that stress is expressed through physical and/or mental symptoms, and that body and mind are reciprocally connected. Several systematic reviews and meta-analyses have shown that physical activity, or sport effectively reduce depressive symptoms, which show a substantial overlap with burn-out symptoms [22]. A Cochrane review summarizing 35 RCTs, showed an overall superior effect in the reduction of depressive symptoms after physical

activity as compared to control interventions (effect size = 0.62), and physical exercise programs were not differently effective in the reduction of depressive symptoms than psychological or pharmaceutical treatment [23]. Based on the large number of meta-analyses and systematic reviews, physical activity is also incorporated in the international guidelines for the treatment of depression [19]. Of specific relevance for the Mindful2Work program is an RCT that compared MBSR to physical activity. Both interventions were equally effective in the reduction of symptoms of (social) anxiety (effect size = 0.97 and 1.15 for the MBSR and physical activity group respectively). The authors therefore recommended including both elements in the development of future programs [24]. Another study compared daily meditations to daily physical exercises in an RCT of a non-clinical student population with at least mild to moderate stress symptoms. Both conditions were found to be effective in the reduction of stress, anxiety, and depression directly after the 5-weeks self-training period (effect size = 0.75 and 0.38 for the physical exercise and mindfulness group respectively) and six weeks later (effect size = 0.75 and 0.61 for the physical exercise and mindfulness group respectively) [25]. Interestingly, both conditions improved equally well on mindfulness-specific measures (awareness, self-compassion), with overall medium effect sizes in both groups after the 6-weeks follow-up period (effect size = 0.44 and 0.48 for the physical exercise and the meditation condition respectively) [26].

Yoga has also been shown to have beneficial effects for mental and physical stress-related complaints. For instance, a meta-analysis of 10 RCTs underlines the effectiveness of yoga for lower back complaints (effect size = 0.59) [27]. Yoga has further been demonstrated to effectively reduce symptoms of depression as compared to regular treatment, relaxation training, or physical activity (effect size = 0.69, 0.62, and 0.59 respectively) as shown by meta-analytic data [28]. Of particular relevance with respect to the Mindful2Work program is the systematic review of Ross and Thomas [29], showing similar or superior effects of yoga as compared to physical exercise. Further, in the RCT of Wolever and colleagues [6] employees of an insurance company with at least moderate stress symptoms were randomized over mindfulness and yoga training, and effects were comparable; both groups experienced a large psychological stress reduction (effect size = 0.51 and 0.77 respectively), improved sleep (effect size = 0.41 and 0.41 respectively), improved physiological markers of stress such as calmer breathing (effect size = 0.35 and 0.29 respectively) and improved heart-rhythm coherence (effect size = 0.94 and 0.35 respectively). Although effects of yoga seem to be promising, caution is warranted due to methodological weaknesses such as poor quality RCTs, and lack of long-term data [30].

In the Mindful2Work program the three effective elements of physical activity, yoga, and mindfulness are combined. A pilot study ($n = 26$) showed promising effects on measures of risk for dropout from work, stress, anxiety, and depression ($\eta_p^2 = 0.74$, $\eta_p^2 = 0.71$, $\eta_p^2 = 0.32$, and $\eta_p^2 = 0.43$ respectively, all large effect sizes) [31]. In the current study, a larger (non-clinical) sample was included, wait-list measurements were added, and in addition to well-being, functioning at work, and training-specific measures and long-term follow-up data were examined. Moreover, trainer-based measures of group characteristics were added, indicating the extent of openness, cohesiveness and safety of the groups.

In this study, we integrated a top-down approach (researcher-driven outcome measures) with a bottom-up approach (personal goals and interview data). Qualitative approaches are useful for assessing the acceptability and feasibility of new interventions, which is crucial considering the high dropout rates in psychological treatments (e.g. Ref. [32]). Especially for the abstract process of mindfulness, which is sometimes hard to grasp and measure, integrating idiosyncratic findings with group-based quantitative findings may be of great value. Further, we include a wait-list period measurement, in order to obtain a baseline of the change in outcomes prior to the intervention.

It was hypothesized that the Mindful2Work program would be associated with improvements in personal goals, well-being, functioning

at work, and measures specific to the training components, and we expected these positive effects to be maintained up to one year later. Changes in primary outcomes (stress and risk for dropout from work) were expected to be correlated with group characteristics, such as perceived group cohesiveness.

2. Materials and methods

2.1. Participants and procedure

In this study, $N = 98$ participants ($n = 73$ female, 74.5%; $n = 25$ male, 25.5%) with (work-related) stress participated. Participants were either self-selected or recruited through company doctors. Flyers and posters, as well as announcements on social media were spread. The inclusion criterion was self-reported suffering from at least moderate (work-related) stress symptoms. The large majority of participants ($n = 91$, 92.9%) had a score above the cut-off for risk for dropout from work on the 20 items Checklist Individual Strength (CIS > 76), or a score above the threshold for mild stress on the 16 items Distress subscale of the 4-Dimensions Symptoms Questionnaire (4-DSQ sub scale Distress > 10). We further included another four participants with 'sub threshold' scores (CIS 74–76 and/or 4-DSQ sub scale Distress 8–10), since the aim of this study was to include people suffering from (work-related) stress complaints, and these people indicated they were suffering and wanted to take part in a training to relieve their suffering. We included another three participants with below (sub) thresholds CIS and/or 4-DSQ sub scale Distress scores, as they were referred by a company doctor specifically for these complaints. Average CIS score was 93.89 ($SD = 20.60$, range 34–140), and average score on the 4-DSQ sub scale Distress was 20.50 ($SD = 7.02$, range 2–31). Exclusion criteria were current psychotic episode, suicidal thoughts, substance abuse, borderline personality disorder, suffering from severe physical impairments and therefore being unable to attend the physical exercises and the yoga practices, or having taken part in a MBP the past six months. One participant reported some suicidal thoughts but was included in the study because she wanted to participate, and the trainer at intake felt the training could benefit her. The mindfulness trainer, supervised by a health care psychologist, kept a close eye on this participants' well-being during the training weeks.

Mean age at pre-test was 43.27 years ($SD = 10.31$, range 23–66). Education levels were as follows: $n = 54$ (55.1%) university, $n = 25$ (25.5%) higher vocational education, $n = 4$ (4.1%) intermediate vocational education, $n = 6$ (6.1%) higher general secondary and pre-university education, $n = 1$ (1.0%) pre-vocational secondary education, and $n = 8$ (8.2%) did not report on their educational background. $n = 80$ (81.6%) participants were born in a European country, $n = 4$ (4.1%) in Asia, $n = 3$ (3.1%) in South America, $n = 1$ (1.0%) in Australia, $n = 1$ (1.0%) in Africa, $n = 1$ (1.0%) in North America, and $n = 8$ (8.2%) did not report on their country of birth.

Measurements were sent out at six time points: about two to four weeks before the training (wait-list), in the week before the training (pre-test), right after the last training session (post-test), right after the follow-up session (six weeks after the training; follow-up 1), six months after the first training session (follow-up 2), and one year after the first training session (follow-up 3). In order to keep the number of questionnaires manageable for the participants, not all measures were assessed at all time points. Top-down measurements consisted of well-being, functioning at work, and training-specific measures. Stress and risk for dropout from work were primary outcomes. Further, bottom-up measurements consisted of personal goals and one-to-one interviews with a random sample from the population of participants.

2.2. Mindful2Work program

The Mindful2Work program consists of six weekly meetings of 2 h and a follow-up session six weeks later, also of 2 h. All sessions combine mindful physical activity (outdoors, in a park), yoga, and mindfulness

meditations. In addition, participants are encouraged to practice at home daily. Participants did not have to pay for the program and it was offered during working hours with consent of the employers.

Although heartbeat increases during the mindful physical exercises, it is of great importance that these practices are carried out with full attention and awareness of the bodily signals. Participants are invited to carry out the physical exercises with a maximum of 70% of their own limits, not at 100%. Particularly people who are sensitive to developing burn-out related symptoms, often cross their limits and may be very demanding of themselves, which can lead to physical and mental exhaustion. This same attitude is presented towards the yoga practices. A combination of yin yoga and hatha restorative yoga is embedded in the Mindful2Work program. These are gentle and calm yoga postures in which one remains in the same posture for an extended period, aimed at making the body more flexible, release stress, and restore mental and physical balance [33].

In addition to recognizing stress-related signals in the body, participants also practice with observing the mind during the Mindful2Work program. The mindfulness exercises are based on both the 'mother' programs MBSR [11], and MBCT [12], as well as on the 'Finding peace in a frantic world' program [34], but have been adjusted specifically to people with burn-out or (work-related) stress symptoms. This is also known as the 'warp and the weft' of MBPs [35]. Every MBP consists of essential elements (otherwise it is not an MBP), for instance practicing how to relate differently to experiences, experiential learning combined with the process of inquiry, and embodiment of a trainer. In addition, an MBP can be adjusted to a specific context, or population, which brings along variable elements. In the Mindful2Work program, this refers to the integration with outdoor mindful physical exercises, the stronger emphasis on (restorative) yoga, the application of insights and practice at work (e.g., mindfulness practices related to work-stress, yoga exercises one can do while at work), the relatively strong emphasis on self-compassion and a 6-week instead of an 8-week program. The Mindful2Work program is available in Dutch and German book form [36,37].

2.3. Measurements

2.3.1. Top-down measurements

Well-Being. Stress, anxiety, depression (psychological well-being), happiness and affect (emotional well-being), and sleep problems and somatic complaints (physical well-being) were assessed. Stress was indexed by the 10-items version of the Perceived Stress Scale (PSS [38]). Reliability at pre-test was $\alpha = 0.90$. Symptoms of depression, and anxiety were assessed by the 7-items sub scales of the Depression, Anxiety, and Stress scale (DASS-21 [39]). Reliabilities for the Depression and Anxiety sub scales at pre-test were $\alpha = 0.76$, and $\alpha = 0.76$ respectively. Happiness was assessed with a one-item question ('Do you feel happy in general?' [40]). Positive and negative affect were assessed with the Positive And Negative Affect Scale (PANAS) which consists of 20 words that describe different positive and negative feelings and emotions [41]. Reliabilities of the Positive and Negative Affect sub scales at pre-test were $\alpha = 0.93$ and $\alpha = 0.90$, respectively. Sleep problems were assessed by the 8-items sub scale Insomnia of the Holland Sleep Disorder Questionnaire (HSDQ [42]). Reliability at pre-test was $\alpha = 0.90$. Last, the 16-items sub scale Somatization of the 4-DSQ [43] was used to indicate physical correlates of stress. Reliability at pre-test was $\alpha = 0.83$. The DASS-21 and HSDQ were not administered at follow-up 2 and 3, and the 4-DSQ Somatization was not administered at follow-up 3.

Functioning at Work. Three measures were administered as an indication of functioning at work. First, risk for dropout from work was measured by the Checklist Individual Strength (CIS) which assesses different aspects of chronic fatigue and burn-out, and is validated for the working population [44]. The CIS consists of 20 items and a cut-off point of >76 has been established for employees who are at increased risk for dropout (long-term) from work because of illness [45]. Reliability at

pre-test was $\alpha = 0.94$. Mental and physical workability was assessed by the 2-item version of the Work Ability Index (WAI [46]). Last, a one-item question was used to index the overall work satisfaction ('How would you currently rate your overall work satisfaction?'). All functioning at work measures were administered at all time points.

Training-Specific Measures. Mindful awareness was assessed by the short version (24 items) of the Five Facet Mindfulness Questionnaire (FFMQ-SF [47,48]). Reliability at pre-test was $\alpha = 0.84$. Self-compassion was assessed by the short version (12 items) of the Self-Compassion Scale (SCS-SF [49]). Reliability at pre-test was $\alpha = 0.90$. Last, facets of emotion regulation were assessed by using the Positive reappraisal and Catastrophizing sub scales of the Cognitive Emotion Regulation Questionnaire (CERQ [50]). Reliabilities at pre-test were $\alpha = 0.88$ for the Positive reappraisal sub scale, and $\alpha = 0.78$ for the Catastrophizing sub scale. These sub scales were specifically included since the practice of mindfulness was expected to have an effect on the way (difficult) situations are appraised and to lower the tendency to catastrophize as an effect of learning to observe events more from a distance, decenter from experiences instead of being overwhelmed by them. In order to keep the number of total questionnaires manageable for the participants, training specific measures were not taken at follow-up 2 and 3.

2.3.2. Bottom-up measurements

Personal Goals. Participants were asked to autonomously formulate their own goals with respect to the Mindful2Work training as an open question at the end of the questionnaires (e.g., 'Learn to better recognize and listen to my bodily stress signals', 'Prevent a future burn-out', 'Learn to better set my limits', 'Increase my energy', 'Better able to leave work at work'). In this study, participants reported their personal goals on a 5-point scale from -1 to 3 with 0 corresponding to the baseline at the wait-list measurement, or no change in personal goal attainment at later measurement occasions. Goal attainment scaling is widely used in a variety of applications but was originally developed as an individualized method of evaluating mental health treatment outcomes [51].

Personal Interviews. Nine participants were interviewed two months after the follow-up session. Subsequently, interview data were processed via guidelines for conventional content analysis. Usually the coding scheme is based on the data, and not defined a priori (Hsieh & Shannon, 2005). However, the phenomena we were interested in were specified beforehand, including 1) the meaning of mindfulness, 2) opinion about the Mindful2Work program, 3) experienced changes (if any) as a result of the Mindful2Work program, and 4) working mechanisms of the Mindful2Work program. Specific main categories and sub categories were not formulated a priori but were based on ideas, thoughts, and opinions of the participants. The interviewer was an independent research assistant with knowledge of and some experience with mindfulness. Interviews took on average 20 min. Subsequently, transcripts of all interviews were made, and EdB divided all transcripts into 'scorable units' (a total of 318). A scorable unit was defined as either a verb plus a noun, a small sentence, a somewhat longer sentence, or even a single word, as long as the unit represented one category, and not two or more (e.g., 'I feel calmer', 'calm', 'after the training I really felt so much calmer'). All 'meaningful units' of the interviews were included (e.g., only leaving out fillers such as 'hmmmm', 'aha', 'let me think'). Subsequently, after reading and re-reading all scorable units, EdB proposed main categories that represented the core concepts and ideas as stated by the participants. Main categories (= first order category) were further sub divided in second and third order categories. For example: 'Acquired skills/insights' (first order category), 'Increased awareness' (second order category), and 'Increased awareness of bodily signals' (third order category). While forming main and sub categories in a tree diagram we constantly looked back into the original quotes of the participants to remain as closely to their spoken words, ideas and opinions as possible [52]. To ensure reliability of these categories, a second independent rater with knowledge and embodied experience of mindfulness was invited (a mindfulness practitioner and mindfulness trainer, but to

retain objectivity, she was not a trainer of the Mindful2Work program). She independently assigned all the scorable units to the different categories that were each described in a brief scoring protocol, which was orally explained beforehand by the first author. An intra class correlation coefficient (ICC) of 0.92 was found, indicating high agreement between the two raters.

2.3.3. Additional measures

Two additional measures were included. First, we invited the trainers to rate group characteristics (openness, cohesiveness and safety, scale 1-7). Second, one year after enrolment in the study (follow-up 3), participants were asked what (if any) changes they still experienced. This was an open-ended question, which was coded and independently rated by two mindfulness trainers.

2.3.4. Statistical analyses

Treatment effectiveness of the quantitative measures (e.g., CIS, PSS) was examined using multilevel (linear mixed) models, as this method accounts for dependencies in nested data []. The statistical model included fixed effects for the measurement occasions and random intercepts for the participants. All participants who completed at least one measurement and who followed at least one group session were included in the analyses (intent-to-treat analyses). The mean number of attended sessions was 5.47 out of six ($SD = 0.64$; range 4-6), and $n = 68$ (69.4%) participants attended the follow-up session. The analyses were based on all available data, i.e. including incomplete cases, based on the assumption that the missing observations were missing at random (MAR). Standardized scores of the outcome variables were computed using a z-score transformation, so that parameter estimates could be interpreted as a measure of effect similar to Cohen's d [54]. An effect size of 0.20 was considered small, 0.50 medium, 0.80 large, and an effect size of 1.3 or above was considered very large [55]. The significance level for all hypothesis tests was set to $\alpha = 0.05$. The intercept was set to the pre-test measurement. Thus, parameter estimates of measurement occasions correspond to the relative change compared to pre-test. McNemar tests were carried out to compare dichotomous CIS cut-off scores at pre-test to all other measurement occasions. Additionally, Pearson's correlations were calculated to assess relationships between trainer-rated group characteristics, and changes in the primary outcome measures (PSS and CIS). All statistical analyses were carried out using R [56].

2.3.5. Compliance with ethical standards

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

3. Results

3.1. Descriptives of sample

On average, general problem severity was rated as 4.73 ($SD = 0.99$, range 2-7, scale 1-7) by the trainers at the end of the training. Further, participants were asked whether they suffered from any chronic physical and/or mental health condition(s) in the past year, which is presented in Table 1. As can be seen, out of all physical and mental conditions, burn-out was the only one that was reported as a physical as well as a mental condition (28.6% versus 71.4% respectively).

3.2. Top-down measures

Well-Being. From wait-list to pre-test, the primary outcome of perceived stress (PSS) did not change, whereas stress was significantly

Table 1
Frequencies of self-reported chronic physical and mental health.

Physical Health	
Chronic physical conditions (at least one)	n = 28 (28.6%)
Asthma	n = 1
Chronic fatigue	n = 4
Diabetes	n = 2
Stomach, liver, intestine problems	n = 5
Rheumatoid arthritis	n = 1
Migraine	n = 7
Cardiovascular problems	n = 2
Cancer	n = 1
Skin disease	n = 2
Shoulder complaints	n = 3
Burn-out	n = 2
Repetitive Strain Injury (RSI)	n = 2
Pain of muscles and joints	n = 2
Other physical conditions	n = 8
No chronic physical condition	n = 44 (44.9%)
Did not report on physical health	n = 26 (26.5%)
Mental Health	
Chronic mental conditions (at least one)	n = 10 (10.2%)
Anxiety disorder	n = 3
Mood disorder	n = 3
Autism + ADHD	n = 1
Burn-out	n = 5
No chronic mental condition	n = 62 (63.3%)
Did not report on mental health	n = 26 (26.5%)

reduced at post-test and follow-up 1 (medium effect sizes), and also at follow-up 2 and follow-up 3 (large effect sizes). Both the Depression and Anxiety sub scale of the DASS-21 showed no significant changes from wait-list to pre-test, but at post-test (approaching medium effect size for Depression, and medium effect size for Anxiety) as well as at follow-up 1 (medium effect size) significant decreases in depression and anxiety scores were found.

Both positive measures of well-being (1-item Happiness and PANAS sub scale Positive Affect) showed no significant changes from wait-list to pre-test. Happiness scores increased significantly at post-test (approaching medium effect size), and remained improved at all three follow-up measurements (medium and approaching medium effect sizes) as compared to pre-test. Positive affect significantly increased at post-test (approaching medium effect size), follow-up 1 and follow-up 2 (medium effect size), and follow-up 3 (large effect size). The negative measure of well-being (PANAS sub scale Negative Affect) showed a significant decrease from wait-list to pre-test (small effect size). From pre-test to post-test, follow-up 1, and follow-up 2 negative affect decreased (medium effect sizes), and also at follow-up 3 negative affect was significantly decreased as compared to pre-test (large effect size).

Both measures of physical well-being (HSDQ and sub scale Somatization of the 4-DSQ) showed no significant changes from wait-list to pre-test. Sleeping problems decreased significantly at post-test and follow-up 1 (small effect sizes). Last, physical correlates of stress (sub scale Somatization of the 4-DSQ) decreased significantly at post-test and follow-up 1 (approaching medium effect sizes), and follow-up 2 (small effect size) as compared to pre-test.

Functioning at Work. The primary outcome of risk for dropout from work (CIS) did not significantly change from wait-list to pre-test. At post-test and follow-up 1, the risk for dropout from work was significantly decreased (medium effect size), and at follow-up 2 and follow-up 3 this decrease was medium and large effect sizes, respectively, as compared to pre-test. At the wait-list measurement, 69% of the participants scored in the range of high risk for dropout from work. At pre-test, this was 73% and after the Mindful2Work training at post-test, this percentage dropped to 44%. At follow-up 1, follow-up 2, and follow-up 3 it was respectively 49%, 49%, and 41%. At post-test, follow-up 1, follow-up 2, and follow-up 3, the number of participants that scored within this critical range was significantly lower than at pre-test ($p < 0.001$ for pre-test to post-test and follow-up 1, $p = 0.001$ from pre-test to follow-up 2,

and $p < 0.001$ from pre-test to follow-up 3 for all McNemar tests), whereas no significant change from wait-list to pre-test occurred ($p = 0.505$).

Physical workability (WAI-Physical) showed a significant increase from wait-list to pre-test (small effect size). It further significantly improved at post-test (small effect size), no significant change was found from pre-test to follow-up 1, whereas the changes from pre-test to follow-up 2 (small effect size) and follow-up 3 (medium effect size) were significant. Mental workability (WAI-Mental) showed no significant change from wait-list to pre-test, but was significantly improved at post-test (small effect size), at follow-up 1 (approaching medium effect size), and at follow-up 2 (medium effect size) and follow-up 3 (large effect size).

Last, work satisfaction did not change significantly from wait-list to pre-test, but participants reported being significantly more satisfied with their work directly after the Mindful2Work training, at follow-up 1 and follow-up 2 (medium effect sizes), and also one year later as compared to pre-test (approaching large effect size).

Training-Specific Measures. Mindful awareness (FFMQ) did not change significantly from wait-list to pre-test. At post-test, scores were increased significantly (medium effect size). FFMQ scores at follow-up 1 went back down to non-significance as compared to pre-test. Self-compassion (SCS) did not change significantly from wait-list to pre-test, but increased significantly after the Mindful2Work training at post-test, and remained increased at follow-up 1 (small effect size and approaching medium effect size, respectively). Positive reappraisal and catastrophizing as emotion regulation strategies (CERQ) did not change significantly from wait-list to pre-test measurement. At post-test and follow-up 1, positive reappraisal significantly increased (small effect sizes) as compared to pre-test. Catastrophizing showed no change from wait-list to pre-test, and significant decreases at post-test and follow-up 1 (small effect sizes). Means and standard deviations of all top-down measures can be found in Table 2, further details about p -values and effect sizes in Table 3, and changes in primary outcome measures (PSS, and CIS) are presented in Fig. 1a and b.

3.3. Bottom-up measures

Personal Goals. Participants reported no significant change in their personal goals from wait-list to pre-test. Improvements on their own goals were found at post-test (large effect size), at follow-up 1 and follow-up 2 (approaching very large effect sizes), and at follow-up 3 (very large effect size). Means and standard deviations of the personal goals can be found in Table 2. Further details about p -values and effect sizes can be found in Table 3, and changes in personal goals are presented in Fig. 2.

Personal Interviews. After coding all the interviews, three reliable first order categories were found of which two were related to effects of the Mindful2Work program: 'Effects on well-being' and 'Acquired skills/insights'. 'Effects on well-being' was further sub divided into 3 second order categories: 'Behavioral changes', 'Bodily changes', and 'Psychological changes'. 'Acquired skills/insights' was further sub divided into the second order categories of: 'Awareness', 'Attention for self', 'Slow-down', 'Letting go', 'Decentering', 'Acceptance', 'Compassion', 'Non-reactivity', 'Non-judging', and 'Here and now'. Some of these second order categories were further divided into third order categories. See for further details the tree diagram in Fig. 3. Example quotes of participants are presented in Table 4 ('Effects on well-being') and Table 5 ('Acquired skills/insights').

The third main category that arose was summarized as 'Aspects of the training'. These quotes consisted mainly of positive remarks about the Mindful2Work program (second order category 'Tops'), and were further divided into the following third order categories under 'Tops': 'Tools' (concrete tools acquired during the training, which are still applicable to daily life), 'Trainer' (positive remarks about the trainers), 'Combination' (the strength of the Mindful2Work program lies in the

Table 2

Descriptive statistics for top-down and bottom-up measures of well-being, functioning at work, and the training, at all measurement occasions.

Outcome	Wait-list		Pre-test		Post-test		Follow-up 1		Follow-up 2		Follow-up 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Top-down measures												
Well-being												
PSS	21.98	5.89	21.53	6.64	17.02	6.26	16.48	7.06	15.67	6.67	13.20	6.10
DASS depression	12.08	8.77	12.77	9.03	8.58	7.73	8.39	8.62	n/a	n/a	n/a	n/a
DASS anxiety	10.56	7.70	9.96	7.18	6.33	4.96	5.98	6.54	n/a	n/a	n/a	n/a
Happiness	6.56	1.81	6.05	2.00	7.00	.88	6.98	1.27	6.76	1.70	7.06	1.79
PANAS positive	26.82	7.78	26.67	7.75	30.18	7.12	30.98	7.26	31.85	7.45	33.82	6.59
PANAS negative	27.16	8.52	26.11	8.37	21.41	7.35	21.45	8.25	21.05	7.64	18.31	5.99
HSDQ	24.76	6.97	24.15	7.64	21.18	7.62	19.00	9.39	n/a	n/a	n/a	n/a
4DSQ Somatic	12.14	5.05	12.12	6.32	9.16	5.10	9.10	6.25	9.68	6.99	n/a	n/a
Work												
CIS Total	92.71	24.23	91.83	23.65	76.43	21.94	77.44	25.41	75.66	26.07	68.18	24.45
Fatigue	39.51	11.76	39.39	10.42	33.26	11.32	33.00	11.12	33.41	11.9	30.04	11.53
Motivation	16.71	6.38	17.27	6.00	14.49	5.61	14.71	5.99	13.99	6.40	12.24	5.35
Activity	12.71	5.25	11.78	4.86	9.53	3.83	10.52	4.68	9.75	4.63	9.24	4.38
Concentration	23.78	7.11	23.40	7.22	19.14	6.49	19.2	7.54	18.51	6.99	16.67	6.78
WAI Physical	6.02	1.66	6.42	1.76	6.90	1.53	6.76	1.75	7.15	1.65	7.40	1.58
WAI Mental	5.49	1.59	5.67	1.84	6.45	1.47	6.45	1.78	6.80	1.53	7.12	1.42
Work Satisfaction	5.21	1.95	5.29	1.79	6.22	1.43	6.58	1.62	6.47	1.80	6.71	1.61
Training												
FFMQ Total	70.75	12.78	72.19	10.96	80.07	11.52	73.41	9.95	n/a	n/a	n/a	n/a
Observe	13.16	3.34	13.02	3.22	14.47	2.75	13.18	2.42	n/a	n/a	n/a	n/a
Describe	17.59	4.36	17.76	3.73	18.58	3.43	16.16	3.44	n/a	n/a	n/a	n/a
Act-aware	13.59	3.58	13.71	3.67	15.41	3.22	15.37	2.92	n/a	n/a	n/a	n/a
Non-judge	14.10	4.23	14.15	4.20	16.29	4.10	15.65	3.73	n/a	n/a	n/a	n/a
Non-react	12.82	3.31	13.55	3.36	15.32	3.39	13.05	3.01	n/a	n/a	n/a	n/a
SCS	39.57	13.85	37.57	14.51	43.56	13.89	43.37	11.97	n/a	n/a	n/a	n/a
CERQ Pos. reappraisal	11.55	4.14	10.73	3.57	11.82	3.58	12.26	3.55	n/a	n/a	n/a	n/a
CERQ Catastrophizing	7.06	3.06	6.58	2.75	5.73	1.81	5.89	2.34	n/a	n/a	n/a	n/a
Bottom-up measure												
Personal Goals ^a	0	0	.12	.65	1.01	.71	1.31	.87	1.26	.84	1.46	.97

Note. *M* and *SD* are used to represent means and standard deviations, respectively. WL = wait-list measurement; 4-DSQ = Four Dimensions Symptoms Questionnaire; CERQ = Cognitive Emotion Regulation Questionnaire; CIS = Checklist Individual Strength; DASS = Depression Anxiety Stress Scale; FFMQ = Five Facets Mindfulness Questionnaire; FU-1 = follow-up measurement 1 (six weeks after the training); FU-2 = follow-up measurement 2 (six months after the training); FU-3 = follow-up measurement 3 (one year after enrollment in the study); HSDQ = Holland Sleep Disorder Questionnaire; PANAS = Positive And Negative Affect Scale; PSS = Perceived Stress Scale; SCS = Self Compassion Scale; WAI = Work Ability Index. ^a: Wait-list measurement set to zero as baseline.

combination of the three elements), 'Gratefulness' (feeling grateful for participation in the training and experiencing the effects), 'Order of elements' (the strength of the Mindful2Work program lies in the flow of starting with the physical exercises, then yoga and ending with mindfulness practices), 'Repetition' (the strength of the Mindful2Work program lies in the repetition of the elements and exercises), 'Group' (the strength of the Mindful2Work program lies in the group dynamics, the open attitudes, the recognition of each other's suffering), and 'Accessibility' (the strength of the Mindful2Work program lies in the fact that it is accessible for nearly everyone). Besides the large number of 'Tops', we formed another second order category of 'Tips' (very small category as compared to 'Tops'). This category mainly consisted of some singular random comments, for example, someone who would have liked more weekly sessions, or who would have liked to receive more background information on the other participants. However the main and only third order category that clearly arose was 'Challenges in Implementation' which refers to the challenges to keep integrating the practices into daily life; to keep up the regular physical exercise, yoga and/or mindfulness practices. Participants explained in the interviews that although they felt they received a lot of tools in the Mindful2Work program (category 'Tools') that were readily applicable in daily life, they found it challenging to keep doing this in the long-term, in the sometimes hectic circumstances of their daily life (e.g., "The biggest challenge is to keep it up"; "I wish the practices would still become a more routine part of my day-to-day life").

3.4. Additional outcomes

Correlations. Contrary to our hypotheses, the reductions in primary outcomes (PSS and CIS) from pre-test to post-test were not significantly

correlated with group characteristics as rated by the trainer (safety, cohesiveness, and openness of the group), and size of the group ($M = 10.65$; $SD = 2.72$; range 4–14 participants). Means, standard deviations and correlations can be found in the Online Appendix 1.

One-year later Effects. In addition to the subset of bottom-up measurements administered one year after enrolment in the Mindful2Work program, people were also asked an open ended question about what effects (if any) they were still noticing. Answers ($n = 51$) were coded into five main reliable categories (kappa = 0.89 between two independent raters): 'Increased awareness/presence' (e.g., "More aware of bodily stress signals, more awareness at work"), 'Pause more' (e.g., "Taking more breaks, taking a step back"), 'More balanced' (e.g., "More balance in emotions, more balanced in general"), 'Integrated tools in daily life' (e.g., "I take a breathing space when I feel I need it, more tools in stressful periods"), and 'Other positives' (e.g., "Enjoy life more, less somatic complaints").

4. Discussion

A researcher-driven (top-down) approach was combined with an individualized participant-driven (bottom-up) approach to investigate the effects of the six-week Mindful2Work program for people with (work-related) stress symptoms.

4.1. Top-down effects

Overall, psychological (stress, anxiety, depression), emotional (positive and negative affect, happiness), and physical (sleep and somatic stress) well-being showed lasting improvements up to one year later, with the largest improvements in the primary outcome general stress. It

Table 3
Parameter estimates of changes relative to pre-test for top-down and bottom-up measures of well-being, functioning at work, and the training.

	WL- Pre	Pre- Post	Pre- FU1	Pre- FU2	Pre-FU3
	<i>pe</i>	<i>pe</i>	<i>pe</i>	<i>pe</i>	<i>pe</i>
Top-down measures					
<i>Well-being</i>					
Stress (PSS)	-.15	-.62***	-.68***	-.83***	-.117***
Depression (DASS-21)	-.01	-.46***	-.51***	n/a	n/a
Anxiety (DASS-21)	-.18	-.50***	-.56***	n/a	n/a
Happiness (1-item)	-.18	.56**	.55***	.45***	.60***
Positive affect (PANAS)	.01	.45***	.57***	.74***	.99***
Negative affect (PANAS)	-.23*	-.55***	-.54***	-.60***	-.80***
Sleep problems (HSDQ)	-.11	-.37***	-.43***	n/a	n/a
Physical symptoms (4DSQ)	-.19	-.44***	-.45***	-.39***	n/a
<i>Functioning at work</i>					
Risk for dropout (CIS)	-.13	-.57***	-.55***	-.68***	-.100***
Physical workability (WAI)	.26*	.26*	.20	.44***	.55***
Mental workability (WAI)	.12	.42***	.45***	.67***	.82***
Work satisfaction (1-item)	.12	.52*	.72***	.66***	.79***
<i>Training-specific</i>					
Mindful awareness (FFMQ)	.17	.67***	.13	n/a	n/a
Self-compassion (SCS)	-.04	.43***	.46***	n/a	n/a
Positive reappraisal (CERQ)	-.16	.30*	.43***	n/a	n/a
Catastrophizing (CERQ)	-.20	-.32**	-.25*	n/a	n/a
<i>Bottom-up measure</i>					
Personal goals	.12	.98***	1.29***	1.26***	1.46***

Note. WL = wait-list measurement; FU1 = follow-up 1 measurement (six weeks after the training); FU2 = follow-up 2 measurement (six months after the training); FU3 = follow-up measurement (one year after enrolment in study); CERQ = Cognitive Emotion Regulation Questionnaire; CIS = Checklist Individual Strength; DASS = Depression Anxiety Stress Scale; FFMQ = Five Facets Mindfulness Questionnaire; HSDQ = Holland Sleep Disorder Questionnaire; PANAS = Positive And Negative Affect Scale; PSS = Perceived Stress Scale. SCS = Self Compassion Scale; WAI = Work Ability Index; 4DSQ = Four Dimension Symptoms Questionnaire. *pe* represent parameter estimates using z-scored variables and can be interpreted similarly to Cohen's *d* (effect size). The Mindful2Work training took place between pre-test and post-test. *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

thus seems that the Mindful2Work program had long-lasting positive effects on both mental and physical aspects of (work-related) stress. Reductions in stress as a result of mindfulness training have been shown in many previous studies (e.g. Ref. [15]). On average, improvements in well-being were medium directly after the Mindful2Work program, as well as six weeks and six months later (effect size = 0.49, 0.53, and 0.60 respectively), and large effects were seen one year later (average effect size = 0.89). These effects seem to be somewhat bigger and longer lasting compared to, for instance, a meta-analysis that compared mindfulness training to control groups, where an overall medium effect (effect size = 0.53) on psychological outcomes for employees was found [9].

Overall, effects of the Mindful2Work program on functioning at work showed a similar pattern. Risk for dropout from work, mental and physical workability, and work satisfaction showed lasting improvements up to one year later, with the largest effect on the primary outcome risk for dropout. Effect sizes were comparable with those for well-being measures (average effect size = 0.44, 0.48, 0.61, and 0.79 after the training, six weeks, six months and one year later respectively).

Mindful awareness and self-compassion showed around medium effect improvements after the Mindful2Work training. Not only has this been found in many studies before (e.g. Ref. [57]) but also this comes as no surprise since the Mindful2Work training was designed to target

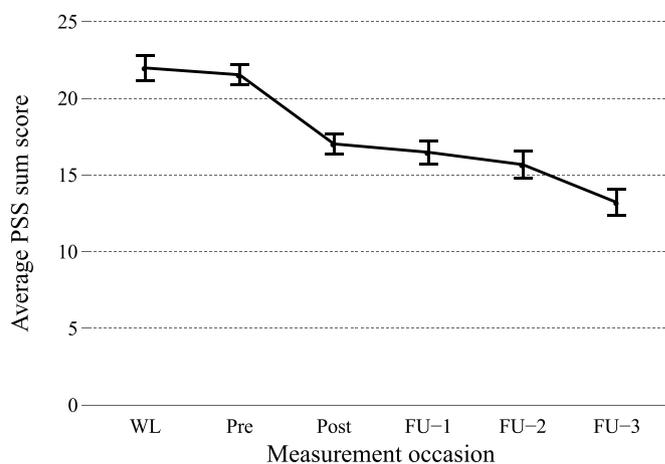


Fig. 1a. Development of PSS scores (stress) across the five different measurement occasions. PSS = Perceived Stress Scale; WL = wait-list measurement; FU-1 = follow-up measurement 1 (six weeks after the training); FU-2 = follow-up measurement 2 (six months after the training); FU-3 = follow-up measurement 3 (one year after enrollment in the study). Error bars denote standard errors of the mean.

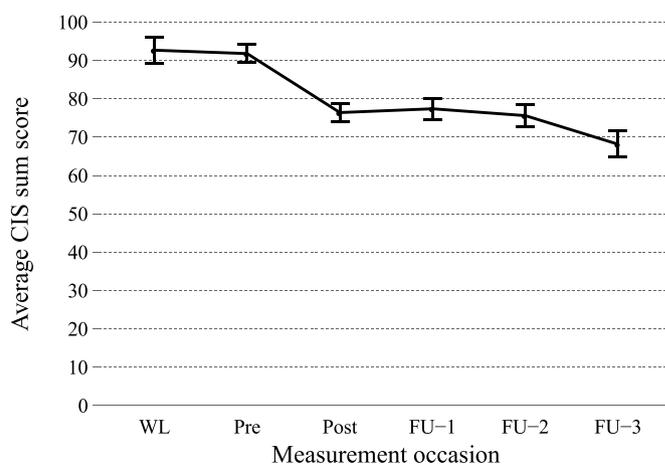


Fig. 1b. Development of CIS scores (risk for drop-out from work) across the five different measurement occasions. CIS = Checklist Individual Strength; WL = wait-list measurement; FU-1 = follow-up measurement 1 (six weeks after the training); FU-2 = follow-up measurement 2 (six months after the training); FU-3 = follow-up measurement 3 (one year after enrollment in the study). Error bars denote standard errors of the mean.

these mechanisms. In future studies it will be assessed whether these measures may be functioning as the working (or mediating) mechanisms for the outcomes of well-being and functioning at work. However, the effect on mindful awareness was not maintained six weeks later. These findings are contrary to mid-term effect findings from other studies (e.g. Ref. [58]) and also not in harmony with participants' observations during the interviews which were taken around the same time. Additional analyses revealed that not all subscales of the FFMQ decreased, as the facets Acting with Awareness and Non-Judging did not change significantly from post-test to follow-up 1 (dependent sample *t*-tests: $t(79) = 0.25, p = 0.805$ and $t(79) = 1.16, p = 0.249$, respectively). Indeed, in the interviews, participants mainly elaborated on their increased awareness (see also all the third-order categories). Another explanation might be that the more mindful people become, the more mindful they are about their (moments of) unmindfulness.

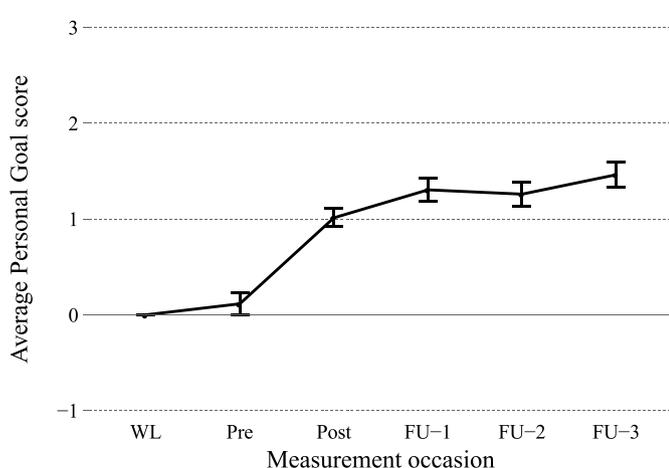


Fig. 2. Development of personal goal scores across the five different measurement occasions. WL = wait-list measurement; FU-1 = follow-up measurement 1 (six weeks after the training); FU-2 = follow-up measurement 2 (six months after the training); FU-3 = follow-up measurement 3 (one year after enrollment in the study). Error bars denote standard errors of the mean.

Further, the (mal)adaptive emotion regulation strategies positive reappraisal and catastrophizing de- and increased, respectively. Interestingly, six weeks after the Mindful2Work program, scores on these strategies were very close to those in the general population. Garnefski and colleagues [50] found that positive reappraisal, catastrophizing, rumination and self-blame were significant predictors of depression and anxiety one year later, with the first two (included in this study) being the strongest predictors.

Nearly all measures showed no change during the wait-list period; however, negative affect and physical workability already improved during the wait-list period, but effects were still bigger after the training. A combination of the following effects might be responsible for this. First, simply knowing that a training aimed at ‘stress and symptom relieve’ is starting soon may perhaps already lead to an improvement. Second, the repeated measuring can make people aware, which in turn can lead to change. Third, treatment as usual may have caused changes during wait-list. Although we have no systematic information available about this, some participants were referred through their company doctor, and kept in contact with this doctor during the wait-list period.

4.2. Bottom-up effects

Participant’s self-formulated goals, which varied from work-related goals, to work-private life balance goals, to private life goals, improved largely after the training (effect sizes from 0.98 to 1.46). Interviews with individual participants about if and how the Mindful2Work program affected them, brought forward mainly effects on well-being (behavioral, bodily, and psychological) and participants further mentioned several skills and insights they had acquired throughout the training (e.g., slowing-down, awareness, acceptance). One year later, participants still reported some of the insights and skills (e.g., awareness and pausing), and they also mentioned having integrated some of the ‘tools’ into their daily life indicating generalization from the training to daily life.

4.3. Integration of top-down and bottom-up effects

Several parallels can be drawn between the top-down and bottom-up approach. The first main category that arose from the bottom-up interviews was effects on well-being. Researcher-chosen measures of well-being consisted of depression, anxiety, (somatic and general) stress, happiness, affect, and sleep, which were remarkably similar to themes

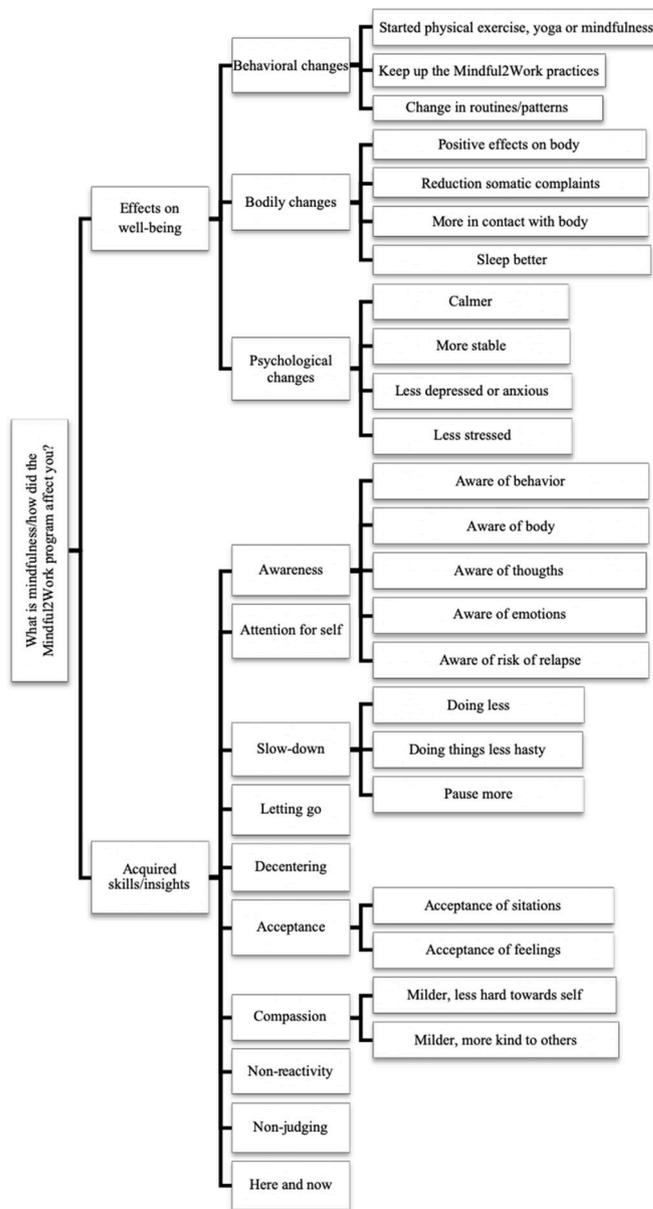


Fig. 3. Tree diagram of themes in interviews with participants (n = 9) of the mindful2Work program.

such as less anxious, less depressed, less stressed that arose from people’s own voices. Interestingly, measures of ‘stress reduction’ are very popular amongst researchers, which make sense considering the mother program of all MBPs is called MBSR [11]. However, when people are invited to verbalize effects in their own words, we found them to much more often choose the other side of the coin. Thus, although some people state their stress is decreased, many more people state their calm has increased. Perhaps, this resonates with the perspective of positive psychology; focus on increase of the positive, instead of decrease of the negative. Upon deeper inspection, it can be seen that the top-down measures of physical well-being (sleep and somatic stress) were reflected in people’s own observations of the effects of the Mindful2Work program. However, they reported many more effects on their bodies, and also being more in contact with their bodies after the training. Perhaps this was related to the physical activity component of the Mindful2Work program. For future studies it would therefore be recommended to emphasize not only on outcomes of psychological aspects of well-being, but also include measures of physical well-being.

Table 4

Effects on well-being (first order category) divided in second and third order categories and example quotes from the interviews with mindful2Work participants.

Second order (and third) category	Example quotes
Behavioural changes <ul style="list-style-type: none"> Started physical exercise, yoga, or mindfulness Keep up M2W practices Change in routines/patterns 	I now go to the gym once a week; I cycle more; I joined a yoga club; I do nightly yoga practices at home now; I now walk to my office; I meditate when I feel I need to; I used to turn the TV on during dinner but not anymore; I see some nice cracks in my daily habits emerging; I now press my own orange juice instead of buying the readymade stuff.
Bodily changes <ul style="list-style-type: none"> Positive effect on my body Reduction somatic symptoms More in contact with body Sleep better 	Mindful2Work makes me more fit; I am more flexible, I can now touch my toes; The somatic stress complaints have now largely disappeared; My lower back is not stiff anymore; I used to function with my head mainly, through yoga and mindfulness I now connect more with my body; I am more in contact with my body; I now sleep better again.
Psychological changes <ul style="list-style-type: none"> Calmer More stable Less depressed/anxious Less stressed 	Mindfulness helps me to be calm; I have a much calmer, more relaxed attitude in life; Also at work I am much more relaxed; I am more balanced; I feel more stable; I experience less extremes in my emotions; Previously I used to sometimes have depressed or anxious episodes, I now don't have that anymore; My head is now stress-free; Through the movements my stress dissolves; I am coming down a bit from the stress; A feeling of relieve/relaxation.

Table 5

Acquired Skills/insights (First Order Category) Divided in Second and Third Order Categories, and Example Quotes from the Interviews with Mindful2Work Participants.

Second order (and third) category	Example quotes
Increased awareness <ul style="list-style-type: none"> Aware of behaviour Aware of body Aware of thoughts Aware of emotions Aware of risk of relapse 	Things I used to do on automatic pilot, I now do with more awareness; I am now aware that I don't take breaks in my work; I am now aware my thoughts are racing; Meditating makes me more aware of how I act.
Attention for self	I am important right now, I care less for the rest; I now create space for myself; Meditating helps me to get closer to myself.
Slow-down <ul style="list-style-type: none"> Doing less Doing things less hasty Pause more 	I live life at a slower pace, and that's a positive thing; I started doing things a little less hasty, not quite slowly yet; I don't keep 'running' anymore.
Letting go	I don't need to be involved in everything; I don't worry about certain things anymore; Let it go.
Decentering	I am better able to observe things from a distance; I can park my thoughts to the side sometimes; It is like a little cocoon around me without becoming apathetic or autistic.
Acceptance <ul style="list-style-type: none"> Acceptance of situations Acceptance of feelings 	I am more satisfied with how things are; It is o.k. to cry sometimes; Let the feelings come, sometimes I am happy and sometimes I am not and I don't need to change that.
Compassion <ul style="list-style-type: none"> Milder, less hard to self Milder, more kind to others 	I am softer, more gentle to myself; It takes the edges of me, I am more friendly to others; I am less hard and critical to myself.
Non-reacting	I don't react to everything and everybody instantly anymore; I don't get angry immediately.
Non-judging	I don't judge things instantly; I now just notice an idea or a feeling without judging about it right away.
Here and now	I am here now, there is no yesterday or tomorrow; I don't think of my 'to-do's', but of things that are actually important.

Another parallel can be drawn between the top-down training-specific measures and the second main category that emerged from the interview data: acquired skills or insights. Mindful awareness, self-compassion, and emotion regulation were included as measures based on previous studies and expectations of the effects of the Mindful2Work program. When we asked people themselves, unprompted, about what mindfulness meant to them, and how the effects of the Mindful2Work program were achieved in their opinion, themes such as awareness, decentering, and compassion arose. It thus seems that although there are large differences between top-down (researcher-driven) and bottom-up (participant-driven) research approaches, in the field of mindfulness research there might actually be quite a strong bridge between the two.

Although most of the participants were fairly new to the practice of mindfulness (e.g., having taken part in an MBP the past year was an exclusion criterion) their answers showed remarkable overlap with some of the seven attitudinal foundations of mindfulness practice of Kabat-Zinn [59,60]: 'Non-judging', 'Patience', 'Beginner's Mind', 'Trust', 'Non-Striving', 'Acceptance' and 'Letting go'. 'Acceptance' for instance refers to seeing things as they really are, and accepting them without the need to change them. In the interviews, participants sometimes responded that they now were more able to accept their thoughts and feeling as they are (e.g., "I now notice that I have an enormous pile of feelings, and where I used to tend to push them away, and noticed they kept coming back, I now welcome them, it's ok for them to be there, I am curious to explore them and accept them. I also notice how they dissolve again, which is pleasant too"). The attitudinal foundation of 'Patience' represents the ability to let things unfold in their own time and their own way, instead of pushing too much. The category 'Slow-down' that arose from the interviews referred to something similar: leaving things as they are instead of forcing them, taking more breaks and doing things calmer (e.g., "I allow myself the time to really be there, to really be present instead of running and rushing all the time. This is the effect of the training, I started to do things a little less hasty, a bit calmer than I used to"). And last, the attitudinal foundation of 'Letting go' which refers to letting things be instead of holding on, was also reflected in the participant's answers (category 'Letting go'). They stated being better able to take some distance, for example from thoughts, instead of fully letting themselves submerge in negative emotions (e.g., "I am now better able to let go, I don't need to know everything about my colleagues anymore").

More than double the interview answers reflected 'acquired skills and insights' as compared to 'effects on well-being'. Historically, in the first wave of MBP-effect studies, the majority examined the effect of MBPs on well-being (e.g. Ref. [61]). Only in the last decade or so, more and more studies are examining the underlying working mechanisms of MBPs (e.g. Ref. [57,58]) which bare resemblance to the 'training-specific measures' in the top-down part of this study, but also to the bottom-up generated category of 'acquired skills and insights'. It took researchers nearly two decades before they started digging into these underlying mechanisms, whereas it seems that when we ask people themselves, they enter this deeper layer right away. Instead of only floating at the surface of whether mindfulness helps their well-being (e.g., sleep better, less stress) they easily seem to access a deeper level about explaining how, through which underlying processes, these changes in well-being may arise.

The effects on functioning at work did not seem to be mirrored in people's own answers during the interviews. Perhaps this was related to the interview questions being broad and not specified to the work situation. Or, one could reason, that people's acquired skills or insights or effects on well-being, may apply to their private and/or work life (e.g., 'less stressed', 'kinder to oneself'). The reflection of effects on work-related outcomes may not have been explicitly stated (or asked) during the interviews, however from the personal goals, that showed long term very large improvements, relationships with work became very apparent (e.g., 'experience more peace and fun at work'; 'gain more overview at work'; 'feeling less vulnerable at work'; 'being more

effective in my work'; 'leave work at work'; 'improving my work-private life balance'; 'being able to work full time in a healthy way').

Last, a remarkable theme that arose from the interviews was the intention or ability to change routines or patterns. Participants often mentioned to actively let go of old (unhelpful) patterns. Interestingly, they were also aware of the risk of relapsing back into old habits and patterns, which was a category that arose as one of the facets of awareness. Thus, not only were participants more aware and attentive (a category that was maintained up to one year later), they also took the initiative to change things in themselves, or in their unhelpful habits.

4.4. Relationship between outcome and group characteristics

There was no relationship between outcome and size of the group or the trainer's impression of safety, cohesion, and openness in the group. These are important findings for clinical practice since trainers may feel 'the group benefits more' when they themselves experience the group as more sharing, more safe and more interconnected. The same applies to group size; a trainer might feel she has more attention for individual group members if the group is smaller and therefore effects might be bigger, but this was not the case.

4.5. Strengths and weaknesses

Strengths of this study were the addition of a wait-list baseline measurement, the combination of a top-down and a bottom-up personalized approach, as well as the long-term measurements. Although mostly substantial and long term effects were found, in line with plenty of other 'positive outcome studies of MBPs', it is important to note that also 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, or presentation as a panacea for all difficulties in life by the media [62]). These articles aim to stimulate researchers and clinicians to remain critical, register trials a priori, define primary outcomes a priori, and also publish negative results, since this is valuable knowledge for health care. Another strength is the approach of burn-out related complaints from a reciprocal body and mind perspective. Within the Mindful2Work program itself, exercises and practices are focused on both body and mind, assuming that stress exerts itself through both. The top-down measurements reflect both dimensions, which was mirrored by peoples' own answers. Interestingly, when participants were asked at the start of the program if they suffered from any mental or physical conditions, burn-out was mentioned several times. About three quarters reported this as a mental condition, and one quarter referred to burn-out as a physical condition, underlining once again, the bi-dimensionality of (work-related) stress and exhaustion symptoms. A weakness of the current study was that participants were not randomly assigned to either an intervention or a wait-list group.

5. Conclusion

The 6-weeks Mindful2Work group program combining outdoor physical activity, yoga and mindfulness meditations, developed to target (work-related) stress complaints from a body and mind perspective, has shown to effectively improve well-being (stress, anxiety, depression, sleep, affect, and happiness), functioning at work (risk for dropout, mental and physical workability, and work satisfaction) and training specific measures (mindful awareness, self-compassion, and emotion regulation strategies). Large effects were found on primary outcomes stress and risk for dropout from work, and very large improvements were found on personal (work- and private life related) goals. Generally, effects lasted until one year later. Peoples' own opinions (bottom-up) reflected effects on well-being and acquired skills or insights as a result of the Mindful2Work training, partly overlapping with the top-down outcomes. No association between outcome and group characteristics

was found. Additionally, future studies may look more closely at the role of informal practice as well as the underlying working mechanisms of the program.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Authors contributions

EdB designed and executed the study, and wrote the paper. SV analyzed the data and assisted in writing the paper. JB assisted with executing the study, the interviews, and assisted with the data analyses. MB assisted with the data collection. SB collaborated in designing the study, and writing of the paper.

Declaration of competing interest

EdB and SB are authors of the Mindful2Work trainer's manual and the Mindful2Work workbook for participants. SB owns shares in UvA minds.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ctcp.2020.101137>.

References

- [1] World Health Organization, *Mental Health and Well-Being at the Workplace – Protection and Inclusion in Challenging Times*, 2010.
- [2] P.J. Rosch, The quandary of job stress compensation, *Health Stress* 3 (2001) 1–4.
- [3] American Psychological Association, *Stress in America - Missing the Health Care Connection*, Washington, DC, 2013.
- [4] N. Schneiderman, G. Ironson, S.D. Siegel, Stress and health: psychological, behavioral, and biological determinants, *Annu. Rev. Clin. Psychol.* 1 (2005) 607–628.
- [5] S.J. Lupien, F. Maheu, M. Tu, A. Fiocco, T.E. Schramek, The effects of stress and stress hormones on human cognition: implications for the field of brain and cognition, *Brain Cognit.* 65 (2007) 209–237.
- [6] R.Q. Wolever, K.J. Bobinet, K. McCabe, E.R. Mackenzie, E. Fekete, C.A. Kusnick, others, Effective and viable mind-body stress reduction in the workplace: a randomized controlled trial, *J. Occup. Health Psychol.* 17 (2012) 246.
- [7] European Agency for Safety and Health at Work, *OSH in Figures: Stress at Work—Facts and Figures*, 2014.
- [8] H. der Molen, P. Kuijjer, G. de Groene, J. Bakker, B. Sorgdrager, A. Lenderink, J. Maas, T. Brand, *Kerncijfers Beroepsziekten 2019 [Core Numbers Occupational Illnesses 2019]*, 2019.
- [9] K.M. Richardson, R. Rothstein, Effects of occupational stress management intervention programs: a meta-analysis, *J. Occup. Health Psychol.* 13 (2008) 69–79.

- [10] J. Kabat-Zinn, Mindfulness-based interventions in context: past, present, and future, *Clin. Psychol. Sci. Pract.* 10 (2003) 144–156.
- [11] J. Kabat-Zinn, An out-patient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results, *Gen. Hosp. Psychiatr.* 4 (1982) 33–47.
- [12] Z.V. Segal, J.M.G. Williams, J.D. Teasdale, Mindfulness Based Cognitive Therapy for Depression: A New Approach to Preventing Relapse, The Guilford Press, New York, US, 2012.
- [13] R.A. Gotink, P. Chu, J.J.V. Busschbach, H. Benson, G.L. Fricchione, M.G. M. Hunink, Standardized mindfulness-based interventions in healthcare: an overview of systematic reviews and meta-analyses of randomized controlled trials, *PLoS One* 10 (2015), e0124344.
- [14] B. Khoury, T. Lecomte, G. Fortin, M. Masse, P. Therien, V. Bouchard, others, Mindfulness-based therapy: a comprehensive meta-analysis, *Clin. Psychol. Rev.* 33 (2013) 763–771.
- [15] B. Khoury, M. Sharma, S.E. Rush, C. Fournier, Mindfulness-Based Stress Reduction for healthy individuals: a meta-analysis, *J. Psychosom. Res.* 78 (2015) 519–528.
- [16] S.B. Goldberg, R.P. Tucker, P.A. Greene, R.J. Davidson, B.E. Wampold, D. J. Kearney, others, Mindfulness-based interventions for psychiatric disorders: a systematic review and meta-analysis, *Clin. Psychol. Rev.* 59 (2018) 52–60.
- [17] M. Hedman-Lagerlöf, E. Hedman-Lagerlöf, L.-G. Öst, The empirical support for mindfulness-based interventions for common psychiatric disorders: a systematic review and meta-analysis, *Psychol. Med.* 48 (2018) 2116–2129.
- [18] C. Strauss, K. Cavanagh, A. Oliver, D. Peltman, Mindfulness-based interventions for people diagnosed with a current episode of an anxiety or depressive disorder: a meta-analysis of randomized controlled trials, *PLoS One* 9 (2014), e96110.
- [19] National Institute of Health and Care Excellence, Treating Depression in Adults: Information for the Public [CG90], 2009.
- [20] A. Burton, C. Burgess, S. Dean, G.Z. Koutsoyopoulou, S. Hugh-Jones, How effective are mindfulness-based interventions for reducing stress among healthcare professionals? A systematic review and meta-analysis, *Stress Health* 33 (2017) 3–13.
- [21] M. Virgili, Mindfulness-based interventions reduce psychological distress in working adults: a meta-analysis of intervention studies, *Mindfulness* 6 (2015) 326–337.
- [22] L. Webster, The effectiveness of physical activity as an intervention in the treatment of depression: a systematic review, *J. Appl. Psychol. Soc. Sci.* 1 (2015) 28–40.
- [23] G.M. Cooney, K. Dwan, C.A. Greig, D.A. Lawlor, J. Rimer, F.R. Waugh, M. McMurdo, G.E. Mead, Exercise for depression, *Cochrane Database Syst. Rev.* 12 (2013). CD004366.
- [24] H. Jazaieri, P.R. Goldin, K. Werner, M. Ziv, J.J. Gross, A randomized trial of MBSR versus aerobic exercise for social anxiety disorder, *J. Clin. Psychol.* 68 (2012) 715–731.
- [25] J.E. der Zwan, W. De Vente, A.C. Huizink, S.M. Bögels, E.I. De Bruin, Physical activity, mindfulness meditation, or heart rate variability biofeedback for stress reduction: a randomized controlled trial, *Appl. Psychophysiol. Biofeedback* 40 (2015) 257–268.
- [26] E.I. De Bruin, J.E. der Zwan, S.M. Bögels, A randomized controlled trial comparing daily mindfulness meditations, biofeedback exercises, and daily physical exercise on attention control, executive functioning, mindful awareness, self-compassion, and worrying in stressed young adults, *Mindfulness* 7 (2016) 1182–1192.
- [27] H. Cramer, R. Lauche, H. Haller, G. Dobos, A systematic review and meta-analysis of yoga for low back pain, *Clin. J. Pain* 29 (2013) 450–460.
- [28] H. Cramer, R. Lauche, J. Langhorst, G. Dobos, Yoga for depression: a systematic review and meta-analysis, *Depress. Anxiety* 30 (2013) 1068–1083.
- [29] A. Ross, S. Thomas, The health benefits of yoga and exercise: a review of comparison studies, *J. Alternative Compl. Med.* 16 (2010) 3–12.
- [30] M. Balasubramaniam, S. Telles, P.M. Doraiswamy, Yoga on our minds: a systematic review of yoga for neuropsychiatric disorders, *Front. Psychiatr.* 3 (2013) 1–16.
- [31] E.I. De Bruin, A.R. Formis, G. Frijstein, S.M. Bögels, Mindful2Work: effects of combined physical exercise, yoga, and mindfulness meditations for stress relieve in employees. A proof of concept study, *Mindfulness* 8 (2016) 204–217.
- [32] S. Hamilton, A.M. Moore, D.R. Crane, S.H. Payne, Psychotherapy dropouts: differences by modality, license, and DSM-IV diagnosis, *J. Marital Fam. Ther.* 37 (2011) 333–343.
- [33] J. Hanson, *Relax and Renew: Restful Yoga for Stressful Times*, Rodmell Press, Berkeley, 2011.
- [34] J.M.G. Williams, D. Penman, *Mindfulness: A Practical Guide to Finding Peace in a Frantic World*, Piatkus, London, 2011.
- [35] R.S. Crane, J. Brewer, C. Feldman, J. Kabat-Zinn, S. Santorelli, J.M.G. Williams, W. Kuyken, What defines mindfulness-based programs? The warp and the weft, *Psychol. Med.* 47 (2017) 990–999.
- [36] E.I. de Bruin, S.M. Bögels, A.R. Formis, Mindful2Work - Participant's Workbook [Mindful2Work - Werkboek Voor Deelnemers], Lannoo Campus, Houten, 2018.
- [37] E.I. de Bruin, S.M. Bögels, A.R. Formis, Mindful2Work - Participant's Workbook [Mindful2Work - Übungsbuch], Arbor Verlag, Freiburg im Breisgau, 2019.
- [38] S. Cohen, T. Kamarck, R. Mermelstein, A global measure of perceived stress, *J. Health Soc. Behav.* 24 (1983) 385–396.
- [39] S.H. Lovibond, P.F. Lovibond, Manual for the Depression Anxiety Stress Scale, The Psychology Foundation of Australia, Sydney, 1996.
- [40] A.M. Abdel-Khalek, Measuring happiness with a single-item scale, social behavior and personality, *Int. J.* 34 (2006) 139–150.
- [41] D. Watson, L.A. Clark, A. Tellegen, Development and validation of brief measures of positive and negative affect: the PANAS scales, *J. Pers. Soc. Psychol.* 54 (1988) 1063.
- [42] G.A. Kerkhof, M.E. Geuke, A. Brouwer, R.M. Rijsman, R.J. Schimsheimer, V. van Kasteel, Holland sleep disorders questionnaire: a new sleep disorders questionnaire based on the international classification of sleep disorders-2, *J. Sleep Res.* 22 (2013) 104–107.
- [43] B. Terluin, Four-Dimensional Symptom Questionnaire (4-DSQ). A questionnaire for the assessment of distress, depression, anxiety, and somatisation. [Vierdimensionale Klachtenlijst (4DKL). Een vragenlijst voor het meten van distress, depressie, angst en somatisatie], *Huisarts Wet.* 39 (1996) 538–547.
- [44] A.J. Beurskens, U. Bültmann, I. Kant, J.H. Vercoulen, G. Bleijenberg, G.M. Swaen, Fatigue among working people: validity of a questionnaire measure, *Occup. Environ. Med.* 57 (2000) 353–357.
- [45] U. Bültmann, M. de Vries, A.J.H.M. Beurskens, G. Bleijenberg, J.H.M.M. Vercoulen, L.J. Kant, Measurement of prolonged fatigue in the working population: determination of a cut-off point for the checklist individual strength, *J. Occup. Health Psychol.* 5 (2000) 411–416.
- [46] K. Tuomi, J. Ilmarinen, A. Jahkola, L. Katajarinne, A. Tulkki, Work Ability Index, 1997.
- [47] E. Bohlmeijer, P.M. ten Klooster, M. Fledderus, M. Veehof, R. Baer, Psychometric properties of the five facet mindfulness questionnaire in depressed adults and development of a short form, *Assessment* 18 (2011) 308–320.
- [48] E.I. De Bruin, M. Topper, J. Muskens, H.J. Kamphuis, S.M. Bögels, Psychometric properties of the Dutch five facet mindfulness questionnaire (FFMQ) in a meditating and non-meditating sample, *Assessment* 19 (2012) 187–197.
- [49] K.D. Neff, The development and validation of a scale to measure self-compassion, *Self Ident.* 2 (2003) 223–250.
- [50] N. Garnefski, V. Kraaij, The cognitive emotion regulation questionnaire, *Eur. J. Psychol. Assess.* 23 (2007) 141–149.
- [51] T.J. Kiresuk, A. Smith, J.E. Cardillo, Goal Attainment Scaling: Applications, Theory, and Measurement, Lawrence Erlbaum Associates, Inc, Hillsdale, NJ, England, 1994.
- [52] G.W. Ryan, H.R. Bernard, Techniques to identify themes, *Organ. Stud.* 15 (2003) 85–109.
- [53] T.A.B. Snijders, R.J. Bosker, *Multilevel Analysis: an Introduction to Basic and Advanced Multilevel Modeling*, Sage Publishing, Thousand Oaks, 2012.
- [54] J.A. Rosenthal, Qualitative descriptors of strength of association and effect size, *J. Soc. Serv. Res.* 21 (1996) 37–59.
- [55] R Core Team, R: A Language and Environment for Statistical Computing, 2014.
- [56] W. Kuyken, E. Watkins, E. Holden, K. White, R.S. Taylor, S. Byford, Others, how does mindfulness-based cognitive therapy work? *Behav. Res. Ther.* 48 (2010) 1105–1112.
- [57] J. Gu, C. Strauss, R. Bond, K. Cavanagh, How do Mindfulness-Based Cognitive Therapy and Mindfulness-Based Stress Reduction improve mental health and well-being? A systematic review and meta-analysis of mediation studies, *Clin. Psychol. Rev.* 37 (2015) 1–12.
- [58] J. Kabat-Zinn, *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*, Dell Publishing, New York, US, 1990.
- [59] J. Kabat-Zinn, *Full Catastrophe Living, Revised Edition: How to Cope with Stress, Pain and Illness Using Mindfulness Meditation*, Bantam, New York City, 2013.
- [60] J.D. Teasdale, Z.V. Segal, J.M. Williams, V.A. Ridgeway, J.M. Soulsby, M. A. Lau, Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy, *J. Consult. Clin. Psychol.* 68 (2000) 615–623.
- [61] N.T. Van Dam, M.K. van Vugt, D.R. Vago, L. Schmalz, C.D. Saron, A. Olendzki, others, Mind the hype: a critical evaluation and prescriptive agenda for research on mindfulness and meditation, *Perspect. Psychol. Sci.* 13 (2018) 36–61.