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General discussion
Over the past decades, both mental health and lifestyle have become relevant matters for worksite health promotion. In addition, developing, implementing and evaluating worksite health promotion requires dealing with stakeholders and their views, in an ethically sound way. Addressing these topics, the three main objectives of this thesis were:

1. **to develop a worksite health promotion intervention**
2. **to evaluate the developed worksite health promotion intervention**
3. **to explore ethical considerations of worksite health promotion.**

In the first part of this chapter, I will present an overview of the findings. Secondly, I will reflect upon these findings. Thirdly, implications of these findings for research and practice will be presented. Finally, I will conclude what this thesis adds to the field of worksite health promotion.

### 9.1 Overview of the Main Findings

**Objective 1**

In chapter 2, the systematic development based on the Intervention Mapping protocol (1) of the worksite health promotion intervention is described. The target population consisted of employees of two research institutes. The employees, together with the management, were involved in the development of the intervention. Needs assessment of the target population resulted in the following intervention objectives: 1) to improve work engagement, 2) to improve vigorous physical activity in leisure time, 3) to reduce sedentary behaviour at work, including sitting during lunchtime, and 4) to increase fruit and vegetable intake. Next, these intervention objectives were translated into theoretical methods (such as self-regulation) and practical strategies (such as mindfulness-based training), to aim at resources (such as self-efficacy) and determinants (such as perceived barriers). In accordance with the target population, this was finally combined into a worksite health promotion intervention. The so-called “Mindful Vitality In Practice (VIP)” intervention comprised an in-company mindfulness-based training, consisting of 8 weekly 1.5 hours sessions plus homework exercises, 8 sessions of e-coaching, and supporting elements such as the provision of fruit, lunch walking routes, and a buddy-system. The total duration
of the intervention was 6 months. The Mindful VIP intervention was evaluated in a randomised controlled trial (RCT) design, among 257 employees of two research institutes. Data were collected at baseline (T0), and 6 and 12 months of follow-up (T1 and T2 respectively) using questionnaires. In addition, physical activity was assessed objectively, using accelerometers in a randomly chosen subgroup (n=100).

Besides addressing mental health (e.g. work engagement) and lifestyle (e.g. physical activity) as separate topics in the Mindful VIP intervention, we wanted to know whether these topics were also associated (chapter 3). We explored whether physical activity and work engagement were associated. In addition, since literature (e.g. 2-5) shows that physical activity seems to have a protective role in the development of mental health disorders, we explored whether associations also existed between physical activity and mental health in a general sense. We did not find any of the hypothesized associations of both objectively and subjectively measured physical activity with work engagement and mental health.

**Objective 2**
The objective of chapter 4 was to evaluate the process of the implementation the Mindful VIP intervention, and to explore associations between process measures and compliance. Process measures were assessed using a combination of quantitative and qualitative methods. The mindfulness training was attended at least once by 81.3% of the participants, and 54.5% was highly compliant (i.e. at least 75% of the intended dose of 8 sessions). For e-coaching and homework exercises, 6.3% and 8.0% were highly compliant. The training was appreciated with a 7.5 and e-coaching with a 6.8. Appreciation of training and e-coaching, satisfaction with trainer and coach, and practical facilitation were significantly associated with compliance. We concluded that the intervention was implemented well on the level of the mindfulness training, but poorly on the level of e-coaching and homework time investment. To increase compliance, attention should be paid to satisfaction with the trainer and coach and the trainer/coach-participant relationship.
The evaluation of the effects of the worksite mindfulness-based intervention is described in chapter 5 and 6. Chapter 5 presented the effects on work engagement, mental health, need for recovery and mindfulness. Chapter 6 described the effects on vigorous physical activity in leisure time, sedentary behaviour at work, fruit intake and behavioural determinants. Effects were analysed using linear mixed effect models. There were no significant differences in work engagement, mental health, need for recovery and mindfulness between the intervention and control group after 6 and 12 months of follow-up. Additional analyses in mindfulness-based training compliance subgroups (high and low compliance versus the control group as a reference), and subgroups based on baseline work engagement scores showed no significant differences either. In addition, there were no significant differences in lifestyle behaviours and behavioural determinants between the intervention and control group after 6 or 12 months either. Therefore, we concluded that this worksite mindfulness-based intervention did not improve work engagement, mental health, need for recovery and mindfulness after 6 and 12 months, nor could the effectiveness to improve lifestyle behaviours be established.

Chapter 7 described the economical evaluation of the Mindful VIP intervention. The intervention costs were €464 per employee (employers’ perspective). After imputation of the data, a statistically significant, but non-meaningful (0.19 on a scale from 0 to 6) adverse effect on work engagement ($\beta = -0.19; 95\%CI -0.38 \text{ to } -0.01$) was found after 12 months. There were no differences in job satisfaction, general vitality, work ability or total costs. It appeared that the Mindful VIP intervention was neither cost-effective from a societal perspective and from an employers’ perspective, nor provided it any return on investment. Therefore, this study provided also no evidence to support its implementation on cost grounds.

**Objective 3**

Chapter 8 showed that although the definition of occupational health is the same for all stakeholders, namely ‘being able to perform your job’, there seem to be some important differences in the views on what constitute the most important risk factor to occupational health. According to employees, occupational health risk factors are
prevalingly job-related. Labour unions agree with them, but other stakeholders, including the employer, particularly see employee-related risk factors such as unhealthy lifestyle behaviours. The differences in conceptualization of occupational health risk factors translate into different views on worksite health promotion. It results roughly in a comparable dichotomy of job-related and employee-related worksite health promotion activities. This difference in conceptualization indicates that worksite health promotion is generally not employee-driven, whereas professionals in worksite health promotion often aim at employee-related risk factors. The difference in conceptualization of risk factors for occupational health and of worksite health promotion also resonates in the way stakeholders understand ‘responsibility’. Even though all stakeholders agree on the employee’s own responsibility for healthy behaviour, the meaning of ‘responsibility’ differs between employees and employers. For employees, responsibility means autonomy, while for employers and other stakeholders, responsibility equals duty.

9.2 REFLECTIONS ON THE FINDINGS

To interpret the findings of this thesis, in this paragraph, I will reflect on these findings by considering methodological issues, program and theory failure, and ethical issues.

Methodological issues

Study design

The MindfulVIP intervention was evaluated in a Randomised Controlled Trial (RCT). This design is considered the most suitable design for (occupational) intervention research for several reasons (6). For example, the randomization avoids selection bias and the prospective design establishes effects over time. However, the workplace is known to pose challenges for intervention research and for RCTs in particular, due to the complexity of the work context (6). Controlling in a complex setting does not do justice to reality; it might even be questioned whether it is justified to speak of effectiveness (rather than of efficacy). In addition, contamination might be an issue. In the Mindful VIP study, primary contamination was not possible for the mindfulness-based training and e-coaching as these intervention components
were only accessible for intervention group participants. Nevertheless, secondary contamination was possible, because employees may have exchanged experiences and materials. However, effects of this secondary contamination are expected to be minimal. In addition, for the supporting elements such as the provision of fruit and lunch walking routes, contamination might have been possible. This may have reduced the contrast between the intervention and control group for fruit intake. Another issue of RCTs in the work context is compliance to the intervention. In the Mindful VIP study, not all types of jobs allowed employees to change their work schedules, which impeded participation in some intervention components. Also, other causes impeded standardization of the intervention. For example, not all employees were present at the worksite in the same amount of time during the intervention period (due to holidays, conference visits etc.).

*Imputation of data*

The effect evaluation did not show an effect on work engagement, whereas the economic evaluation did show a statistically significant effect on this outcome measure. This difference in results was probably caused by different analysis techniques where for the economic evaluation, data were multiply imputed, to enlarge statistical power for the generally underpowered cost-outcomes. In the effect evaluation, data was not imputed, because loss to follow-up was 9%, which was lower than anticipated in the power calculation (i.e. 25% loss to follow-up). Although there was a difference in the level of statistical significance, the size of the effects was comparable in both studies (-0.1 for the effect evaluation and -0.2 for the economic evaluation). Hence, selective dropout was probably not the cause of the difference in found effects. Moreover, the small size of the effect could be regarded as non-meaningful (-0.2 on a scale from 0.0 to 6.0).

*Study population*

The study population consisted of employees of two Dutch research institutes, of which the large majority (80%) was highly educated. As socio-economic status (SES) is a combined measure of occupation, income and education (7), our study population can be considered as of high SES. SES is known to be positively associated with
health, healthy behaviour, functioning and well-being (7). Given the probability of high SES and the therewith associated good health, ceiling-effects could be expected. The study population showed a slightly higher work engagement score (4.1) than the average Dutch employee (3.8) on scale from 0.0 to 6.0 (8). We considered this score left room for improvement, especially since the category ‘highly engaged’ starts with a score of 4.7 (8). Nevertheless, we did not measure the resources preceding work engagement, to restrict the burden (in terms of time investment) of the questionnaire on participants. Therefore, a ceiling-effect in resources can not be ruled out as an explanation for the lack of finding an effect of the intervention after 6 and 12 months. Concerning the lifestyle objectives of the intervention, lifestyle behaviours were specifically selected on their change potential based on a needs assessment (chapter 2). Therefore, ceiling effects on the selected behaviours are not expected. However, it appeared that the scores on the key determinants for the corresponding behaviours were already very high. This implies that ceiling effects for the behavioural determinants might have contributed to the lack of findings.

**Measurements**

Work engagement was the primary outcome measure of the Mindful VIP study, and was measured with the Utrecht Work Engagement Scale (8). Work engagement is a “positive, fulfilling, work-related state of mind that is characterized by vigour, dedication and absorption” (8). However, Sonnentag et al. (9) claim that to investigate state work engagement, one has to focus on work engagement as a momentary and transient experience that fluctuates within individuals within short periods of time (i.e., from minute-to-minute or from hour-to-hour, perhaps from day-to-day). In our trial, however, work engagement was measured once at baseline, and once after six and twelve months. It is therefore probable that we measured trait work engagement. This might explain why we did not find an effect. It is therefore recommended for future research, to measure state work engagement by repeated measures at the same day or week.

Another measurement that should be reflected upon is mindfulness. In the Mindful VIP study, mindfulness was measured using the Mindful Attention Awareness Scale
Although the MAAS is one of the most frequently used scales to measure mindfulness, its suitability is also subject of debate in literature, as it particularly measures states of *mindlessness* (a lack of mindfulness) (11). In addition, several items have shown to be incapable to differentiate (11). Therefore, the results should be interpreted with caution. In addition, the relevance of measuring mindfulness in itself can be disputed since there is disagreement in literature as to whether the effectiveness of mindfulness-based interventions is indeed due to increased mindfulness. Studies examining the working mechanism of mindfulness-based interventions found only a partial or no relation between an increase in mindfulness and health effects (12;13). From the above, it can be concluded that a lack of finding an effect on mindfulness, does not necessarily imply that the intervention could not have health effects or that the mindfulness-based training was not effective at all. Nevertheless, we did not find any effects on health outcomes.

Next to the measurement items, the time period after which follow-up measurement took place also needs critical reflection. Previous studies have prevalingly demonstrated overall effects of mindfulness-related interventions on short term; in most cases that is immediately after the training (14-17). Respondents of interviews from the process evaluation of the mindful VIP intervention (chapter 4) reported feeling ‘revitalized’, ‘fresh’, ‘energetic’, and ‘peaceful’ immediately after a training session, but they also reported that this faded away. We do not know whether the mindfulness-based training had an immediate effect, which could only have been captured directly after the training and not after 6 or 12 months. Since the mindfulness-based training was one component of the 6 month lasting Mindful VIP intervention, we measured the effects of the total intervention after 6 months. The study design does not allow insight into the effects of separate components. It is therefore recommended for future intervention research, to do intermediate follow-up measurement (i.e. immediately after the training) to gain insight into short-term attrition of possible effects, if present.

*Program and theory failure*

The lack of effects of the Mindful VIP intervention should also be reflected upon
by considering program and theory failure (6). Program failure regards the implementation; when an intervention has not been implemented as planned, it may reduce its potential effectiveness. Theory failure refers to the theoretical background of the intervention; an intervention may be well implemented, but will not be effective unless the rationale behind the intervention is sound (6).

Program failure
To determine whether the intervention was implemented as planned, the process of implementation of the Mindful VIP intervention has been evaluated (chapter 4). The intervention was implemented well on the level of the mindfulness-related training, but poorly on the level of e-coaching. It was intended to prolong mindfulness practice after the mindfulness-based training through e-coaching by the mindfulness trainers. However, only 6.3% of the participants received the dose of e-coaching as intended. Barriers for participation in e-coaching were the impersonal character of the e-coaching (lack of face-to-face contact), the unattractive lay-out of the e-coaching logbook, and the attitude and responsiveness of the coaches. The low dose of the e-coaching may have contributed to the lack of effects after 6 and 12 months.

Theory failure
A first sign of theory failure might be that our mindfulness-related training had a lower dose (8 weekly sessions of 90 minutes) compared to a ‘traditional’ mindfulness-based training (8 weekly sessions of 150 minutes) (10). Although a previous study demonstrated (immediate) effects of an intervention with a smaller dose (6 weekly sessions of 1 hour) (18), it may be that this dose was too low to generate an effect, especially after 6 and 12 months.

Secondly, the intervention was targeted at the needs of the study population, but not tailored to their individual needs. Mindfulness might not be appealing for every employee. The suitability of ‘One size fits all interventions’ has been questioned in various settings of health promotion (19;20). In other words, the lack of individual adjustment (tailoring) may have contributed to the lack of effects.

The third issue related to theory failure is the approach we chose to target both
work engagement and lifestyle-related outcomes. The chapters of this thesis cover multiple fields, where generally different terminology is used for similar types of approaches. For example, within the field of occupational psychology, job resources and demands constitute the job-related contextual factors (21). Within the field of health sciences, contextual determinants are generally conceptualized as environmental determinants. Environmental determinants comprise the physical, social, and economic environment of the individual (22). Within the field of medical humanities, contextual factors are referred to as collective factors (23). For uniformity purposes, I will apply the terms ‘individual approach’ and ‘contextual approach’, as umbrella terms comprising all factors from the different disciplines as summed up above. To target work engagement and lifestyle-related outcomes, we chose an individual approach, as opposed to a contextual approach. This individual approach might have contributed to the lack of effects on both work engagement, and lifestyle-related outcomes.

To date, the few studies that examined interventions with work engagement as outcome, have not been able to show an overall effect on work engagement (24-26). Of these studies, only the study by Ouweneel and colleagues (25) was primarily aimed at work engagement, whereas the other studies reported work engagement as a secondary outcome. However, they all have an individual approach in common. The findings of these intervention studies suggest that an individual approach to work engagement might not be the most effective approach. In 2009, when this PhD project started, it was assumed that aiming at personal resources (i.e. aiming at the individual employee) was the most promising strategy to increase work engagement, because personal resources explain why employees react differently to similar work environments (27;28). Recently, it became clear that to target work engagement, job characteristics (job demands, such as cognitive and emotional workload, and job resources, such as performance feedback and supervisory support) should be considered in addition to personal resources in an integrated model (29).

For lifestyle-related outcomes, literature reviews have shown that environmental factors and work characteristics (e.g. long work hours, shift work) should be taken
into account when developing an effective worksite health promotion intervention (30;31). It is therefore recommended to combine both contextual and individual components in an integrated approach in the future development of worksite health promotion interventions to generate effects among relatively healthy working populations.

**Ethical considerations regarding the Mindful VIP intervention**

In this paragraph, I will perform an ethical reflection on the development, implementation and evaluation of the Mindful VIP intervention by applying the findings of chapter 8.

For an ethically sound development of a worksite health promotion intervention, employees should be given a voice. The Mindful VIP intervention was developed in a systematic way, involving the study population. Although employees were involved in the development of the intervention, it can be stated that this was not sufficient. Employee involvement was not primarily driven by what employees consider occupational health risk factors and relevant worksite health promotion activities. Employees were queried on topics that were predetermined by the research team based on literature and in consultation with the employer.

Thereby, the voice of the employee was limited to the predetermined topics. Although the necessity of predetermination of topics could be seen as a practical constraint, ideally it should be reduced as much as possible to match the worksite health promotion activities to the needs of the employees. This match might in turn contribute to a good relationship between employer and employee. Predetermination might lead to ambivalence in this relationship, as employees might not feel acknowledged. In addition, a good match between needs and activities might also influence the reach and effectiveness of worksite health promotion, as ethical concerns of employees influence their decision whether or not to participate (32).

One of the predetermined conditions of the mindful VIP intervention was the individual approach of worksite health promotion. This leads to a second ethical concern
of the Mindful VIP intervention. By choosing a prevailingly individual approach beforehand, we have insufficiently acknowledged the work context of mental health and lifestyle. In literature, this is called ‘blaming the victim’ (23;33;34), which we also found this to be an important ethical consideration in chapter 8. Therefore, from an ethical point of view, an integrated approach of worksite health promotion in which both individual and contextual aspects are considered is recommended.

9.3 IMPLICATIONS AND RECOMMENDATIONS

This thesis provides insights into the development and evaluation of a mindfulness-related worksite health promotion intervention, and into stakeholders’ ethical considerations of worksite health promotion. In the following paragraphs, implications and recommendations for research and practice will be discussed.

A first recommendation for future research is related to the study design. Ethical concerns and the complexity of the work context might be dealt with by carrying out a different type of evaluation. I would plea for future research to consider responsive evaluation of worksite health promotion interventions. Responsive evaluation is a form of interactive research, in which the dialogue between stakeholders is key (35). This design permits to test whether the perception, views and ideas of the stakeholders correspond to those who designed the study. The role of the researcher changes from observing outsider (in traditional research) to an intermediate in translating and interpreting views of stakeholders (35). Responsive evaluation generally takes into account several ethical considerations from chapter 8, as employees (and other stakeholders) have a voice in the process. Involving the target population in the development of the intervention has become more common, as is demonstrated by for example the application of the Intervention Mapping protocol (1). Yet, the target population is currently not being involved in the evaluation. Therefore, responsive evaluation is justified. Nevertheless, I would like to refrain from stating that this type of evaluation should fully replace the RCT. The RCT has advantages for intervention studies that no other design offers, such as the possibility to differentiate between causality and association (6). To my opinion, ideally, ways to perform a responsive
evaluation alongside or within an RCT should be explored. I would suggest considering responsive evaluation as a continuous process evaluation alongside an RCT. As standardization is an important part of RCTs, and responsive evaluation requires flexibility, this seems to be a paradox. However, there are possibilities to incorporate the flexibility needed for responsive evaluation in a study protocol of an RCT. These possibilities have been demonstrated by for example participatory approaches. A participatory approach is a strategy in which stakeholders collectively inventory occupational health problems, collect solutions, deal with compliance issues and implement and evaluate solutions (e.g. \((36;37)\)). In retrospect of the Mindful VIP study, responsive evaluation alongside the RCT could have shown that there were signs of immediate effects after the training, and that these effects were fading away. This would have permitted us, for example, to organize repetition sessions, and in addition, it would have given us the opportunity to perform a short intermediate measurement of the primary outcome. To my opinion, this would have intercepted two important shortcomings of the Mindful VIP study; the dose of the mindfulness-related training, and the time period of the measurements.

A second recommendation refers to another limitation of the Mindful VIP study: the individual approach. Both the results of the trial and the exploration of ethical considerations indicate that worksite health promotion research and practice should have an integrated approach, in which both contextual and individual factors are considered. The importance of contextual factors to meet the challenges in occupational health due to demographic changes (see general introduction) was stressed by Van der Klink and colleagues \((38)\). According to them, the challenges due to demographic changes require that employees dispose of ‘capabilities’ as conceptualized by Amartya Sen \((39)\). A capability refers to both being able and being enabled. Van der Klink and colleagues emphasize that it is not only about individual behaviour or skills, but that it is also about the presence of a context that facilitates and enables \((38)\). Therefore, an integrated approach of worksite health promotion in which all these contextual factors (i.e. work-related, environmental and collective factors) are combined with the individual factors is warranted.
Although the Mindful VIP study did not show effects, I consider future mindfulness research with a population health approach still relevant. Considering the indications that effects might have been missed due to, for example, a too low dose and the rigid design, more research into the effects of mindfulness-related training with a population health approach is needed. Although subgroup analyses for high-risk subgroups (for example obese, high need for recovery), still did not show any effects of the Mindful VIP Intervention (unpublished data), the effectiveness of mindfulness-related training among populations at risk seems to be established in literature, at least at a short term. Therefore, both intermediate (and immediate) and long term follow-up measurements of effects are recommended to gain insight into the sustainability of effects of mindfulness-based training. Likewise, it is recommended for mindfulness-based trainers in practice to explore ways to maintain effects, if present. Ways to maintain possible effects are for example repetition sessions after the initial training, or mindful walks.

Last but not least, I would recommend taking ethical considerations into account beforehand, when developing, implementing and evaluating a worksite health promotion intervention.

Although an ethical evaluation afterwards has its merit, deliberating on ethical considerations should be a part of every step in the research process. It is not an instrument to improve quality, but it is part of the quality of the research (40). Based on the ethical reflection of the Mindful VIP study, I recommend for future research and practice of worksite health promotion, to match the worksite health promotion activities to the views and experiences of the employees. To do so, the discourse of employees and other stakeholders about occupational health (the way they talk about occupational health and give meaning to it) should be examined as a first step. Then, the same language can be spoken and needs can be met. Furthermore, I recommend an integrated approach to all stakeholders in worksite health promotion, in which individual and contextual factors are balanced.
9.4 CONCLUDING: WHAT THIS THESIS ADDS

From our RCT, it resulted that a worksite health promotion intervention consisting of 8 weeks of mindfulness-related training, 8 sessions of e-coaching, 6 months of fruit provision, a buddy system and lunch walking routes, was not (cost-) effective on work engagement, and other mental health outcomes, nor on lifestyle behaviours, and behavioural determinants. Therefore, we do not recommend large scale implementation of the Mindful VIP intervention in its current form in a general working population. Considering the indications that effects might have been missed due to, for example, a low dose and rigid design, more research into the effects of mindfulness-related training with a population health approach is needed.

Both the results of the trial and the exploration of ethical considerations indicate that worksite health promotion research and practice should have an integrated approach, in which both contextual (i.e. work-related, environmental and collective) and individual factors are considered. Such an approach is expected to increase the potential effectiveness of worksite health promotion and take into account ethical issues.
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