Chapter 11
Section 1 of this general discussion describes the main findings ordered per objective of the present thesis. In section 2, reflections on the findings are given by discussing methodological issues and the possibilities of a program and/or theory failure. Finally in section 3, an overall conclusion is presented and implications and recommendations for future research and practice are given.

5. OBJECTIVES AND OUTLINE OF THIS THESIS

This thesis addresses five objectives:

1) To investigate associations between NFR and overweight/obesity, self-perceived health, physical activity, detachment and relaxation in office employees during and after a workday;

2) To systematically develop and describe the design of the worksite social and physical environmental intervention program for office employees to reduce the NFR;

3) To investigate the measurement properties of the Detachment and Relaxation At Work (DRAW) scale and to assess the responsiveness of the Individual Work Performance Questionnaire (IWPQ);

4) To evaluate the process of implementation of the worksite social and physical environmental intervention program;

5) To study the (cost-) effectiveness of the worksite social and physical environmental intervention program.

1. OVERVIEW OF THE MAIN FINDINGS

- **Objective 1** was to investigate associations between NFR and overweight/obesity, self-perceived health, physical activity, detachment and relaxation in office employees during and after a workday:

*Chapter 2 describes the results of a cross-sectional study on associations between NFR, overweight, obesity and self-perceived health. Our results showed that obesity and poor health status were significantly associated with the NFR, indicating that*
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obesity and poor general health, poor mental health, poor sleep quality, high self-reported stress levels and poor vitality were associated with a high NFR. No significant associations were found between overweight and NFR.

Chapter 3 presents the results of a cross-sectional study on associations between NFR and physical activity during and after work hours, detachment and relaxation. Results showed that a lower NFR was independently associated with a higher frequency of stair climbing, more minutes spent in leisure activities, more detachment at work, more physical detachment at work, and more detachment and relaxation at home.

- **Objective 2** was to systematically develop and describe the design of the worksite social and physical environmental intervention program for office employees to reduce the NFR:

Chapter 4 describes the development and the design of the social and physical environmental interventions using a modified Intervention Mapping protocol. As a result of the needs assessment, the following two program objectives were prioritized (1) to increase daily physical activity at work, (2) to increase relaxation at work, both with the aim to improve the NFR. The social and physical environmental interventions were evaluated among 412 office employees of a Dutch financial service provider using a 2x2 factorial design with 12 months follow-up. The two factors were a social environmental intervention and a physical environmental intervention, of which the social environmental intervention was randomised at department level and the physical environmental intervention was stratified at department level, i.e., one stratum with environmental modifications and the other stratum without environmental modifications. This resulted in four research groups: (1) combined social and physical environmental intervention group; (2) social environmental intervention group only; (3) physical environmental intervention group only; (4) no intervention (control group). The social environmental intervention consisted of Group Motivational Interviewing (GMI), led by the teamleaders, and supported by a social media platform. The physical environmental intervention consisted of several environmental modifications (e.g., modifications in coffee corners, table tennis, sitting balls and standing meeting tables). Data were collected at baseline (T0), and after 6 (T1) and 12 (T3) months using questionnaires.
Objective 3 was to investigate the measurement properties of the Detachment and Relaxation At Work (DRAW) scale and to assess the responsiveness of the Individual Work Performance Questionnaire (IWPQ):

Chapter 5 presents the results of the assessment of the measurement properties of the DRAW scale. In the present study, a priori hypotheses were formulated for each of the four subscales based on three general assumptions. First, we hypothesized moderate ($r$:0.30-0.50) correlations between the DRAW scale and related questionnaires. Second, we hypothesized weak ($r$<0.30) correlations between the DRAW scale and more distantly related questionnaires. Third, as the DRAW scale is expected to be most closely related to the NFR, we hypothesized that correlations between the DRAW scale and the NFR should be higher than correlations between the DRAW scale and exhaustion, vigour, absorption, and dedication. The same hypotheses and three general assumptions formulated for construct validity were applied to measure responsiveness. It was revealed that all four subscales of the DRAW were internally consistent, reliable and had moderate (50-75% confirmed hypotheses) construct validity. Results for responsiveness were disappointing for within workday detachment and relaxation (<25% confirmed hypotheses), and moderate (50-75% confirmed hypotheses) for after workday detachment and relaxation. For now, the scale does not seem to be responsive enough and therefore should not be used in the current format in intervention studies.

Chapter 6 includes the results of the study on responsiveness of the IWPQ. In total, 39 hypotheses were formulated concerning correlations between changes in the IWPQ scales and changes in distinct constructs (e.g., NFR) and similar constructs (e.g., presenteeism). For the IWPQ scales, 23% (task performance), 15% (contextual performance), and 38% (counterproductive work behaviour) of the hypotheses could be confirmed. As hypothesized, the correlations of the IWPQ scales were slightly stronger with similar constructs than with distinct constructs, on average. However, in general, the correlations between change scores were weaker than expected. The weaker than expected correlations may be accounted for by characteristics of the intervention study, such as the relatively healthy, well-functioning study population, and the fact that the intervention study was not primarily aimed at individual work
performance. Based on the results of this study, no firm conclusions can be drawn about the responsiveness of the IWPQ.

- **Objective 4** was to evaluate the process of implementation of the worksite social and physical environmental intervention program at the Dutch financial service provider:

Chapter 7 describes the process evaluation of the social and physical environmental intervention program in the participating company. It was shown that the reach (i.e., percentage of teamleaders and employees that respectively attended or used the interventions at least once) of the social and physical environmental interventions ranged from 45-76%. Mean satisfaction was 6.0 for the social environmental intervention and 7.0 for the physical environmental intervention on a 0-10 scale. Generally, the teamleaders were more satisfied than the employees. From this process evaluation, two main lessons can be learned: 1. Not only during development, but also during implementation, both teamleaders and employees should be involved, and 2. It seems beneficial to add a social environmental intervention to a physical environmental intervention to better embed the physical environmental intervention.

- **Objective 5** was to study the (cost-) effectiveness of the worksite social and physical environmental intervention program:

It was hypothesized that the combined intervention would be more effective than the separate interventions compared to the control group. Multilevel analyses were performed to investigate the effects of the three interventions compared to the control group separately.

Chapter 8 shows the results of the social and physical environmental intervention on NFR. In all intervention groups, a non-significant reduction was found in the NFR (i.e., in the combined intervention it was nearly significant with (-6.8; 95%CI -14.0 to -0.4; based on Maximum Likelihood). In the combined intervention group, exhaustion and minutes spent in vigorous intensity physical activity decreased, and the number of small breaks at work and minutes spent in active commuting increased compared to
the control group. The social environmental intervention group showed a reduction in exhaustion, minutes spent sedentary at work and an increase in the number of small breaks at work and minutes spent in leisure activities compared to the control group. In the physical environmental intervention group, frequency of stair climbing at work and minutes spent in active commuting increased, and minutes spent sedentary at work decreased compared to the control group.

Chapter 9 presents the results of the social and physical environmental intervention on presenteeism, absenteeism, work performance (i.e., task performance, contextual performance, and counterproductive work behaviour) and work engagement (i.e., vigour, dedication, and absorption). The combined intervention showed a decrease in contextual performance and dedication. The social environmental intervention showed an improvement in task performance. The physical environmental intervention revealed an improvement in absorption.

Chapter 10 presents the results of the economic evaluation. At 12 months, the combined intervention group participants significantly improved their NFR (−8.4; 95%CI -14.6 to -2.2) compared to the control group, whereas this was not the case for the social and physical environmental intervention group (based on Multiple Imputation). Depending on the societal and employer’s willingness-to-pay and the probability of cost-effectiveness that they consider acceptable, the combined intervention may be considered cost-effective in improving NFR. Both separate interventions were not cost-effective in improving this outcome. Moreover, all interventions were neither cost-effective in improving general vitality (societal perspective) and job satisfaction (employer’s perspective), nor cost saving to the employer.

2. REFLECTIONS ON THE FINDINGS

In the following paragraphs, I will reflect on the findings of this thesis by considering methodological issues, i.e., study design, study population, statistical analyses, outcome measurement, and the possibilities of a program and/or theory failure will be discussed.
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Study design

A distinctive strength of our study concerns the randomisation of the social environmental intervention and the use of a 2X2 factorial design. The latter enabled us to simultaneously study the effectiveness of the combined, social and physical environmental interventions, respectively.

Our study design included the risk of contamination. Contamination was not considered to be an issue in the social environmental intervention for GMI, as we randomised at department level, but was expected to be so for the physical environmental intervention. Contamination was considered an issue because people in the other intervention groups (i.e., the social environmental intervention group and the control group) could easily use the table tennis at the other departments. To cope with this issue, the physical environmental intervention was stratified, i.e., one stratum with environmental modifications (i.e., 6 departments) and one stratum without these environmental modifications (i.e., 13 departments). To keep contamination at a minimum, the adaptations in the physical environment were made at floors 2 and 3, while the floors 0, 1 and floor 4 were excluded from the program.

We have applied the CONSORT statement criteria (1) for high quality trials to our study. The following criteria were fulfilled: detailed trial information (i.e., eligibility criteria for participants and detailed information about recruitment, setting and intervention) is given, objectives and hypotheses are described, information on sample size calculation is given, all outcomes are reported as stated in the protocol, concealed randomisation for the social environmental intervention is executed, interventions are described in a manner which allows for replication, participant flow is given, a table is provided with baseline data, intention-to-treat analyses are performed, limitations of the trial are given, generalizibility of the trial findings is discussed, information about trial registration and source of funding is given and there is access to the full protocol. Although our study meets a number of criteria, the following criteria were not met: blinding of the participants and intervention providers for the social and physical environmental intervention was impossible. We recommend that independent researchers should perform a quality or risk of bias assessment to verify our observations.
General discussion

Study population
A challenge regarding recruitment in randomised controlled trials is to minimise non-response in the target population. Non-response can be a significant threat to external validity of a study. In total, 1182 employees of the financial service provider were approached, and 412 of them participated (initial response rate of 35%). Compared to other studies, our participation rate is found to be consistent with response rates of other worksite studies (61 studies published in 2000 and 56 studies in 2005) (2). Moreover, the current sample mirrors the source sample in terms of gender and age, further adding to the external validity of the findings.

In the present study, efforts were directed at all office employees who were generally healthy instead of a selected high risk population with mental or physical health problems (3). The participants of our study had relatively positive baseline values on the NFR (M=33.2, SD=29.3), comparing this to norm scores (M=38.1) (4). This is in line with previous research, because participants in lifestyle projects are more likely to have adopted a healthy lifestyle, leading to above average health (5).

Statistical analyses
The results presented in chapter 8 and 10 differ on NFR, because of the different methods employed. We have applied multilevel analyses using the Maximum Likelihood estimation procedure to account for missing data in chapter 8 and 9 while in the economic analysis (chapter 10), Multiple Imputation was applied to account for the missing data. In chapter 8, it was shown that the results for the combined intervention group on the NFR were not significant (-6.8; 95%CI -14.0 to -0.4). However, for the cost-effectiveness analyses using Multiple Imputation, the results for the combined intervention group on NFR were significant (-8.4; 95%CI -14.6 to -2.2) (chapter 10). In practice, Maximum Likelihood estimation and Multiple Imputation are differently implemented, which can affect the outcomes of the analyses (6). This is an explanation for the different results obtained in chapter 8 en 10 on the NFR. The largest difference between the two is that for Maximum Likelihood no separate model is created, and there is no difference between the imputation model and the analysis model. With the Multiple Imputation technique, imputation is done separately from the analyses. Every time you apply imputation to a given set of data, one will get slightly different parameter estimates and test statistics.
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Outcome measurement

Detachement and relaxation. One of the objectives of this thesis was to investigate the measurement properties of the Detachment and Relaxation At Work (DRAW) scale. For this project, the subscales detachment and relaxation from the recovery experience questionnaire of Sonnentag (7) have been adapted to a within workday context (i.e., by changing the instruction and the response categories). Results for construct validity and responsiveness were disappointing for the DRAW scale. Detachment and relaxation during work seem to be difficult to measure (i.e., hard to recall). Furthermore, during some activities it’s easier to take a break, but during others it is problematic to leave the desk. The concept detachment could be more related to daydreaming or it could be related to a lack of concentration. As a result, detachment might depend on the type of task and can therefore also be seen as a signal of fatigue or boredom.

Individual work performance. Another aim of this thesis was to evaluate the responsiveness of the IWPQ which was previously developed (8) and validated (9). Results for the responsiveness of the IWPQ were disappointing. Several reasons may account for the weaker than expected relations. First, the study involved a relatively, healthy and well functioning population, which makes it harder to detect improvements. Also, the social and physical environmental interventions were not primarily aimed at improving individual work performance. Further, responsiveness was assessed based on the construct approach (10), which means that hypotheses were formulated concerning relationships between changes in the IWPQ and changes in other instruments. However, the instruments that were used for comparison showed a poor methodological quality and/or responsiveness had not been studied before. This is a limitation, as the IWPQ was thus tested against change scores of poorly or not known responsiveness.

Other remarks on measurement bias. With the use of self-reported questionnaires information bias is likely to be introduced, e.g., recall bias and self-favouring bias (11). Recall bias (i.e., not being able to precisely recollect one’s pattern) is likely to be present in our study for measuring physical activity, small breaks, stair climbing, detachment and relaxation. Previous research indicated that intensive physical activities are more easily recalled than light intensive physical activities (12).
Another issue is self-favouring bias which concerns the tendency of an individual to present him or herself in a favourable light for example to enhance self-esteem (13). Preferably, objective measurements for physical activity are more accurate than self-administered questionnaires; nevertheless, the latter are commonly used because they are relatively inexpensive and are easily used in intervention studies. Not all data collection of physical activity was subjective, however, because we did use accelerometers among a subsample. Unfortunately, we did not have sufficient accelerometers available, leading to a small sample. Therefore, these data are not included in this study.

Possible program and/or theory failure
There are two possible reasons for an intervention not to be as effective as expected, and these are program failure or theory failure. Program failure means that a program was so poorly adopted that it could not be effective. Theory failure implicates that although an intervention has been ‘perfectly’ implemented, it would not have led to improvements on the outcomes (i.e., the theoretical ideas and hypotheses behind the interventions were wrong) (14).

Program failure
In the present study, there were some signs of program failure. In the current investigation, the reach of the social and physical environmental interventions ranged from 45-76%. Since other workplace health programs mostly had reaches below 50% (32), this was seen as an acceptable result (15). On a 10-point scale, satisfaction was 6.0 for the social environmental intervention, 7.0 for the physical environmental intervention, and 6.9 for the combined social and physical environmental intervention. Disappointing results were found for the social media platform of which a reach was demonstrated of 0-34% and an average satisfaction of 4.3 (16). A reason could be that the majority of participants found the social media platform not appealing enough to be used. Moreover, at the time the intervention was conducted, not everyone had a smart phone that could have facilitated access to the platform.
Further, the process evaluation data (16) showed that teamleaders did not follow the GMI protocol to the fullest extent (fidelity: 59%). It seems that the rationale was not entirely followed by the teamleaders, who were not fully proficient in GMI after a two-day training. Since only two days were spent on teaching GMI, it could be that teamleaders did not have enough time to master the skills, which may have reduced the effectiveness of the GMI sessions. In addition to insufficient time, resources (e.g., capacities/current mental and physical health/earlier coaching experience) may have played a role as well. Research shows that line managers need sufficient resources to implement an intervention (17). Therefore, it is important to assess teamleaders’ resources as they could ‘make or break’ the intervention. For this, we found after analysing the baseline values for the NFR in teamleaders, the highest NFR in the physical environmental intervention group (M=31.8) and respectively lower values in the combined intervention group (M=25.6) and in the social environmental intervention group (M=21.8). These differences in NFR at baseline could have influenced the implementation of the intervention program.

For the physical environmental intervention, we also did not find 100% fidelity. Winston Churchill proclaimed in a speech to the House of Commons in 1943, “First, we shape our buildings, then they shape us.” This quote can be held in an analogy to the physical environment, which is first shaped by humans, but when finished, it has its own agency and influences on the people who are surrounded by it. To illustrate in our study, for the VIP Hall Zone, the fidelity was 66.7%, because at one department, the table tennis had to be removed, mainly because of complaints by employees about the associated noise. These adaptations should not be labelled as implementation failure. Instead, these adaptations could be a positive contribution to the outcomes (18). Besides, it could be that relatively ‘simple’ environmental modifications (e.g., placing signs to promote stair use) did not produce sufficient effects. Implementation of more drastic environmental modifications (e.g., restructuring entire department floor) could increase the effectiveness of the physical environmental intervention.
Theory failure?

Besides the above mentioned signs of program failure, the intervention could possibly also have been more effective if its reach had been optimal and all participants had used the interventions as intended.

In general, the interventions resulted in improvements related to physical activity. This could partly be explained by the fact that the financial service provider had recently renovated their fitness center and promoted its use more than in the past. The program also intended to stimulate relaxation, however, no results were found on that outcome. Relaxation comes in many forms and an increased understanding of this is vital for future intervention development. Also, focusgroup interviews with the target group during the development phase revealed that employees found relaxation an activity that one should do after work and not within workhours: "employees did not felt legitimized to relax during work hours".

Moreover, previous research has indicated that a combined social and physical environmental intervention has an advantage over individual interventions (19-23). To our knowledge, no worksite health promotion intervention has evaluated the effects of a combined social and physical intervention and the separate social and physical environmental intervention, compared to a control group. Related studies are found in ergonomics, for example a study by Feuerstein et al., (24) on the effectiveness of a single ergonomic approach and of a combined approach offering a job stress management program compared to usual care. Similar as in our study, the combined approach was not more effective. This was also seen in a study of Bernaards et al., (25), in which the effectiveness of a work style intervention and a combined work style intervention with physical activity was evaluated. Also, this study did not show that the combined intervention was more effective compared to the work style intervention alone. An explanation for these findings and the findings of our study is that a combination of interventions could have resulted in a lack of focus resulting in smaller behavioural changes.

Although no overall combined intervention effect was shown, there may be subgroups (i.e., based on age, working hours per week) within the total group who benefit from the applied interventions. For this, a new analysis method called Qualitative INteraction Trees (QUINT) can be used, developed by TNO Life Style in
collaboration with the Catholic University of Leuven (26). QUINT makes it possible to show which intervention is best for a given individual considering its treatment and personal characteristics at baseline.

Also, few studies have investigated the effects of a WHP program on improving NFR as primary outcome measure. A study in which the NFR was considered as a secondary outcome is a 6-month worksite vitality intervention program aiming at improving physical activity, nutrition, and relaxation among older Dutch hospital employees. The results showed that the NFR was reduced in the intervention group compared to the control group at 6 months, but this effect disappeared at 12 months (27). Other studies with the NFR as secondary outcome did not show effects on the NFR, such as a study among construction workers aimed at improving sustainable employment (28) and a study among employees of two Dutch research institutes aimed at improving physical activity, dietary behaviour and sedentary behaviour (29). In all of these studies, the interventions were aimed at changing individual behaviour. Previous studies have shown that for developing lifestyle interventions, work characteristics (30) (i.e., workload, job control) and environmental factors (31) should be taken into account. Higher effectiveness is expected when interventions also concentrate on the organization of work, however, within the present study it was not feasible to pay attention to work characteristics such as the (re)structuring of work processes to diminish work load.

3. IMPLICATIONS AND RECOMMENDATIONS

This thesis provides insights into the development and evaluation of a worksite social and physical environmental program. In the following paragraphs, an overall conclusion is given and implications and recommendations concerning research and practice are taken into account.

The need for recovery and work-life balance

During the course of this thesis, increasing attention was paid to flexible working (in Dutch ‘het nieuwe werken’) in organizational, political and public debates. Depending on the type of work, technology allows employees to work practically
everywhere and anytime. The ‘virtual’ office never closes as people have access 24/7 through their computers, tablets and mobile smart phones. This is likely to stress an individual’s work-life balance and could influence a person’s NFR negatively. Therefore, more insight is needed on how to create workplaces with sufficient flexibility to allow employees to fulfil their recovery needs with regard to their work-life balance. Thus, in addition to the current questions asked in this thesis on NFR, future research should also focus on work-life balance. In my opinion, this might be crucial for employees’ to control their workload, to remain satisfied and committed to the job and organization.

**Employees as passive recipients**

In my opinion, the role of employees and line managers should be carefully evaluated in occupational health intervention research. It is plausible that the current process evaluation paradigm by Steckler & Linnan (32) is too static for this. This evaluation paradigm focuses in our case on employee’s reactions, such as dose delivered (components delivered to participant), dose received (participants use), reach (attendance rate) and fidelity (components delivered according to plan). In this way, employees are considered as ‘just passive recipients’. Because we used intervention mapping as a tool in which employees were involved from scratch, we should not only measure satisfaction with the interventions and whether the interventions were delivered, but also how employees and teamleaders could have influenced the intervention process. Also, in line with this is that employees and teamleaders should be both involved in the development and implementation of the interventions. More qualitative information during implementation about the intervention process (i.e., fidelity) and content are needed. By doing so, an intervention can be directly revised when problems are revealed or when suggestions for improvement are given. Thus, I suggest that a more in-depth process evaluation will help to distinguish between theory and program failure and could help to act in solving the errors that were encountered.
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Group paradigm

When developing the interventions, we used focus group interviews for the needs assessment, which is in line with the intervention mapping protocol (33). Moreover, we decided to adjust individual motivational interviewing to a group context, defined as Group Motivational Interviewing (GMI) (34-39). A group setting has several benefits, e.g., sharing experiences, providing feedback and giving support (39). Social Identity Theory proposes an explanation for this in which it is stated that people form perceptions of an in-and out-group. Group membership, be it in the form of a focus group or being part of an intervention group, provides some stability and a meaningful purpose, adding positively to one’s well-being (72). Through participation, one can see oneself as belonging to an in-group because of feelings of special attention that other groups do not receive. It creates a sense of solidarity and this may increase feelings of social support. I suggest employing a group paradigm by e.g., ‘belonging to a steering group or an intervention group’ (i.e., creation of an in-group). This is likely to improve participation in WHP programs.

Prevention and high-risk strategies

Another recommendation has to do with our study population. Efforts were directed at all office employees of the selected departments, who were generally healthy and had a relatively low NFR. To be more effective, it is recommended for future studies to focus on a high-risk population (e.g., people with a high NFR). The population approach (i.e., primary prevention for all individuals) and the high-risk approach both have their counterparts in prevention. With the high-risk approach, interventions are developed and implemented which are appropriate for a selected group of individuals, i.e., interventions to reduce NFR for individuals with a high NFR. Screening for high risk individuals results in an intervention group with enhanced motivation, because the needs and thus the benefits are greatest (40). Therefore, a high-risk strategy is more likely to be cost-effective and/or cost saving when having limited resources. However, applying a high-risk approach does not deal with the causes of the problem, but it will identify people who are vulnerable to these causes (40). A high-risk strategy poses therefore a threat, necessitating a year-after-year effort to protect the ones who are vulnerable to the causes of a disease. A combination of
universal prevention (i.e., measures targeted to general public or all members of a specific group), selective prevention (i.e., directed to individuals/groups with above average risk of developing problem) and indicated prevention (i.e., individuals/groups that have minimal but detectable signs of the problem) may therefore be necessary to tackle a full degree of prevention and protection in work settings (40-42). Personally, I propagate an approach that combines both a universal and selective strategy, provided that this approach is combined with physical environmental adaptations. In particular, the creation of a healthy environment that facilitates the desired lifestyle changes in practice is important.

**Overall conclusion**
The present thesis has shown that the social and physical environmental interventions were not able to induce significant effects on the NFR in office employees. We did find a non-significant trend in the reduction of the NFR among all intervention groups. Further, significant positive intervention effects were found on exhaustion, task performance, absorption, number of small breaks, minutes spent in active commuting, frequency of stair climbing, minutes spent sedentary at work and minutes spent in leisure physical activities. Unexpected significant negative intervention effects were found for vigorous intensity physical activity, contextual performance and dedication. The combined intervention can be regarded as cost-effective in improving the NFR from both the societal and employer’s perspective, but this depends on the respective decision-makers’ willingness-to-pay per point improvement as well as the probability of cost-effectiveness that they consider acceptable. The findings make clear that, although positive effects were found, it is not recommended to implement the program in its current form. In part, this is due to issues in the research context such as methodological issues, and program and/or theory failure. At the same time, we found that the reach of the interventions was fairly good and that the participants were generally satisfied with the interventions. This indicates that interventions focusing on the social and physical environment have potential in the future, despite the observed limited effects. To retain the knowledge gained in this thesis, I suggest considering the interventions to be part of a continuous improvement cycle. Therefore, I would advise to take the recommendations below into account.
RECOMMENDATIONS FOR FUTURE RESEARCH

Measurement

- Attention should be devoted to the development of a reliable, valid and responsive questionnaire for measuring relaxation and detachment during work hours. In addition, other measurement instruments should be employed such as observation, physiological measurement (i.e., stress hormones, blood pressure, vagal tone), and the use of diaries or interviews.
- As responsiveness of both the DRAW and IWPQ was assessed with instruments of which not all measurement properties were known, future research should stress more on the development of high quality instruments. Besides, a uniform guideline should be developed to assess and interpret scores of responsiveness (i.e., a starting point could be the COSMIN guideline) (43).
- Future research should focus on obtaining more solid standards for the assessment of physical activity, sedentary behaviour, small breaks and stair climbing at work. For this, heart rate monitoring, accelerometers, GPS-related techniques or other modern technologies can be used.

Process evaluation

- Future research might consider a more in-depth process evaluation. As both employees and line managers are active agents in shaping the intervention and process, qualitative data should be collected on the line manager’s and employees’ role during implementation.

(Cost-) Effectiveness

- As the present study was conducted among office employees with generally ‘normal’ baseline values, it is recommended to study the effectiveness of an intervention among a high-risk population (people with NFR>54.5).
- Also, it is recommended to investigate the effectiveness among subgroups (i.e., age and education), for example, based on the Qualitative Interaction Trees (QUINT) method.
Choosing to implement a program is based on many considerations, among which the costs are important. For future research a better understanding is needed of non-economic benefits of WHP programs and those related to productivity and organizational effectiveness, as this could lay a foundation on which implementation is decided upon.

RECOMMENDATIONS FOR FUTURE PRACTICE

Overall
- The combined intervention did not result in strong effects and there was hardly an overlap in the outcome measures that were found to be effective following the separate social and physical environmental interventions. A lack of focus might be a possible explanation for this. The combined intervention should be implemented with more focus on the separate elements, i.e., better communication and integration of elements.
- The present study focused on the social and physical environment and for future studies the organizational environment (i.e., structures and procedures) might be taken into account as well. It is recommended to pay attention to four levels; intervention actions targeting the level of individual, the group, the leader and the organizational procedures and structure. Taking these separate elements into account helps the evaluator to identify which actions lead to certain results. To illustrate, the human resource department might be responsible for changes in organizational procedures.
- It is also recommended that line managers and employees have sufficient resources (i.e., capacities/current physical and mental health/ earlier experience in coaching) available to develop and implement the intervention, e.g., through training.
- Also, it is suggested that during development and implementation, both teamleaders and employees should be involved.
- It is recommended to integrate the health program into daily operations of the line managers and link health promotion objectives to business objectives in an integral health management approach.
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- It is recommended to employ a group paradigm for developing (steering group) and for delivering interventions (team-based interventions) for both the social and physical environmental intervention.

Social environmental intervention
- More frequent GMI-contacts are recommended as the current 2-day GMI-training and the 4 GMI-sessions may not have been sufficient to generate large significant effects. For this, a state of the art technique like ‘serious gaming’ (44) (a virtual worksite environment) can be used for more intensive GMI-training and GMI-sessions. With this participants can log in anytime and anywhere.
- It is recommended to employ a social media platform to the fullest extent by designing a strategic plan, incentives for regular use, emphasising elements such as praise, competition and recognition. Also, the social media platform should be linked to existing platforms (e.g., Facebook, Twitter).

Physical environmental intervention
- It is recommended to implement more drastic physical environmental interventions (i.e., restructuring of entire department floor). It could be that relatively ‘simple’ environmental modifications (e.g., placing signs to promote stair use) did not produce sufficient effects.
- It is recommended to collect qualitative information during implementation about the intervention process (i.e., fidelity) and content. By doing so, an intervention can be directly revised when errors are encountered or when suggestions for improvement are given.
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