

Summary

Sustainable employability is one of the major challenges for industrialised countries in the next decades. Because of the shrinking and ageing working population, it is important that more workers prolong their working life in a healthy and productive way. The challenge to prolong healthy and productive working lives is the most eminent in industries with high physical workload. Because workers with physically demanding jobs run an increased risk for a lower work ability and poor health, many of them are currently retiring at a younger age than the official retirement age. Moreover, these workers report that they are less able and less willing to continue working until their official retirement age compared to other workers. Thus, in order to support sustainable employability among workers with physically demanding jobs, there is a need to develop policies and intervention programmes to promote their work ability and health (**Chapter 1**).

The main objectives of this thesis were (i) to identify factors that influence the ability and the willingness to continue working until the age of 65 years in the general population of employees aged 45-64 years and in the specific population of construction workers, and (ii) to develop and (iii) to evaluate a tailored prevention programme to promote the work ability and health of construction workers. The first objective was addressed in Chapter 2 and 3, the second objective was addressed in Chapters 4 and 5, and the third objective was addressed in Chapters 6 to 9. In Chapter 10, the results of this thesis were summarized and discussed.

Factors to continue working until the age of 65

Chapter 2 describes a longitudinal study with one year follow-up, in which 4.937 workers aged 45-63 included in the Netherlands Working Conditions Cohort Study were studied to investigate which factors influenced the ability and willingness to continue working until the age of 65. This study showed that older workers and men were more often able and willing to continue working until the age of 65. Moreover, workers with emotional exhaustion were less often able and willing to continue working until the retirement age, whereas a work handicap was related to a lower ability to continue working until the age of 65. In addition, using force, emotional demands, a lack of social support from the supervisor and having a work handicap also predicted that workers felt less often able to continue working, whereas

inappropriate behaviour by colleagues or supervisor predicted more often a lower willingness to continue working until the age of 65.

Chapter 3 describes a cross-sectional study on the factors associated with the ability and willingness to continue working until the age of 65 in Dutch construction workers. For this study, 5,610 construction workers of the Netherlands Working Conditions Survey were included. This study showed that older construction workers were more often able but less willing to continue working until the age of 65. Besides, the occurrence of musculoskeletal symptoms was associated with both a lower ability and willingness to continue working, whereas emotional exhaustion was only associated with lower ability to continue working. In addition to physical job demands (i.e., using force and working in awkward postures), several psychosocial factors played a significant role in both the ability and willingness to continue working in construction workers. Specifically, lower supervisor support and lower skill discretion were associated with both a lower ability and willingness to continue working. In addition, dangerous work, occasionally using force, working in awkward postures, and lack of job autonomy were associated with a lower ability to continue working, whereas working overtime was associated with a higher ability.

Development of a prevention programme to prolong a healthy working life

The structured development of an intervention to promote the health and work ability of construction workers is outlined in **Chapter 4**. The intervention was developed by using the Intervention Mapping protocol, in which evidence from the literature was combined with qualitative data from stakeholders (i.e., older construction workers, managers, providers, and researchers). According to the principles of the Intervention Mapping protocol, the first step resulted in two program objectives: (i) construction workers improve the balance between physical workload and recovery, (ii) and construction workers improve their range of influence at the worksite. For each programme objective, materials were developed and combined into one prevention programme lasting six months. Finally, the intervention programme consisted of the following components: two individual visits at the worksite from a physical therapist, a Rest-Break tool to raise awareness about reducing fatigue by taking flexible rest breaks, and two interactive group sessions from an empowerment trainer. Following the Intervention

Mapping protocol resulted in an intervention that was not only tailored to the construction workers' needs and desires, but also to the abilities and opportunities of employers and programme implementers.

Chapter 5 presents the design of a cluster-randomised controlled trial, in which a process, effect and economic evaluation of the worksite prevention programme took place. The study included 293 construction workers from six construction companies in the Netherlands. Measurements took place at baseline, and at three, six and 12-month follow-up. Outcome measures were work ability, health (i.e., physical and mental health status, and musculoskeletal symptoms), work engagement, physical workload, need for recovery, social support, and sick leave. Sick leave data were acquired from continuous registration systems of the companies after follow-up.

Evaluation of the prevention programme among construction workers

Chapter 6 describes the implementation process and feasibility of the prevention programme at construction worksites. Although the research team faced immense difficulties in recruiting companies, the reach among workers of companies that finally participated was high (84%). Because the training sessions of the intervention were held at the worksite, 61% of the construction workers followed at least three out of four training sessions. The main reason for not attending the training sessions was the high impact of the financial crisis for one company, which had to lay-off workers and had to force the remaining workers to work part-time. The Rest-Break tool was hardly used by the workers. Main reasons for the lack of interest in the tool were that workers already took short-rest breaks at the worksite or that they were not able to follow the advice from the tool in practice. Regarding the satisfaction of the construction workers, the study showed a varying satisfaction towards the programme: workers were moderately satisfied with the training sessions of the physical therapist and empowerment trainer, whereas they rated the Rest-Break tool as unsatisfactory. Overall, 64% of the construction workers recommended the intervention to their colleagues. The training sessions of the physical therapist were recommended by 76% of the construction workers. Finally, contextual factors, such as working in a smaller company (< 100 employees) and higher management engagement towards the program, positively influenced the implementation of the intervention.

Chapters 7 and 8 present the effect evaluation of the prevention programme within a cluster-randomised controlled trial. A total of 15 departments from six companies participated in the trial; eight departments (n=171) were randomised to an intervention group and seven departments (n=122) to a control group. After 12 months, the loss-to-follow-up was 24% in the control group (n=29) and 30% in the invention group (n=51). **Chapter 7** concludes that the intervention neither improved social support nor work engagement, nor was effective in reducing the physical workload and need for recovery among construction workers. Even an adverse effect was found for physical workload at 6 months of follow-up. in which the intervention group reported a small but significant increase in physical workload compared to the control group. The results were neither influenced by the number of followed training sessions of the workers nor by the contextual factors as described in Chapter 6. Furthermore, no differences between the intervention and control group were found for work ability, physical and mental health (**Chapter 8**). Although the intervention showed a beneficial decline in the 6-month prevalence of musculoskeletal symptoms and long-term sick leave among construction workers in the intervention group, both reductions were not statistically significant at any of the measurements.

An economic evaluation from an employer's perspective in terms of a cost-effectiveness and financial return is described in **Chapter 9**. Data on work ability and health were collected at baseline, and at three, six and 12 months of follow-up by questionnaires. Costs due to sick leave were collected and calculated after 12 months of follow-up, whereas intervention costs were valued using the market prices that the six companies had to pay for the intervention. For the economic evaluation, missing data were imputed using multiple imputation. The prevention programme resulted, as described in Chapter 8, in non-significant effects on health and work ability, but significantly lower costs due to reduced sick leave. Due to a lack of effect on the primary outcomes and confusing results from the sensitivity analyses, we need to conclude that the intervention was not cost-effective compared to the control group. The financial return was estimated using a return-on-investment analysis. This analysis showed that the intervention was cost-saving for the employers due to reduced sick leave costs in the intervention group. Specifically, for each €1 invested in the intervention group, €6.4 was gained by the company.

Chapter 10, the general discussion, started with presenting the main findings in the light of the study objective, followed by methodological issues that should be acknowledged when interpreting the findings. Recommendations for future researchers and implications for practice were addressed in this Chapter. The general conclusion of objective one was that prevention of emotional exhaustion and promotion of a healthy social work climate may support both the willingness and ability to continue working until the age of 65 in older workers. Among construction workers, not only a poor health and high physical workload but also high psychosocial job demands play a role in their ability and willingness to continue working until the retirement age. The overall conclusion of the prevention programme, in which both physical and psychosocial factors were addressed, is that it neither improved work ability, health status, social support, and work engagement, nor reduced the physical workload and need for recovery among construction workers in the intervention group. However, the statistically non-significant reductions of the prevalence of musculoskeletal symptoms and sick leave and the finding that the non-significant reduction in sick leave resulted in a positive financial impact for the employer is intriguing. This, in combination with the fact that the construction workers were rather positive about the overall intervention, indicates that interventions focusing on physical *and* psychosocial work factors still have potential in the future.