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### Promotion of sustainable employability

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## **Chapter 8**

### **GENERAL DISCUSSION**

## Chapter 8

The objectives of this thesis were 1) to provide an overview of effectiveness of existing occupational health interventions in the meat processing industry, 2) to compare energetic workload and energetic capacity in production workers, 3) to evaluate the POSE program (Promotion Of Sustained Employability) on its implementation process, effectiveness, and cost-benefit, and 4) to study associations between indicators from the POSE program and work ability. In this chapter, the main findings of the thesis are summarized and interpreted, methodological considerations are addressed, and recommendations for science and practice are presented.

### MAIN RESULTS

#### *Existing evidence on effectiveness of interventions in the meat processing industry*

In **chapter 2** a systematic literature review showed studies about the effectiveness of three types of occupational health interventions in the meat processing industry: ergonomics programs, skin protection, and Q fever vaccination. Ergonomics programs focused on workplace health and safety and their effects on injuries and sickness absence. Programs focused on the effect of added rest breaks as well. Very low level evidence for the effect of added rest breaks on ratings of perceived discomfort was found. Skin protection comprised the use of gloves and hand creams. Moderate level evidence for the effectiveness of skin disorder prevention was found. Regarding Q fever, high-quality evidence for strong effectiveness of Q fever vaccination was found. It was also found that studies on workers' health surveillance (WHS) programs for meat processing workers were lacking.

#### *Objective comparison of workload and capacity*

Workload of meat processing workers consists of static and energetic load. In **chapter 3** a novel method was introduced which compared energetic workload and energetic capacity at the workplace by objective methods. Workers in the meat processing industry worked at 18% of their heart rate reserve or 33% of their energetic capacity. Based on heart rate reserve, 17% of the workers exceeded the maximum acceptable working time. Besides having a higher objectified energetic workload, these workers did not differ from workers who did not exceed maximum acceptable working time.

**Study design**

In **chapter 4** the design of POSE program evaluation was described. The POSE program is a WHS program specifically designed for meat processing workers and consisted of the following components: questionnaires on work ability and health, biometric screening, Functional Capacity Evaluation (FCE), and a counseling session. Interventions could be deployed on indication. The program was evaluated in a stepped wedge trial with a one to three-year follow-up.

**Quality of the implementation process and stakeholder satisfaction**

The process evaluation described in **chapter 5** showed that different strategies were followed to recruit workers for the POSE program in the different participating plants, which also resulted in different program reach. The dose of program components that was delivered to participants was high, ranging from 85 to 100%. The dose that was actually received ranged from 66 to 100%. The program components were delivered according to protocol and, when assessable, fidelity was 100%. Information on program follow-up and FCE fidelity was lacking. Participants and company stakeholders were generally satisfied with the POSE program. Several personal and contextual factors influenced program implementation. One major barrier was economic recession in the Netherlands. Other barriers were novelty of, and skepticism towards the program. Factors that facilitated implementation were management support, organization during working time and near the work floor, and growing awareness about sustainability in society in general.

**Effects of the POSE program on primary and secondary outcomes and cost-benefit**

The results of the effectiveness study in **chapter 6** showed a significantly negative effect on all primary outcomes. There was significantly more sickness absence (OR=1.40), lower work ability (B=-0.63), and a lower chance for full productivity (OR=0.71) in the experimental condition. On the secondary outcomes vitality, subjective health, and psychosocial workload no differences between experimental and control condition were found with the exception of the psychosocial outcome meaning of work, where the experimental group scored significantly higher. The cost-benefit analyses from the employer's perspective (absenteeism and presenteeism costs) showed negative results for net benefit, benefit-cost ratio, and

## Chapter 8

return-on-investment. Extra costs could be divided into 42% caused by absenteeism and 58% caused by productivity loss.

### *Work and health indicators associated with work ability*

In **chapter 7**, associations between work ability and several POSE program indicators were investigated, with the aim to make screening more efficient. Work ability was found to be significantly and independently associated with age, need for recovery after work, overhead work, and systolic blood pressure. This study showed that work ability can be explained from different perspectives, i.e., a health perspective, a work perspective, and a functional capacity perspective. The finding that age is negatively related to work ability stresses the need for interventions targeted at the aging workforce in the study sample.

## INTERPRETATION

### *Main findings*

In the Netherlands many employers are aware of the urgency to invest in sustainability, of companies as well as of workers<sup>1</sup>. For this reason, policies have been developed and put into practice. For policy on sustainable employability to be effective, change is required at the individual and organizational level. The systematic review in this thesis (**chapter 2**) described several organizational interventions to improve health of meat processing workers. Evidence of effectiveness was presented for ergonomics programs, skin protection, and Q fever vaccination. This thesis added evidence for a WHS program designed to improve sustainable employability of meat processing workers. However, effectiveness could not be demonstrated within a one to three-year follow-up period. The results of this study should be interpreted in the specific context of the meat processing company. This study was carried out during economic recession, when two plants were closed because of reorganizations. Research indicates that sickness absence decreases during periods of economic recession, but also increases in times of economic prosperity<sup>2</sup>. In the years prior to the POSE program (until 2011), the company had already been working on reducing sickness absence for a couple of years. At study baseline, the sickness absence rate was already as low as approximately 4%. This may have caused a ceiling effect regarding

effectiveness which may have limited a positive effect on (a part of) sickness absence. Furthermore, after 2013, economy started to grow again<sup>3</sup>. This may explain the increase in sickness absence at the end of the study and thereby the adverse effects of the POSE program.

The process evaluation in this thesis (**chapter 5**) was conducted to provide insight into possible reasons for the (in)effectiveness of the POSE program. Unfortunately, the data from the process evaluation could not be associated directly with effect outcomes. In our studies, too much process information at the individual level was missing to allow for this. The process evaluation showed that POSE program implementation went according to plan, although some program components could not be evaluated. One important issue was the lack of information on the counseling and follow-up process. Therefore, we had no information on whether participants understood the advice they received on their risks, which might have had an adverse effect on their outcomes. As shown in a previous study, workers need help with interpretation and advice in dealing with a health risk<sup>4</sup>. Raising health literacy will allow workers to make sound health decisions in everyday life, at home and at work<sup>5</sup>. If participants did not act on the advices they received, effects may also have turned out to be negative or lacking.

Effects were either adverse or absent, but it is unknown whether this was caused by the POSE program. Nevertheless, the program had some positive effects. Participants were satisfied with the program; they had the feeling they were heard and valued. The occupational health service emphasized that the POSE program had achieved one of the main goals of WHS, i.e., identification of people at risk. The POSE program identified many workers (84%) with one or more health and employability risks. They all received advice for further interventions. Making workers more aware that they are at risk of health loss and giving them advice to contact health care professionals may have resulted in sickness absence shortly after participation in the POSE program. Although this may have resulted in a negative effect on the sickness absence rate in the intervention group, it can be seen as a desired effect from an occupational health care perspective. Sickness absence on the short term can be a strategy to prevent sickness absence on the long term and thereby improve chances for sustainable employability. Participants indicated that the program created awareness about their health status and employability, a first step in behavioral change

## Chapter 8

models<sup>1</sup>. They were more aware about their own responsibility and appreciated the opportunity to work on their health and employability<sup>6</sup>. As a result, company management decided to implement the POSE program throughout the whole company, before results of the effect evaluation were known. So, even if the POSE program was not effective on sickness absence, work ability, and self-reported productivity within a one to three-year follow-up, it may still be beneficial for others to adopt a similar program in order to change behavior in the future.

In the process and effect evaluation (**chapter 5 & 6**) it was mentioned that the negative results could be explained by program failure, i.e., the program was not implemented as intended<sup>7</sup>. It was shown that during implementation of the POSE program several barriers were encountered. Not only by the company implementing it, but also by the occupational health care providers. Some of the barriers were inevitable, but had to be overcome (novelty, skepticism). Other barriers could have been anticipated, but were still encountered (workforce planning, availability of interventions). These barriers may have caused the program not to be implemented fully according to protocol. The negative effects after the POSE program might be attributed to theory failure as well, meaning that, despite high participation rates and adequate follow-up, the intended results were not achieved<sup>7</sup>. The idea of the POSE program was to construct it in such a way that it was comprehensive and job-specific. Face validity was assumed, but no scientific validation was performed on comprehensiveness and job-specificity. Lack of effects might therefore also be attributed to theory failure, because the program was not sufficiently attuned to the needs of the specific occupation. On the other hand, previous reviews on (job-specific) WHS and workplace health promotion (WHP) programs have provided evidence for their effectiveness on several health-related outcomes, but only modest positive effects on sickness absence<sup>8-10</sup> and work ability were identified<sup>10</sup>. However, those reviews did not present information on the implementation process.

To our knowledge, this study was the first to investigate the effects of a WHS program on sustainable employability. Other studies on workplace health promotion programs have investigated similar outcomes to our study<sup>10-12</sup>, but this is among the first to specifically study sustainable employability<sup>13,14</sup>. Similar to our study, those studies reported no or negative results for sickness absence, work ability, and productivity. Contrary to our study,

several other studies differed on primary and secondary outcomes<sup>9,10,15,16</sup>. In concordance with the negative effects on the primary outcomes, the POSE program did not result in financial benefits in the follow-up period. Both higher sickness absence and lower self-reported productivity led to significantly more costs after program implementation. As indicated in **chapter 6** this finding differed from most other studies on workplace health programs<sup>15,16</sup> which reported positive financial results. Different findings compared to other studies may be explained by differences in interventions, differences in study samples, and may also depend on the timing of the study. Another explanation may be publication bias, indicating that mainly positive effects and positive financial results have been published previously<sup>17</sup>, while negative or indifferent results, if or when present, may not have been published.

### ***Fine-tuning of the POSE program***

In literature the consensus opinion is that WHP programs need to be in place for at least three years to observe any possible positive health and financial outcomes but that annual assessments of those outcomes are necessary to track progress and fine-tune the interventions<sup>18</sup>. In the effect study health outcomes were evaluated repeatedly in a three-year period, but the POSE program has not been fine-tuned intermediately. Development of the POSE program was initiated by the company and performed in cooperation with an occupational health service. It is unknown whether the needs of the workers were reflected and incorporated in the contents of the POSE program. Possibly, fine-tuning of the program could be achieved by taking into account the needs and preferences of workers. Consequently, better attunement may lead to better program results. A recent study demonstrated that those needs can vary between different ages, between educational levels, and between genders<sup>19</sup>. In general, workers reported a need for programs addressing physical activity (55%), general health (45%), stress management (39%), healthy nutrition (33%), and smoking cessation (7%). Programs provided by the employer were favored over programs at one's own discretion<sup>19</sup>.

Another way to fine-tune the occupational health care process can possibly be achieved by relating screening indicators to interventions. First, there should be more clarity on how to categorize outcomes. When is someone not at risk, extremely at risk, or only moderately at

## Chapter 8

risk? Gaining more insight into which risk category should lead to a certain intervention may benefit the effectiveness of the referral process and effects on outcomes. Second, more knowledge must be acquired about the effectiveness of interventions. As indicated before, interventions should reflect the needs of individuals.

Further fine-tuning may be deployed by introducing a stepped-care procedure<sup>20</sup>. This means that workers do not receive more care than strictly necessary. Translating this procedure to the POSE program implies that workers are screened on a restricted set of risk indicators. The cross-sectional study on associations in the POSE program (**chapter 7**) showed that work ability was related to age, need for recovery after work, overhead work capacity, and systolic blood pressure. These aspects could be taken as a starting point. Age is not a modifiable factor, but it has been shown that work ability depends on age<sup>21</sup>. So, work ability screening and treatments might be deployed differently for different ages. In screening and treatment, focus could be on the other associated indicators: need for recovery, overhead work capacity, and systolic blood pressure. A short screening module might then indicate if more elaborate assessment is needed. In that case the full health surveillance program can be deployed, as well as subsequent interventions. Effectiveness of this procedure first needs to be investigated in longitudinal studies.

## METHODOLOGICAL CONSIDERATIONS

### *Design*

In the intervention study a stepped wedge design was used instead of a parallel arm trial. For the company, the stepwise implementation of the POSE program was beneficial in terms of practicality, logistics, and finances. Compared to a parallel arm trial, the use of a stepped wedge design has both advantages and disadvantages<sup>22-24</sup>. The main advantage was ethical in nature, because the POSE program could be offered to all contracted workers, since it was expected to yield positive results. Another advantage was that the design allowed a smaller sample than would be required in a regular cluster-randomized trial, and it depended to a lesser extent on the number of included clusters. A stepped wedge trial usually takes longer than a RCT, which makes it possible to follow the intervention for a

longer period. On the other hand, a longer study period can also introduce confounding by time. In our study, different lengths of follow-up applied to different plants, varying from one to three years. Despite those differences, effects did not differ between plants. The course of outcomes over time was similar for all plants, and did not seem to depend on the timing of POSE program implementation. Unfortunately, confounding by time could not be separated from specific cluster (plant) effects in our study. We did observe an increase in sickness absence towards the end of our follow-up, but this occurred at all plants. Furthermore, in the last two follow-up periods all plants were in the experimental condition, meaning that adjustment for those time points was not possible. This may have caused the influence of sickness absence in the experimental condition to become exaggerated. The magnitude of this exaggeration can be determined when sickness absence in the experimental condition is compared to sickness absence rates throughout the entire company. Inclusion of a comparable control condition over the whole study period could indicate the true effect of sickness absence in the experimental condition. Another disadvantage of the long trial concerned the data collection procedure which required multiple measurements, every time a new cluster was included in the study. As explained in the effect study in **chapter 6** this may have led to survey fatigue and it complicated statistical analysis. A strategy to prevent survey fatigue is the use of incomplete designs, which means that data are not collected from all clusters at all times<sup>25</sup>. However, that was not feasible in the current study, because only one cluster (i.e., one plant) switched to the intervention at every step.

### ***Selection bias***

Participation in the POSE program and the scientific study was voluntary. Company management emphasized to workers that participation was not obliged, but encouraged participation. POSE program participants were not obliged to participate in the scientific study. Nevertheless, workers sometimes did not want to participate in the program, because they felt obliged to participate in the scientific study as well, or considered it too large a burden. This may have led to a selection of workers who were more motivated to participate in the program and/or study. It is assumed that motivated workers positively influence study results<sup>26</sup>. However, this does not seem to be reflected in the results. It must be noted that the same participants were both in the control and experimental condition,

## Chapter 8

for whom within-subject analyses were performed. So, this type of selection bias probably did not influence the outcomes of the study.

### ***Generalizability***

A limitation of the studies in this thesis concerns generalizability within and outside the meat processing industry. Due to the selective sample, it is difficult to generalize the results to the whole industry, or to other industries. The meat processing industry consists for about 30% of temporary workers and for about 25% of foreigners<sup>27,28</sup>. For practical reasons, temporary workers were not included in our study. However, inclusion of these workers would provide a better representation of the industry. It was impossible to follow these workers throughout the whole study period. This would require cooperation with temporary employment agencies. Depending on the number of involved agencies this could be a barrier. Furthermore, inclusion of foreign workers brings along that study material should be available in several languages. This implies that questionnaires are to be validated in these languages within different study samples, which is a time-costly process. Language difficulties may have prevented foreigners from participating in the POSE program, even though materials were available in different languages and workers could receive assistance in completing questionnaires.

Another limitation regarding generalizability involves the recruitment strategies which differed between plants; at some plants specifically older workers (>50 years) were targeted. The company made a strategic choice to first offer the POSE program to this sample of older workers assuming they were most vulnerable. This assumption was not only based on the constitution and aging of the workforce, but also on the high work pressure and limited opportunities for retraining. Although this creates a great sense of urgency to address sustainable employability, it also makes it harder to achieve success, because it was shown that workplace health promotion programs are less effective for older workers<sup>10</sup>. Therefore, generalizing findings to other ages or to the total meat processing industry should be practiced with caution.

### ***Sustainable employability***

Sustainable employability is multifactorial, and its defining factors have been scarcely investigated. As described in the introductory chapter of this thesis, there are several proxies that can be used to assess sustainable employability. In this thesis three proxies were used: sickness absence, self-reported work ability, and self-reported productivity. These proxies are assumed to be indicative for sustainable employability, although they do not cover the whole spectrum of sustainable employability, neither can they fully explain the concept<sup>29</sup>. Many other factors are involved that define sustainable employability, which may be just as important, such as aspects related to opportunities, knowledge/skills, and attitude/motivation (p203)<sup>30</sup>. Possibly equally important is the work environment, because sustainable employability implies an interaction between a worker and his/her environment. We deliberately chose not to incorporate those factors in the participant questionnaires in order to keep the burden for participants as low as possible. Inclusion of the work environment could have provided a better assessment of the fit between a worker and his/her environment. Consequently, better tailored interventions could have been deployed, possibly leading to more positive results on health and employability.

### ***Objective, test and self-reported measures***

For the different studies, several types of data were used. Sickness absence data and salaries were retrieved from company registries. Energetic workload and capacity were obtained by heart rate registrations and by exercise testing; FCE data were obtained by performance tests. All other data were self-reported; Work Ability Index data were retrieved from the POSE program (electronic questionnaire) as well as from paper questionnaire; productivity and secondary outcomes data were obtained by paper questionnaire; process data were obtained by questionnaire and by interview. Although self-reported outcome measures are less reliable than register (i.e., objective) data<sup>31-33</sup>, it is assumed that bias resulting from self-reported data did not distort outcomes. Because POSE program participants were their own controls, bias would be present before and after the implementation of the program. Most probably this would not alter the results.

Study participants may have encountered difficulties with correctly interpreting the questionnaires. Although the questionnaires have been validated, they are not always

comprehensible for all target populations. The Dutch Central Committee on Research Involving Human Subjects recommends using language at the level of 8<sup>th</sup>-graders (12 years old) in all study materials. But these recommendations have not been practiced in validated questionnaires like the WAI, QQ, and COPSQ. Adjustments in these questionnaires could benefit comprehensibility and contribute to the quality of future studies, and perhaps lower the number of missings. However, adapted questionnaires need validation before being used in research and practice.

## RECOMMENDATIONS

### Recommendations for research

- Several occupational health interventions are available to address health risks in the meat processing industry. However, not all health risks are covered by the available interventions. Therefore, it is recommended to conduct more research on effectiveness of interventions.
- Multiple strategies were used to compare energetic workload and energetic capacity of meat processing workers. The applied methods were feasible in practice but no gold standard. To improve the methods, further study is recommended in which gold standard methods are made feasible for practice. In **chapter 3** we showed that energetic work capacity was sufficient to handle the workload for the majority of older production workers in this sample. For future research it is recommended to investigate whether static work capacity of these workers is sufficient as well, as the work in the meat processing industry consists of several physical static tasks, e.g., working in a standing position, either up right or bent forward.
- The process evaluation showed that most components of the POSE program were properly implemented. However, it also showed that several aspects in program implementation can be improved. Moreover, not all components could be evaluated on quality of implementation. For future studies, more accurate registration and monitoring is recommended. This will allow intermediate adaptation of the program and improvement of interventions. Although workers were satisfied with the POSE program, it is unknown whether the needs and preferences of the workers were reflected in the

program. When a new intervention is developed this should be incorporated by, for instance, following the intervention mapping approach<sup>34</sup>.

- Sickness absence, work ability, and productivity did not improve within a one- to three-year follow-up period. Longer follow-up studies with better operationalization of sustainable employability and better registration of counseling and implementation of subsequent interventions should be performed to investigate the effects of the POSE program on the longer term (e.g., 5-10 years, or until statutory retirement age).
- Cross-sectional associations between work ability and several health-related and work-related indicators were identified. The predictive value of these indicators for future work ability should be investigated in a longitudinal study. Furthermore, similar studies can be performed on other outcomes of sustainable employability, such as sickness absence and productivity.

### Recommendations for practice

- To achieve a good fit between the worker with his/her environment, workload should not exceed the worker's capacity level, as this may result in musculoskeletal or cardiovascular complaints. Methods have been provided to compare energetic workload and energetic capacity. It is recommended to use those methods in practice to establish whether a worker has sufficient energetic capacity to perform his/her work without becoming overloaded. Moreover, it is recommended to assess if the static work capacity of these workers is sufficient, as the work in the meat processing industry consists of several physical static tasks as well. If a worker's capacity (static or energetic) is insufficient for the tasks he/she should perform, worker's capacity should be ameliorated by physical training or workload should be reduced.
- Health screening (i.e., the POSE program) depending on risk identification alone did not seem to be effective. For risk identification to be effective, it should be followed by (appropriate) evidence based interventions.
- Usability and satisfaction are good, but those qualitative results were not reflected by quantitative results on sustainable employability within the follow-up period. Based on the fact that interventions were not or hardly deployed, it is recommended to consider adaptations to the present form of the POSE and integrate interventions into the program. In the systematic review, several effective occupational health interventions

## Chapter 8

were identified to address health risks in the meat processing industry. It is recommended to deploy evidence based interventions when available and applicable. Sustainable employability is a dynamic interplay between a worker and his/her environment. Instead of only focusing on worker characteristics in the POSE program, it is recommended to include evaluation of the work environment as well.

- Improvements can be made in the screening process. Instead of performing a complete assessment, a short form screening may suffice. For work ability it could possibly be shortened to four indicators: need for recovery, overhead work capacity, systolic blood pressure, and age. Risk profiles should be identified and these should be directly related to further assessment and interventions. This will help occupational health care providers to better attune their services to the needs of workers. The stepped care approach can be considered here.

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## Chapter 8

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