

# Investing in employability interventions? : methodological challenges and economic evaluation results

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# Summary

Health problems continue to limit labor participation, creating a growing need for sustainable employability. Structural methods are needed to develop appropriate responses when health problems impede employability and labor participation. This PhD-thesis addresses this by providing insight how the methodology underlying economic evaluations within occupational health care can be improved. The first central aim throughout this PhD-study is therefore to *generate knowledge and insight into the methodological challenges when conducting economic evaluations of employability interventions* (Part I). Given the results, efforts to improve the current methodology are required. Throughout this PhD-study, the required efforts were applied to practice in order to conduct methodological high quality economic evaluations in employability interventions. To properly assess the added value of both existing-, and innovative employability interventions, this PhD-thesis furthermore describes the underlying health economic aspects, and the economic evaluation results of employability interventions aimed at achieving sustainable employability for employees with health problems. The second central objective of this PhD-thesis is therefore the application of the generated methodological knowledge to different employability interventions, and the thereby *generated economic evaluation results of different existing and innovative interventions aimed at achieving sustainable employability for employees with health problems* (Part II and III).

## **Part I: Methodological Challenges**

**Chapter 2** presents a systematic review in which the measurement properties of generic self-reported instruments that measure health-related productivity changes are critically appraised. 25 articles assessing the reliability, validity and responsiveness of 15 different generic self-reported instruments measuring health-related productivity changes were included. The Work Limitation Questionnaire (WLQ) was most frequently evaluated and yielded moderate to strong positive evidence for content and structural validity. The Stanford Presenteeism Scale (SPS) and the Productivity and Disease Questionnaire (PRODISQ) also yielded strong positive evidence for several measurement properties. The overall evidence on the psychometric properties of the other 12 instruments was limited and of fair to poor quality. Based on these findings, the WLQ, SPS, and in a Dutch context, the PRODISQ are cautiously preferred until high-quality studies are in place to accurately assess the measurement properties of the currently available instruments. This study also warrants careful consideration of the content of the instrument, usage purpose,

target country and population of interest, and available evidence to guide decision making.

The results of another systematic review are presented in **Chapter 3**. The exchangeability of self-reported and administrative healthcare resource use measurements for cost estimation was studied. The methodological reporting quality of studies comparing the validation evidence of healthcare resource use measurement tools was assessed with an appraisal tool. This tool was derived by combining aspects from the Guidelines for Reporting Reliability and Agreement Studies and The Standards for Reporting Diagnostic Accuracy. Out of the 16 included studies, seven scored 'good' on more than 75% of the reporting criteria. In the end, six studies scored 'good' on the minimal criteria for reporting. These criteria included: (i) a clear description of the measurement methods with a critical review of evidence relevant for the study, (ii) a rationale for the relationship between the self-report and the administrative data, (iii) the methods or measurement procedures for the self-report, and (iv) the methods and measurement procedures for the administrative data. Despite varying levels of agreement among the different data sources, the validation evidence of the small number of studies with adequate methodological reporting quality cautiously supported the exchangeability of both the self-reported and administrative resource use measurement methods.

**Chapter 4** describes how to preferably conduct economic evaluations of multiple different employability interventions based on a similar methodological framework. This framework enables the development of guidelines on how to conduct economic evaluation in this field and thereby contributes to the decision-making regarding treatment options in occupational health practice. The paper describes a consistent and transparent methodological design to analyze the cost effectiveness of five different employability interventions directed at work disabled employees with divergent health complaints. The comparisons between the employability interventions and usual care or the control conditions were pragmatic in nature replicating the actual ((occupational) health care) setting in which the studies occur. The design is compliant for different settings, for example when different unit prices for resource utilization, or divergent outcome measures, are preferred. According to sample-size calculations, each employability intervention needed a total of 142 participants to detect decreased sick leave duration. Eligible participants were employees aged 18 to 63, working at least 12 hours per week, and at risk of work disability, or already work-disabled due to medical restrictions. The economic evaluation results for each employability intervention are described elsewhere. This chapter discussed the methods, strengths and weaknesses of the study protocol.

Given the results of the studies included in Part I of this PhD-thesis, the economic evaluation of existing- and new employability interventions are based on solid methodologies, accounting for stakeholder interests, and proper methodological reporting quality to ensure transparency. The economic evaluation results are summarized in the paragraphs below.

## Part II: Existing practices

In **Chapter 5**, the results of a comparative cost effectiveness of two strategies to promote work functioning among nurses by reducing symptoms of mental health complaints are presented. In total, 617 nurses from one academic medical centre in the Netherlands were included and divided over either the control condition (online screening for mental health problems without feedback about the screening results), the occupational physician condition (screening, feedback and referral to the occupational physician for screen-positive nurses), or the e-mental health condition (screening, feedback, and referral to e-mental health). After six months, significant improvement in work functioning occurred in all three groups. The incremental cost effectiveness ratio for the occupational physician condition versus the control condition was dominant, suggesting cost savings of €5,049 per treatment responder. The occupational physician condition resulted in greater treatment responses for less costs relative to the control condition and was therefore recommended to be put in practice. The incremental cost effectiveness ratio for the e-mental health condition versus the control condition was estimated at €4,054 (added costs) per treatment responder, producing less treatment response than the control condition and therefore not recommended to be put in practice.

**Chapter 6** addresses the question to whether a preventive intervention in the work setting is cost-saving from a business perspective. Alongside a cluster-randomized trial in a Dutch academic hospital, the control condition (screening without feedback) was compared to the experimental condition (screening, personalized feedback and referral to the occupational physician for screen-positive nurses) to evaluate the balance between the invested intervention costs and the cost offsets stemming from improved productivity. Net-savings of €244 per nurse were observed when only absenteeism is regarded and €651 when presenteeism is also taken into account. Within half a year, the costs of offering the preventive intervention were more than recouped. A return-on-investment ranging from €5 up to €11 per Euro invested was found. Offering the preventive intervention represents a favourable business case as seen from the employer's perspective.

**Chapter 7** focusses on the results of a pilot cost effectiveness study. This study aimed to detect how to improve a web-based employability intervention aimed at increasing self-perceived work ability among employees who experienced problems in relation to their employability. This study detected elements requiring improvements and thereby demonstrated the value of cost effectiveness analyses within a pilot study, preceding a full-scale study. First, content related improvements were recommended based on the low uptake and compliance rates, particularly for the online intervention element. Additional analyses concluded that the intervention appeared too general for specific situations, such as prolonged health problems requiring specific questions on work and health. Furthermore, the web-based employability intervention was not associated with an economically relevant impact over regular trade union support for a heterogeneous population with

work- and disability related concerns. However, there was a tendency females and participants aged 50 or older might be more sensitive for an intervention effect. Ongoing tailoring and better targeting was therefore recommended. Secondly, improvements regarding the study design of the web-based employability intervention were also recommended based on the results of the pilot economic evaluation. Negligible incremental differences on work ability and quality adjusted life years were unable to demonstrate an effect of the web-based intervention. Future studies should avoid discussion on whether the most appropriate outcome was selected to assess the true effect of the intervention, or whether the effect of the intervention was influenced by other factors (for instance derived information other than via the web-based employability intervention). In addition, the relative contribution of patient- and family out-of-pocket costs to the total overall costs was minimal. Data gathering for these cost categories could be omitted to minimize the burden for the employees and their environment. Based on the pilot economic evaluation results, the intervention content needs to be improved with respect to targeting and intensity. Regarding the study design, reconsideration of the selected outcome measures and the collection of cost data is preferred.

### **Part III: Innovative interventions**

In the third part, in **Chapter 8** a field study is described that assessed the cost effectiveness, -utility, and -benefit of a new organizational return-to-work (RTW) intervention to improve Cooperation between Sick-listed employees and their Supervisors (COSS). After six months follow-up, employees in the COSS-group reduced almost 16 calendar days of absenteeism and saved approximately €27 per day of work resumption. The cost utility analysis also exhibited reduced costs; however the gain in quality adjusted life years was uncertain. From an organizational perspective, the net benefits of COSS versus common practice yielded a productivity gain of almost €396. COSS has the potential to improve productivity at reduced societal and organizational costs when implemented among sick-listed employees. Long-term research needs to detect whether COSS also has the potential reaching sustainable RTW.

**Chapter 9** provides the results of a short-term economic evaluation. First insights into the cost effectiveness of an intervention coordinating clinical- and occupational care at the worksite are provided. This intervention is aimed to support the work participation of workers with rheumatoid arthritis. After six months, both at-work productivity loss and QALY differences were in favor of the control group. Together with the higher costs of the intervention group compared to the control group, no evidence was found to support the implementation of the intervention. The main cost effectiveness and cost utility analyses show that the intervention was more expensive and less effective than the control condition. Sensitivity analyses supported these findings.

In **Chapter 10**, another economic evaluation was conducted. A tailored educational training program for general practitioners was provided to increase GPs' awareness of work-related health problems. This training program aimed to improve treatment strategies in the primary care setting. Awareness for work-related health problems in the GP practice is assumed to increase work-related self-efficacy and quality of life for patients in paid work. After six months follow-up, the differences in the main outcome measures between the intervention group and the usual GP care group were minimal. A negative incremental cost effectiveness ratio revealed fewer effects at higher costs for both the cost effectiveness and -utility analyses. Based on cost-related grounds the intervention could therefore not be recommended for implementation.

#### **Part IV: Discussion**

In **Chapter 11** the main practical and methodological considerations and considerations regarding the employability interventions that aim for sustainable employability among employees with health constraints are touched upon.

Practical considerations regard the recruitment of organizations and participants to take part in the research. To conduct an economic evaluation, at least a minimum required number of participants, a comparative design, and a comparable control group needs to be guaranteed. These practical considerations might slow down data collection as they require contacting other parties. Another practical consideration is the follow-up time, which is preferably stated before the study begins, but often not achieved due to practical issues.

Methodological considerations concentrate around the perspective of study. Within this field of study the perspective often has to deviate from the preferred societal perspective according to the health economic guidelines when accounting for specific stakeholder's interest and when preventing the risk of double counting productivity changes. Further methodological considerations concern the methodological (reporting) quality of measurement tools, more specifically those that measure and value costs. Uniform and transparent methods are still lacking. Next, generalizability issues might also be at stake when applying these findings to another country, and thus another social security system. A final methodological consideration distresses the lack of insight into changes in the quality of life due to health problems impeding labor participation, and how employability interventions might improve the effect of productivity on health and quality of life.

Final considerations regard the intervention. The studied control groups were already likely effective, limiting the visibility of the effectiveness of different employability interventions. In addition, some effect measurements did not represent what is truly relevant to expect from an employability intervention for employees with health problems (e.g. generic QALYs). The results of the included studies demonstrated that the field of (Dutch) occupational health is not that easily affected, even when the economic evaluation results of the employability interventions

## SUMMARY

are relatively positive. Adequate implementation of the employability intervention in practice requires meeting the needs of all stakeholders. Hence, decision making also requires the acknowledgement of context-specific characteristics, which make the employability intervention more or less relevant to particular stakeholders. Pilot economic evaluations, conducted before large-scale studies, appeared to provide valuable insight into how and where to target the intervention, given its population of interest.

In future research more attention could preferably be paid to subgroup analyses to account for participant heterogeneity, which provides valuable information on how to target the interventions aimed at achieving sustainable employability for employees with health problems. In addition more focus on characterizing the uncertainty around the joint cost-effect estimates (CEA-plane) is preferred. At the moment no visual methods, such as a uniform willingness-to-pay or willingness-to-accept for increased health-related productivity, has yet been developed to help occupational health decision makers interpret the economic evaluation results. Also, more insight into health-related productivity and research on factors influencing changed productivity (e.g. compensation) and the measurement of productivity costs would be helpful to interpret the results. Portraying and valuing the advantages and disadvantages of an employability intervention (from the societal perspective) will support the policy choices regarding the implementation of such an intervention. The MKBA is suggested as an appropriate method since it is applicable for all types of interventions in all policy areas and provides an overview of the effects, the risks and the uncertainties attributable to the interventions.

# Samenvatting

Recentelijk zijn diverse interventies ontwikkeld die streven naar duurzame inzetbaarheid van werknemers met gezondheidsproblemen. Deze interventies worden 'inzetbaarheidsinterventies' genoemd. Gezien de betrokkenheid van meerdere belanghebbenden is gezondheid op het werk een complex onderzoeksgebied. Hierdoor kunnen besluiten over het inzetten van de juiste inzetbaarheidsinterventies bemoeilijkt worden. Verschillende afwegingen moeten worden gemaakt. Onderzoek, en voornamelijk economisch evaluatieonderzoek, kan helpen om deze afwegingen op een gegronde manier te maken. De resultaten ondersteunen besluitvorming over het al dan niet implementeren van de specifieke inzetbaarheidsinterventie en informeren onder welke voorwaarden dit gedaan moet worden om het beoogde effect te bereiken.

Deze dissertatie beoogt: (i) het genereren van *kennis en inzicht in de methodologie* van economisch evaluatie onderzoek bij inzetbaarheidsinterventies (deel I), en, (ii) het interpreteren van de resultaten van *economisch evaluatie onderzoek van zowel bestaande als innovatieve inzetbaarheidsinterventies* gericht op het realiseren van duurzame inzetbaarheid van werkenden met gezondheidsproblemen (deel II & III).

## Deel I: Methodologische uitdagingen

In **hoofdstuk 2** werden generieke, zelf-gerapporteerde instrumenten die gezondheidsgerelateerde productiviteit meten kritisch beoordeeld in een systematische review. In totaal konden 15 verschillende instrumenten geïnccludeerd en geëvalueerd worden. De betrouwbaarheid, validiteit en responsiviteit van deze verschillende instrumenten werd onderzocht. The Work Limitations Questionnaire (WLQ) was het meest frequent geëvalueerd en die studies leverden een matig tot sterk positief bewijs voor zowel inhoudelijke als structurele validiteit. Ook de Stanford Presenteism Scale (SPS) en de PROductivity and DISease Questionnaire (PRODISQ) leverden sterk positief bewijs voor meerdere psychometrische eigenschappen. Op basis van deze bevindingen werden de WLQ, SPS, en (in een Nederlandse context) de PRODISQ voorzichtig aanbevolen. Om de besluitvorming te begeleiden werd tevens aanbevolen zorgvuldige afwegingen te maken ten aanzien van de inhoud van het instrument, het streefdoel en de doelgroep.

In een tweede systematische review in **hoofdstuk 3** werden meetmethoden bestudeerd om de kosten van gezondheidszorg te meten. De 'uitwisselbaarheid' van zelf-gerapporteerde en administratieve data ten aanzien van het zorggebruik werd onderzocht. Om hierover uitspraken te doen, werden gepubliceerde validatie-



studies beoordeeld. Deze beoordeling richtte zich op de kwaliteit van de methodologische verslaglegging aan de hand van een nieuwe 'tool'. Deze tool werd samengesteld door aspecten van verschillende richtlijnen te combineren (*Guidelines for Reporting Reliability and Agreement Studies* en *The Standards for Reporting Diagnostic Accuracy*). Uit de resultaten bleek dat zelf-gerapporteerde als administratieve meetmethoden over het algemeen goed genoeg uitwisselbaar zijn.

Vervolgens werd in **hoofdstuk 4** beschreven hoe een consistente en transparante methodologische onderzoeksopzet ontwikkeld werd. Deze onderzoeksopzet beschrijft hoe de economische evaluatie van verschillende interventies gericht op duurzame inzetbaarheid bij werkenden met uiteenlopende gezondheidsklachten uit te voeren. Door interventies in het veld van arbeid en gezondheidszorg systematisch te onderzoeken wordt de vergelijking van deze behandelopties eenduidiger. De vergelijkingen tussen inzetbaarheidsinterventies en de controle condities (de gebruikelijke interventies) zijn bij voorkeur pragmatisch van aard om de werkelijkheid zo goed mogelijk te repliceren. De beschreven onderzoeksopzet kan breed ingezet worden en rekening houden met de vereisten van bijvoorbeeld diverse organisatie en aanbieders.

## Deel II: Bestaande inzetbaarheidsinterventies

De eerste studie, beschreven in **hoofdstuk 5**, betrof een vergelijkende kosteneffectiviteitsanalyse van twee strategieën om het functioneren van verpleegkundigen te bevorderen door psychische symptomen te verminderen. In totaal werden 617 verpleegkundigen verdeeld over een controle conditie (online screening voor geestelijke gezondheidsproblemen zonder feedback over de resultaten van de screening), een 'bedrijfsarts-interventiegroep' (screening, feedback en doorverwijzing naar de bedrijfsarts voor screen-positieve verpleegkundigen), of een 'e-mental health groep' (screening, feedback, en verwijzing naar e-mental health). Gezien de dominante kostenbesparing van €5.049 ten opzichte van de controle conditie, werd implementatie aanbevolen voor de 'bedrijfsarts-interventie'. De incrementele kosteneffectiviteit ratio voor de 'e-mental health conditie' versus de controle conditie bedroeg €4.054 extra kosten. Implementatie van de 'e-mental health interventie' in de praktijk werd op basis van de vergelijking met de controle conditie niet aanbevolen.

In **hoofdstuk 6** werd vervolgens onderzocht of een preventieve interventie in dezelfde werksetting resulteerde in een positieve 'business case' vanuit het perspectief van de werkgever. De controle conditie (screening zonder feedback) werd vergeleken met de experimentele conditie (screening, persoonlijke feedback en doorverwijzing naar de bedrijfsarts voor screen-positieve verpleegkundigen). De interventie gerelateerde (investerings-)kosten werden afgezet tegen de kosten die voortvloeien uit veranderde productiviteit. Er werden netto besparingen variërend van €244 tot €650 per verpleegkundige waargenomen. Binnen een tijdsbestek van

een half jaar werd een positieve *return-on-investment* tussen €5 tot €11 per geïnvesteerde euro behaald.

**Hoofdstuk 7** richtte zich op een pilot kosteneffectiviteit studie van een web-based inzetbaarheidsinterventie gericht op het vergroten van werkvermogen onder werknemers met gezondheidsklachten. De pilot kosteneffectiviteit studie onderzocht of (a) inhoudelijke verbeteringen, en/of (b) verbeteringen ten aanzien van de studieopzet nodig waren. Op basis van de lage respons en minimale gebruik van (onderdelen van) de interventie werden aanbevelingen gedaan om zowel de respons als het gebruik te bevorderen. Inhoudelijke aanbevelingen ten aanzien van de interventie werden gebaseerd op het gebrek aan noemenswaardige effecten van de interventie. Hoewel de verbeteringen ten aanzien van werkvermogen minimaal waren, detecteerden subgroep analyses groepen gevoeliger voor een effect van de interventie. Doelgericht inzetten van interventieonderdelen voor specifiek gevoeliger groepen ('targetten') werd aanbevolen. Verbeteringen ten aanzien van de onderzoeksopzet werden ook aanbevolen op basis van de minimale effectiviteit van de interventie, vooral de marginale verschillen voor werkvermogen en de kwaliteit van leven. De relatieve bijdrage van kosten voor de patiënt en familie aan de totale kosten waren verwaarloosbaar, waardoor ook op basis van deze bevindingen aanbevelingen werden gedaan om verbeteringen door te voeren. Alvorens grootschalig onderzoek naar implementatie op te zetten, dragen pilot kosteneffectiviteit studies bij aan zowel inhoudelijke als methodologische inzichten om interventies in het veld van arbeid en gezondheidszorg te verbeteren.

### Deel III: Innovatieve inzetbaarheidsinterventies

**Hoofdstuk 8** beschreef de economische evaluatie van een innovatie gericht op de organisatorische aspecten die terugkeer naar arbeid beïnvloeden. De COSS-interventie richtte zich op de verbeterde samenwerking tussen verzuimende werknemers en hun werkgevers. Na zes maanden follow-up reduceerde verzuim (gemeten als initiële terugkeer naar werk) bij de werknemers in de interventiegroep met bijna 16 kalenderdagen en werd ongeveer €27 per dag bespaard door de werkherleving. Vanuit organisatorisch oogpunt leverde de interventie (vergeleken met de controle conditie) netto- productiviteitswinst op van bijna €396 per werknemer.

**Hoofdstuk 9** presenteerde korte-termijn resultaten van een inzetbaarheidsinterventie die klinische- en arbeidsgerelateerde zorg trachtte te optimaliseren. De interventie ondersteunde de arbeidsparticipatie van werknemers met reumatoïde artritis. Na zes maanden interim analyse bleek dat de interventie duurder en minder effectief (in termen van arbeidsproductiviteit en kwaliteit van leven) was dan de controle conditie. Momenteel worden nog data verzameld voor een langere termijn follow-up.

In **hoofdstuk 10**, werd een op maat gemaakt educatief trainingsprogramma voor huisartsen economisch geëvalueerd. Het doel van de interventie was het bewustzijn van huisartsen ten aanzien van werk gerelateerde gezondheidsproblemen

in de huisartsenpraktijk te verhogen en hiermee de werk gerelateerde 'self-efficacy' en de kwaliteit van leven voor patiënten in betaald werk te verhogen. Na een interim-analyse van zes maanden bleken de verschillen in effectiviteit tussen de interventiegroep en de gebruikelijke huisartsenzorg-groep minimaal te zijn. Momenteel worden nog data verzameld voor een langere termijn follow-up.

### **Deel IV: Discussie**

De bevindingen van deze dissertatie boden oplossingsrichtingen voor diverse methodologische uitdagingen binnen het complexe onderzoeksgebied van gezondheid op het werk. Daarnaast werden de resultaten van verschillende economische evaluaties bij inzetbaarheidsinterventie in de praktijk gepresenteerd en geïnterpreteerd. Hoewel de studies aantoonde dat de praktijk van arbeid en gezondheid zich niet zo gemakkelijk laat beïnvloeden, boden de (relatief positieve) economische evaluatie resultaten van de inzetbaarheidsinterventies toch diverse mogelijkheden voor de belanghebbenden. De resultaten van de studies beschreven in deze dissertatie kunnen onder andere onderzoekers, werknemers, werkgevers en beleidsmakers ondersteunen in het selecteren van inzetbaarheidsinterventies voor zowel verder onderzoek als implementatie in de praktijk. Een duidelijke uitwisseling tussen wat belanghebbenden relevant vinden, inzicht in context-specifieke kenmerken van een interventie, en adequate meting en waardering voor zowel kosten als uitkomsten, bleken essentieel.