# Technical Appendix for the Wellness in Work Report

### Wellness in work: The economic arguments for investing in the health and wellbeing of the workforce in Wales

Technical Appendix prepared by Dr Llinos Haf Spencer and Bethany Fern Anthony

Centre for Health Economics and Medicines Evaluation (CHEME)

cheme@bangor.ac.uk

# Link to the full report: <https://cheme.bangor.ac.uk/reportspublications.php.en>

# Wellness in work report – Technical Appendix

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# Rapid review methodology

A rapid review was conducted to investigate the cost-effectiveness and social return on investment of:

1. Initiatives to move people into employment.
2. Initiatives to ensure wellbeing in the workplace, thus keeping people well in work

The review broadly followed the design, methods and processes of the Cochrane Effective Practice and Organisation of Care Group (EPOC) for the synthesis of effect evidence and reporting guidance as set out by the Preferred Reporting Items for Systematic Review and meta-analysis (PRISMA). Where necessary, this process was condensed to account for the rapid nature of the evidence review.

Internet reference database searching was the main strategy for gathering evidence. Databases included: Cochrane Collaboration Register and Library, CINAHL, ASSIA, PsychINFO, PubMed, Web of Science, DARE, NHS EED and HTA. Screening of reference lists and hand-searching was supplement to electronic searching. Grey literature was included to limit publication bias, and was sought using online search engine searches (e.g. Google, Google Scholar). Due to limited translation resources, only studies written or translated into English (UK and international) or Welsh were eligible for inclusion. Search results were managed using the online bibliographic management software Mendeley and Refworks.

Search terms and keywords are a mixture of MESH (Medical Subject Heading) and non-MESH terms. In order to ensure that the correct studies are identified, search terms have been divided into 3 groups: population, intervention and outcomes. The ‘population’ search terms cover the demographics of the study participants. The ‘intervention’ search terms cover the range of employment terms. The ‘outcomes’ search terms cover relevant economic terminology.

Search terms were linked with ‘OR’ Boolean operators within groups, and with ‘AND’ Boolean operators between groups. ‘NOT’ Boolean operators were used to exclude specific words/phrases where necessary. This ensured that each study considered eligible for inclusion contains at least one search term from each group. An information scientist was consulted to help shape the search terms and truncate keywords. The titles were screened by two researchers.

Screening, data extraction and quality appraisal were carried out by two independent reviewers. Due to the rapid review nature of the evidence synthesis, a rapid quality appraisal methodology was undertaken, informed by quality appraisal and risk of bias assessment tools specific to economic evaluations. Research identified through the primary database searches was graded as weak, moderate or strong with any disagreements between reviewers quality checked against the full CASP checklist which was adapted from the BMJ Drummond checklist, recommended by the Cochrane collaboration.

Data analysis themes were organised to produce tabular and narrative summaries of key characteristics to produce an overall narrative.

# 2. Search terms for wellness in work rapid review

This technical appendix includes the search terms for the rapid review of initiatives to move people into work (see Table 2.1).

**Table 2.1 Search terms for rapid review 1: Initiatives to move people into employment**

|  |  |  |
| --- | --- | --- |
| **Population** | **Intervention** | **Outcome** |
| BenefitDisab\*Disabled Persons (MESH)EmployeesLocalNEETOlderRecipient\*Social Welfare (MESH)UnemployedWorker\*Young Adult (MESH)Welfare N/3 claimant\*(ASSIA proximity operator) | Activ\*Application\*Competit\*ContractEarn\*Employ\*FitFitness for work (ASSIA thesaurus)Fitness N3 work“Full time”Full time employment (ASSIA Thesaurus)Illness\*IncomeInitiativeJobJob applicant\*Job applications (MESH)Job N5 offer“Job seeker”, job seek\*Job searching (ASSIA thesaurus, explode)Job N5 search\*“mental health”Occupations (MESH)Off N5 sick“Part time”Part Time employment (ASSIA Thesaurus)ProductivityProsperityQuality of lifeRemploySalarySalari\*School leavers (ASSIA)“School leaver\*”SeekerSeek\* N5 workSick day\*Sick leaveSick N5 leaveSicknessSupportUnderemploymentUnemploymentWagesWellbeingWork\*Worklessness | Cost analys\*Cost benefitCost effectiv\*Cost effective\* analys\*Cost utilit\*Cost-effectiv\*Cost-utilit\*cost-consequencecost consequenceCost savings/Economic analys\*Economic evaluation\*Economic reviewEconomicsHigh adj. costImpact analys\*Low adj. costMarkovQALYQuality adjusted life yearQuality-adjusted life yearReturn on investmentSocial return on investmentBudget impact analy\* |

**Moving people into employment**

**Population**

“Benefit” OR “Disab\*” OR “Disabled Persons” 1OR “Employees” OR “Local” OR “NEET” OR “Older” OR “Recipient\*” OR “Social Welfare” OR “Unemployed” OR “Worker\*” OR “Young Adult” OR “Welfare N/3 claimant\*”

**Intervention**

“Absence” OR “Activ\*” OR “Application\*” OR “Competit\*” OR “Contract” OR “Day\*” OR “Earn\*” OR “Employ\*” OR “Fitness for work” OR “Fitness N3 work” OR “Full time” OR “Full time employment” OR “Illness\*” OR “Income” OR “Initiative” OR “Job” OR “Job applicant\*” OR “Job applications” OR “Job N5 offer” OR “Job seeker” OR “job seek\*” OR “Job searching” OR “Job N5 search\*” OR “mental health” OR “Occupations” OR “Off N5 sick” OR “Part time” OR “Part time employment” OR “Productivity” OR “Prosperity” OR “Quality of life” OR “Remploy” OR “Salary” OR “Salari\*” OR “School leavers” OR “School leaver\*” OR “Seeker” OR “Seek\* N5 work” OR “Sick day\*” OR “Sick leave” OR “Sick N5 leave” OR “Sickness” OR “Support” OR “Underemployment” OR “Unemployment” OR “Wages” OR “Wellbeing” OR “Work\*” OR “Worklessness”

**Economic terms**

“Cost analys\*” OR “Cost benefit” OR “Cost effectiv\*” OR “Cost effective\* analys\*” OR “Cost utilit\*” OR “Cost-effectiv\*” OR “Cost-utilit\*” OR “cost-consequence” OR “cost consequence” OR “Cost savings” OR “Economic analys\*” OR “Economic evaluation\*” OR “Economic review” OR “Economics” OR “High adj. cost” OR “Impact analys\*” OR “Low adj. cost” OR “Markov” OR “QALY” OR “Quality adjusted life year” OR “Quality-adjusted life year” OR “Return on investment” OR “Social return on investment” OR “Budget impact analy\*”

# 3 Summary of rapid review search (PRISMA type figure)

Records identified through library database searching and grey literature searching
(n = 1751)

Records screened (titles)
(n = 1751)

Records excluded

(n =1701)

Reasons: not relevant due to no economics or no application to workplace

Records screened (abstracts)
(n = 339)

Full-text articles assessed for eligibility (n = 199)

Studies included in the rapid review synthesis

(n = 50)

# 4 Rapid review tables according to type of intervention

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**Table 4.1 Discouraged workers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Discouraged workers | Heslin et al  | 2012 | Discrimination leads stigmatised minorities to become discouraged workers. | n/a | n/a | Need to consider minority groups in employment initiatives. | Moderate |
| Discouraged workers | Zhan and Hample | 2016 | Argumentativeness and verbal aggressiveness in the workplace are mediated by costs and benefits. | Money and benefits are taken into account before people speak up in the workplace. | n/a | Employees may decide not to speak out against decisions in the workplace on the basis of costs and benefits, and may risk being unhappy - keeping secretes is harmful to psychological health (Finkenauer et al., 2009). | Strong |

**Table 4.2 Unseen barriers to employment**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Barriers to employment | Bonoli | 2014 | Many unemployed people are not making use of personal networks because they are not aware of the importance of this method for recruitment into a job. | n/a | n/a | As many job seekers are not aware that networking with informal contacts is an important recruitment method, there should be simple interventions aimed at raising such awareness. | Strong |

**Table 4.3 Employer initiatives to reduce staff burn-out and staff turnover including healthy eating and weight loss initiatives**

| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Weight loss initiatives | Finkelstein and Brown  | 2005 | A simulation model found that 5 or more years of follow-up after bariatric surgery are most likely required for the operations to become cost saving to employers, unless the employee bears a significant fraction of the total costs of the surgery. | Obese workers eligible for bariatric surgery have 5.1 additional days of work loss and $2230 (in 2014 dollars) higher annual medical costs than persons of normal weight. | Medical costs would be $2230 (in 2014 dollars) lower if the person would be of normal weight (compared to morbidly obese).  | A bariatric surgery patient would need to be followed-up for 5 years to ensure that the surgery benefitted the employer. | Strong |
| Weight loss initiatives | Meenan et al  | 2010 | There were modest savings in the second year to a Work, Weight and Wellness (3W) weight loss programme delivered through Hawaii hotel worksites. | The cost of the 3W intervention over 24 months was $1.12M dollars. | The authors found that a presenteeism improvement of 50% combined with baseline 10% productivity shortfall was required to generate positive 24 month intervention for net present value. | Future research should focus on identifying approaches to deal directly with higher-risk sub-groups, for which the economic return to employers may be more compelling. | Strong |

**Table 4.4 Sickness absence interventions**

| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sickness absence interventions | Arends et al | 2013 | A cost-effectiveness analysis showed that the SHARP –at work intervention (for common mental disorders) was more effective but also more expensive than care as usual. The cost-benefit analysis revealed that employers occupational health care costs were significantly higher in the intervention group compared to care as usual. Overall the SHARP-at work intervention showed no economic benefit compared to care as usual. | The mean costs for productivity loss were Euro5246 higher in the SHARP group than for the care as usual group. | There was no cost saving to using the SHARP-at work intervention. | The SHARP-at work intervention has a superior effect on the incidence of and time to recurrent sickness absence but had no economic benefit compared to care as usual. | Strong |
| Sickness absence interventions | Boseman | 2001 | A safe return to work programme can minimise personal costs to the employee and corporate costs to the employer. | Sickness absence costs can be minimised through an application of a nurse based model to deliver short and long term disability programmes. | Following a successful pilot, the nurse based programme of disability management was implemented throughout the corporation in the USA and resulted in a $30million dollar (dollar in 2001) savings during a 3 year period. | A nurse based model for disability management which focuses on optimal health care and productivity for all employees minimizes personal and corporate costs. | Moderate |
| Sickness absence interventions | Taimela et al  | 2008 | An occupational health intervention for workers with high risk of sickness absence is a cost-effective use of health care resources in Finland. | After one year, the mean sickness absence was 30 days in the usual care group and 19 days in the intervention group. | Euro 43 (in 2008 Euros) per sickness absence day avoided. | Targeting selected employees at a high risk of sickness absence and work disability may be a better use of occupational health resources than targeting all employees.  | Moderate |

**Table 4.5 Interventions to reduce burnout and keep people working for longer**

| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Burnout interventions | Bittman et al | 2014 | A cost-effective, 6 session recreational music making protocol reduces burnout and mood dimension, as well as TMD, in t long term care workers. | Economic-impact analysis projected cost savings of $89,100 (US dollars in 2014) for a single typical 100 bed facility, with total annual potential savings to the long-term care industry of $1.46 billion. | Cost savings of $89,100 (US dollars in 2014) for a single 100 bed facility in the USA | Reducing or preventing burnout while improving mood states among long-term health care employees should be considered cost-effective. | Moderate |
| Burnout interventions | Chhokar et al  | 2005 | The rapid economic gains and sustained reduction in the frequency and cost of patient handling injuries beyond the first year strongly advocate for ceiling lift programmes as an intervention strategy. | The cost of the intervention in 1997/1998 was $344,323 (Canadian dollars). | A total of $1,257,605 (Canadian dollars) was saved during the 3 years post-intervention with payback of the initial investment occurring within 0.82 years. | With the lifespan of a ceiling lift estimated to be 12 years, the relatively short payback period strongly advocates for the continued use of ceiling lifts as an intervention intended to mitigate injuries related to patient handling in British Columbia, Canada. | Strong |
| Vitality intervention | Van Dongen et al  | 2013 | The workplace vitality intervention among 730 older hospital workers was neither cost-effective nor cost-saving. | Incremental cost-effectiveness ratios in terms of general vitality, work-related vitality and need for recovery were Euro280, Euro7506 and Euro258 per point improvement. | Per Euro invested Euro2.21 was lost. | The vitality intervention was neither cost-effective nor cost-saving. | Strong |
| Workplace wellness study | Palumbo et al  | 2012 | Providing innovative approaches for older nurses to improve health and reduce stress is a best practice worth testing. | Those in the control group had more compensatory time off than those in the Tai Chi experimental group. | Cost saving of $760.22 (US dollars in 2012) | To reduce compromised emotional health and subsequent job dissatisfaction, absenteeism and burnout a Tai Chi type of exercise may be beneficial for older nurses. | Moderate |

**Table 4.6 Interventions to support workers who abuse substances (cigarettes, alcohol and drugs misuse)**

| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Smoking cessation | Halpern et al  | 2007 | Providing a workplace smoking cessation benefit results in substantial health and economic benefits with economic savings exceeding the cost of the benefit within 4 years. | Total savings from benefit coverage (decreased health care and workplace costs) exceeded costs of the benefit within 4 years. | Total savings per smoker ranged from $350 (US dollars) to $582 (US dollars in 2007) at 10 years. | Workplace smoking cessation benefits can result in decreased absenteeism, increased productivity and net cost savings within 4 years. | Moderate |
| Smoking cessation | Jackson et al  | 2007 | The economic benefit of varenicline pharmacotherapy agent for smoking cessation is improved over bupropion, despite the increased initial cost of varencline. | It was estimated that 12-month employer cost savings per non-smoking employee were $540.60 for varenicline, $269.80 for bupropion generic. | It was estimated that 12-month employer cost savings per non-smoking employee were $540.60 for varenicline. | There is economic benefit of using varenicline pharmacotherapy agent for smoking cessation instead of bupropion. | Moderate |
| Substance abuse | Miller et al  | 2007 | Peer-based workplace substance abuse prevention programmes couple with random testing can be cost-effective in the workplace. | Programme staff and meeting expenses constituted the largest proportion of the estimated $900,000 cost of the PeerCare programme in 1999 (US Dollars). | The programme avoided an estimated $1850 in employer injury costs per employee in 1999 (US dollars).There was a benefit-cost ratio of 26:1. | Peer-based workplace substance abuse prevention programmes couple with random testing can be cost-effective in the workplace | Strong |
| Alcohol abuse | Quanbeck et al  | 2010 | The Screening, Brief Intervention, and Referral to Treatment Programme (SBIRT) is beneficial for the employers in Wisconsin as it leads to a reduction in problem drinking. | The net present value of SBIRT adoption was $771 per employee. | The ratio benefit of costs was 4.4:1 ($997/$227 (US dollars in 2010). | The Screening, Brief Intervention, and Referral to Treatment Programme (SBIRT) could be beneficial for employers in companies where there workers with problem drinking profiles. | Strong |

**Table 4.7 Interventions regarding common and severe mental illness and employment**

| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Severe mental illness | Booth et al  | 2014 | Integration of employment support within mental health services is central to the success of employment programmes in the UK context. | Econometric analysis showed that local commissioners could save £1,400 per additional job outcome by commissioning evidence-based interventions. | There is a positive return on investment to the Treasury for every £1 spent there is a return to the Treasury of £1.04. | As there is general agreement that unemployment is bad for your health more employment initiatives should ensure that more people with severe mental illness can secure and maintain suitable employment. | Weak |
| Severe mental illness | Chow et al  | 2015 | Job accommodations (such as performance expectations) among individuals with psychiatric disability is associated with a marginal monthly saving. | Job accommodations must be provided by employers as long as the modifications do not produce “undue hardship”. | A monthly Supplementary Security Income saving of $11.73 (US dollars in 2015) could be made due to job accommodations. | Job accommodations for those with a psychiatric disability could save money to the Social Security Administration in the USA. | Strong |
| Severe mental illness | Dewa et al  | 2009 | Collaborative Mental Health Care Programmes of disability management based on the Canadian data bay b e a worthwhile investment in helping people who are receiving short-term disability benefits for psychiatric disorders. | The Independent Medical Examination held a cost for the employers. | The results suggest that with Collaborative Mental Health Care Programmes,, for every 100 people on short-term disability leave for psychiatric disorders, there could be $50,000 (Canadian dollars in 2009) in savings related to disability benefits along with the more people returning to work, less people transitioning to long-term disability leave, and 11600 more workdays. | Collaborative Mental Health Care Programmes within the workplace could have an important impact on mental health-related disability leave. | Moderate |
| Severe mental illness | Kessler et al | 1999 | Workplace costs of depression treatment are nearly as much as productivity loss. | The cost of depression treatment in the workplace was estimated as $402 (US dollars in 1999) per thirty depression free days. | Salary equivalent of between $182 and $395 in productivity loss. (US dollars in 1999). | Encouraging depressed workers to obtain treatment for major depression might be cost-effective for some employers. | Strong |
| Workplace screening for depression and anxiety | McDaid et al (in Knapp et al, 2011) | 2011 | The results show that from a business perspective the intervention appears cost-saving, despite the cost of screening all employees Benefits are gained through both a reduction in the level of absenteeism and improved levels of workplace productivity through a reduction in presenteeism. However, the impact may differ across industries; the case may be less strong where staff turnover is high and skill requirements low. From a health and personal social services perspective the model is cost-saving, assuming the costs of the programme are indeed borne by the enterprise. | The intervention is cost-saving from the perspectives of both business and the health system, on the assumption that all costs are borne by business. | Year 1 cost saving in 2009 prices was Year -19,700.Cost saving in Year 2 was -63,578 in 2009 prices. | Public sector employers also have the potential to benefit from investing in universal workplace depression and anxiety screening interventions.The intervention was a workplace screening for depression and anxiety disorders. | Strong |
| Mental health promotion | McDaid et al (in Knapp et al, 2011) | 2011 | From a business perspective the providing mental health promotion in the workplace appears cost saving compared to taking no action.  | The cost of a multi-component intervention is estimated at £80 per employee per year | In year 1, the initial costs of £40,000 (2009 prices) for the programme are outweighed by gains arising from reduced presenteeism and absenteeism of £387,722 (2009 prices). This represents a substantial annual return on investment of more than 9 to 1. In addition there are likely to be benefits to the health system from reduced physical and mental health problems as a result of the intervention, but these are not quantified here. | A strong case can be made to businesses that workplace well-being interventions can be significantly cost-saving in the short term, but some smaller companies may need public support to implement such schemes. | Strong |
| Mental health promotion | Milligan-Saville et al., | 2017 | A 4-h manager mental health training programme could lead to a significant reduction in work-related sickness absence.  | Associated return on investment of £9.98 for each pound spent on such training.  | £9.98 return on every £1 spent on training. | Further research is needed to confirm these findings and test their applicability in other work settings. | Strong |
| Mindfulness | Van Dongen et al  | 2016 | After 12 months, a significant but not clinically relevant adverse effect on work engagement was found (−0.19; 95% confidence interval: −0.38 to −0.01). | There were no significant differences in job satisfaction, general vitality, work ability, and total costs.  | Probabilities of cost-effectiveness were low (≤0.25) and the intervention did not have a positive financial return to the employer. | The mindfulness workplace based intervention was neither cost-saving nor cost-effective. Poor e-coaching compliance might partly explain this result. | Strong |
| Mindfulness | Klatt et al  | 2016 | Worksite mindfulness is an intervention that resulted in fewer following healthcare visits. | Fewer healthcare visits leading to less costs to the economy | Significantly fewer primary care visits (p < .001) for both intervention groups as compared to controls, with a non-significant trend towards lower overall HC utilization (4,300.00 actual dollar differences) and hospital admissions for the intervention groups after five years. Pharmacy costs and number of prescriptions were significantly higher for the two intervention groups compared to controls over the five years (p < 0.05), yet still resulted in less HC utilization costs, potentially indicating greater self- management of care. | Providing work- place lifestyle interventions that focus on awareness of one’s body and health can result in cost savings | Strong |
| Mindfulness | Herman et al  | 2017 | Mindfulness-Based Stress Reduction may be cost-effective in adults with lower back pain. | Compared to UC, the mean incremental cost per participant to society of CBT was $125 (95% CI: −4103, 4307) and of MBSR was −$724 (CI: −4386, 2778)—i.e., a net saving of $724. Incremental costs per participant to the health plan were $495 for CBT over UC and −$982 for MBSR, and incremental back-related costs per participant were $984 for CBT over UC and − $127 for MBSR. | These costs (and cost savings) were associated with statistically significant gains in QALYs over UC: 0.041 (0.015, 0.067) for CBT and 0.034 (0.008, 0.060) for MBSR | Mindfulness-Based Stress Reduction may be cost-effective for adults with lower back pain. | Strong |
| Severe mental illness | Stewart et al  | 2003 | Lost productive time is a big cost among US workers with depression. | Lost productive time from depression was estimated to be $44 billion per year, and this is significantly more than the $31 billion per year in productivity time loss of peers without depression. | The authors suggested that a cost-saving in terms of less lost productive time could be made. | Low level treatment of depression may be a cost-effective way to improve depression-related outcomes in the US workforce. | Strong |
| Severe mental illness | Lo Sasso et al  | 2006 | Many employers will receive a potentially significant ROI from depression treatment models that improve absenteeism and productivity at work. | Physician practice training represents a fixed cost of implementing enhanced depression treatment. The author assume there are 10 physician practice sites that must be trained at a one-time cost of $4660 per site. (US dollars in 2006). | Using depression treatment methods could realize a return on investment of $1.20 for every $1.00 invested (in the USA in 2006) | Many employers may receive a potentially meaningful return on investment from enhanced depression treatment which improves absenteeism and productivity at work. The actual return on investment will vary across employers by occupational distributions in the company, by covered partners and by turnover. | Strong |
| Severe mental disorders | Lammerts et al  | 2017 | A participatory supportive return to work programme for workers without an employment contract, sick-listed due to a common mental disorder was not cost-effective and could not be supported by the Dutch social security sector for economic reasons. | For QALYs, an ICER of –Euro125, 357 was found, indicating that a QALY lost was associated with a societal cost of Euro125,357 (Euros in 2017). | Cost utility analysis found that the intervention was less effective and more costly than no intervention. | As there was a loss of 278% per Euro invested, the return to work programme was not cost-effective and could not be supported for economic reasons.  | Strong |
| Severe mental illness | Reeves et al | 2017 | An introduction of a national minimum wage in the UK reduced depressive symptoms in low-wage workers. | In 1999, the UK government implemented minimum wage legislation, increasing hourly wages to at least £3.60 (in 1999, UK GBP), | The intervention group whose wages rose about the minimum wage, experience lower probability of mental ill health compared with both control groups in the study. | Increasing wages significantly improves mental health by reducing financial strain in low-wage earners. | Strong |
| Minor mental disorders | Brouwers et al  | 2007 | Further implementation of an activating intervention by social workers for patients with minor mental disorders on sick leave is not justified. | Health care costs amounted to Euros 636 in the intervention group and Euros 547 in the control group, resulting in a small and not statistically significant cost difference of Euros 89 (in 2007). | The cost saving due to the primary care intervention programme was not significant. Sick leave costs amounted to a mean of Euros 13,721 in the intervention group and Euros 13,993 in the control group. | The intervention was not cost-effective compared to usual care. | Strong |
| Minor mental disorders | Iljima et al  | 2013 | Mental health prevention programmes may provide a net benefit for companies.  | The programme’s average cost was 12,608 yen per employee and the total benefit was 19.530 yen per employee. | The net benefit per employee was 6,921 yen and the return on investment was in the range of 0.27-16.85. | Mental health prevention programmes may provide a net benefit for companies. | Moderate (pilot study only) |
| Minor mental disorders | Veerman et al  | 2015 | Group therapy is estimated to prevent around 5,200 prevalent cases of depression in the Australian workforce. | The income difference between those in the labour force without depression and those not in the labour force with depression in Australia in 2010 was around $48,000 Australian dollars for men aged 45-54 years and $28,200 for women of the same age group. | Those able to remain in the workforce as a result of a prevention of depression programme would earn between $28,000 and $48,000 Australian dollars (in 2010) more per year and net government revenues would increase by around $5million. | Group-based psychological intervention to percent depression could result in considerable economic benefits in addition to its clinical effects. | Strong |

**Table 4.8 Interventions to reduce work disability related to musculoskeletal disorders**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Musculoskeletal disorders | Abaisolo et al | 2005 | The intervention group received a specific programme, administered by rheumatologists, in which care was delivered during regular visits and included 3 main elements: education, protocol-based clinical management, and administrative duties. Implementation of the programme, offered to the general population, improves short- and long-term work disability outcomes and is cost-effective. |  | To save 1 day of temporary work disability, $6.00 had to be invested in the programme. Each dollar invested generated a benefit of $11.00. The programme's net benefit was in excess of $5 million. | The authors recommended that the intervention programme was cost-effective. | Strong |
| Muskuloskeletal disorders | Ektor-Andersen et al  | 2008 | A Cognitive Behavioural intervention (CBT) reduced the number of sickness days compared to usual treatment of spells of musculoskeletal pain in the primary care setting. | The cost of the CBT intervention was Euro235,681 per year (in 2003). | The cost saving due to reduced sickness days could be as much as Euro 599, 113 in 2003 per primary care team per year. | The intervention costs were balanced out during the first year. A large potential for further cost reductions was identified in increased implementation of workplace-based return-to-work interventions. | Strong |
| Muskuloskeletal disorders | Bultmann et al  | 2009 | Coordinated and tailored work rehabilitation (CTWR) delivered by an interdisciplinary team in the Netherlands was cost-effective in terms of productivity loss.  | The cost of the coordinated and tailored work rehabilitation intervention programme was $2,200 US dollars per person in 2007 (incremental costs compared to the conventional case management control). | The total costs saved in CTWR participants compared to controls were estimated as US $1,366 per person at 6 months follow-up and US $ 10,666 per person at 12 months follow-up. | Coordinated tailored work rehabilitation employed by an interdisciplinary team is effective compared to conventional case management in workers absent from work due to musculoskeletal disorders. Workers had fewer sickness absence hours than controls, particularly in the second half of the year. The economic evaluation showed that the intervention was cost saving for society. | Strong |
| Muskuloskeletal disorders | Leon et al  | 2009 | The study was conducted in Spain to evaluate the effectiveness and early cognitive behavioural treatment in patients with work disability due to musculoskeletal disorders. | Direct and indirect costs were significantly lower in the intervention group saving $1, 796 per patient (US dollars in 2009), and the highest savings were related to productivity loss ($1,546 per patient in US dollars in 2009) | In terms of cost-benefit, every dollar invested produced a savings of $4.08 (US dollars in 2009) at the end of the second year. | Early cognitive-behavioural treatment complementary to a rheumatologic care programme is cost-effective, adds more than 20% efficacy to the rheumatologic care programme and reduces the duration of relapse. | Strong |
| Muskuloskeletal disorders | Van Eijsden et al | 2009 | The study was conducted in the Netherlands to investigate the cost-effectiveness of postural exercise therapy versus physiotherapy in computer screen-workers with early non-specific work-related upper limb disorders (WRULD). | Total health care costs were Euro693 per patient group in 2009 for the postural exercise group, and Euro 684 per patient group in 2009 for the regular physiotherapy group at one year. | At one year after the baseline the mean costs due to productivity loss were Euro217 in the postural exercise group and Euro920 in the regular physiotherapy group. | The postural exercise therapy had a higher probability of being cost-effective than regular physiotherapy, but more research is needed. | Strong |
| Muskuloskeletal disorders | Evanoff et al  | 2010 | Pre-employment screening for carpal tunnel syndrome is not appropriate for most employers. | The median cost per employee positon over five years was $503 (US dollars in 2010). | The cost saving for a strategy of no screening would be $302 per employee positon over five years. | A post-employment offer screening for carpal tunnel syndrome is not cost-beneficial for the majority of employers and any such screening should be carefully evaluated for economic yield and social consequences before being implemented. | Strong |
| Muskuloskeletal disorders | Roelofs et al  | 2010 | Cost-effectiveness of lumbar supports for home care workers with recurrent low back pain. | Direct health care costs, direct non-health care costs, and indirect costs because of lower back pain were used as economic indicators. | Direct costs were Euro235 in 2010 lower in the lumbar support group. Indirect costs were Euro255 in 2003 lower, but this was not statistically significant. | Lumbar support seems to be a cost-effective addition to usual care for home care workers with recurrent lower back pain. | Strong |
| Muskuloskeletal disorders | Spekle et al | 2010 | The cost-effectiveness of the RSI QuickScan intervention programme for computer workers.  | The mean intervention costs paid by the employer were Euro59 in 2010 in the intervention and Euro28 in 2010 in the usual care group | Non-significant sick leave effects were found between the intervention and the control groups. | Although the RSI QuickScan programme improved work posture and movement of computer workers, it was not cost-effective from a societal or companies’ perspective and therefore the study did not provide a financial reason for implementing the intervention. | Strong |
| Muskuloskeletal disorders | Bernaards et al  | 2011 | A work style plus physical intervention was not cost-effective in the Netherlands for improving recovery from upper limb symptoms of computer workers. | The cost of the work style plus physical intervention was Euro2811 in 2010, and the cost of usual care was Euro2310 in 2010. However, this was not a statistically significant difference. | The work style plus physical intervention was not cost-effective compared to usual care. | As there were no clinically significant benefits or cost-savings, the authors suggest that more research it needed to understand which specific risk groups may benefit most from a work style intervention. | Strong |
| Musculoskeletal disorders | Vermeulen | 2013 | An economic evaluation of a participatory return to work intervention for temporary agency and unemployed workers sick-listed due to musculoskeletal disorders was conducted in the Netherlands in 2013. | The total health care cost in the return to work programme group was Euro 10,189and significantly higher compared to the care as usual group Euro7,862 in 2013. | The net social benefit of the participatory return to work programme compared to care as usual was Euro2073 per worker in 2013. | The newly developed participatory return to work programme was more effective but also more costly than usual care, the programme enhanced work resumption and generated a net socioeconomic benefit, thus has potential to achieve a sustainable contribution of vulnerable workers to the labour force.  | Strong |

**Table 4.9 Interventions to reduce work disability related to rheumatoid arthritis**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Rheumatoid arthritis | De Jong et al  | 2016 | A cost-effectiveness study was conducted in the Netherlands to compare initial triple DMARD therapy compared with methotrexate monotherapy in early rheumatoid arthritis. | Initial triple therapy cost Euro 12,748, compared with Euro17,408 for the initial monotherapy.  | There was no cost saving to using initial monotherapy in the treatment of early rheumatoid arthritis. | Initial triple therapy was more cost-effective and had better worker productivity compared with initial monotherapy. | Strong |
| Rheumatoid arthritis | Noben et al | 2017 | An economic evaluation was carried out in The Netherlands of an intervention programme with the aim to improve at work productivity for workers with rheumatoid arthritis, and no severe comorbidities. | The average costs after twelve months follow up was Euro7,437.76 in 2013 for the intervention group and Euro5,758.23 in 2013 for the care as usual group. | There was no cost saving to using an integrated workplace intervention programme. | The integrated care intervention and participatory workplace intervention for workers with rheumatoid arthritis did not show any gains in productivity in the workplace or in quality of life, therefore additional costs cannot be justified. | Strong |

**Table 4.10 Interventions to reduce work disability related to migraine**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Migraine | Legg et al | 1997 | The authors investigated the cost benefit of using sumatriptan as a treatment for migraine headaches to improve work productivity. | The cost of sumatriptan was $43.78 per month in 1997, and the reduction in lost productivity was valued at $435 US dollars per month in 1997. | The benefit to cost ratio is 10:1. | The availability of sumatriptan for migraine headache improves work productivity and has a net benefit for employers. | Strong |

**Table 4.11 Interventions to reduce work disability and increase productivity**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Interventions to increase productivity (Disability Management Programme) | Skisak et al | 2006 | An internet based case management tool, Medgate resulted in a more than four to one return on investment based on direct expenditures and cost savings in terms of reduced absence days. | The direct expenditure was $500,000  | The savings were approximately $2,300,000. A more than four to one return on investment. | The in-house disability management program was successful by absence duration, employee satisfaction and return on investment criteria. | Strong |

**Table 4.12 Interventions to improve work participation of young adults with physical disabilities**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Intervention to improve work participation of young adults with physical disabilities | Verhoef et al  | 2013 | A feasibility study was conducted in The Netherlands to evaluate a new intervention to improve work participation of young adults with physical disabilities. | The median cost per participant for 1 year was Euro3,128 (in 2008) which is equivalent to the cost of 72 contact hours per participant. | There was a cost-saving to society from having more physically disabled young adults in work. At 3 years post intervention, seven of the 12 young adults were in paid employment and 1 was in unpaid employment compared with a ratio of 4:4 in paid and unpaid work respectively post-intervention. | Employed participants seemed to have achieved suitable and continuous employment. | Strong |
| Type 2 diabetes | Brown et al | 2012 | In 2012 in the USA a cost-effectiveness analysis of community health worker intervention for low-income Hispanic adults with diabetes was conducted. | The incremental cost-effectiveness ratio of the intervention ranged from $10,995 to $33,319 per QALY gained when compared with usual care. | The incremental cost-effectiveness ratio of the intervention ranged from $10,995 to $33,319 per QALY gained when compared with usual care | The authors noted that culturally sensitive lifestyle modification programmes to control type 2 diabetes can be a cost-effective way to improve health among Hispanics with diabetes, particularly among those with high blood sugar levels. | Strong |

**Table 4.13 Interventions to improve work participation through vaccination programmes**

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| **Category of Initiative** | **Author** | **Date**  | **Main finding** | **Cost implication** | **Cost saving**  | **Recommendation** | **Strength of evidence****(weak, moderate, strong)** |
| Influenza vaccine | Blommaert et al | 2014 | Vaccinating people with underlying illnesses is likely highly cost-effective above 50 years of age and borderline cost-effective for younger persons. | There would be a cost of Euro23.32 per GP consultation. | A zero marginal administration cost (e.g. vaccination during a routine medical visit or through occupational health doctor) increased influenza vaccination of active health care workers is likely to be cost-effective even without accounting for secondary influenza cases.  | Vaccinating health care workers is cost-effective (median Euro24,096/QALY gained Euro16,442-Euro36,342. | Strong |
| Influenza vaccine | Bridges et al  | 2000 | Influenza vaccination of healthy working adults younger than 65 years old can reduce the rates of influenza like illness, lost workdays and physician visits during years when the vaccine and circulating viruses are similar, but vaccination may not provide overall economic benefits in most years. | In 1997-1998 when the vaccine and viruses circulating were not a good match, the net societal cost was $65.59 US dollars per person compared with no vaccination. In 1998-1999 when there was a better match between the vaccine and viruses circulating the net societal cost was $11.17 US dollars per person. | There were no cost savings to providing the influenza vaccination to healthy working adults in the USA between 1997 and 1999. | Vaccination of healthy adults younger than 65 years is unlikely to provide societal economic benefits in most years. | Strong |
| Influenza vaccine | Nettleman and Schmid | 1997 | Varicella vaccination of potentially susceptible health care workers can reduce costs and decrease morbidity in the USA. | The cost of a case of varicella was estimated to be $2,056 US dollars in 1997, based on the cost of outpatient care, time lost from work, and hospitalization. | Vaccination of potentially susceptible workers would result in a net cost saving of $59 USA dollars in 1997. | Vaccination of susceptible employees was found to result in net cost savings, but this was dependent on the infection control policy regarding work restrictions after vaccination. | Strong |
| Influenza vaccine | Parlevliet et al | 2002 | Vaccination promotion has an economic benefit for the Academic Medical Centre (AMC) of the University of Amsterdam, The Netherlands. | The cost of the campaign and administration costs would be around EUR117,000 (EUR125 per vaccination (in 2000 prices). | The net benefit was EUR125 per vaccination (in 2000 prices), but this excluded the campaign and administration costs. | An influenza vaccination programme in an institution with the characteristics of the AMC can be performed with an economic benefit for the organisation, therefore for economic reasons the authors would encourage an influenza vaccination programme in the AMC, particularly for the medical resident staff. | Strong |
| Influenza vaccine | Nichol | 2001 | Substantial health and economic benefits might be realised from vaccinating all working adults against influenza, especially when immunization occurs at the work site or other efficient and low-cost settings. | The mean cost of the vaccine was $10 in 1999 (US dollars). | Mean cost savings of $13.66 (US dollars in 1999) per person vaccinated. | Influenza vaccination of healthy working adults is cost saving. The findings support a strategy of routine annual vaccination especially when vaccination occurs in efficient and low-cost sites. | Strong |
| Influenza vaccine | Nichol et al | 2003 | A cost-benefit of influenza vaccination in healthy, working adult: an economic analysis based on the results of a clinical trial of trivalent live attenuated influenza virus vaccine.  | The mean cost of the vaccine was $10-$15 in 1999 (US dollars). | At a mean cost of US$26 for vaccine and administration, vaccination would generatenet savings to society 95% of the time; at a mean costof US$ 43 vaccination would generate net savings 50% ofthe time. | The influenza vaccination may provide both health and economic benefits for healthy working adults. | Strong |
| Influenza vaccine | Van Buynder et al  | 2015 | A study was conducted in Canada to investigate the cost-effectiveness of giving the influenza immunization vaccine to health care workers. |  | Those vaccinated had 23,473 (10,035–46,314)less illness absenteeism hours saving over $1.25 M in staff costs. | The influenza vaccination was associated with reduced absenteeism, saving the Health Authority substantial money. | Strong |

NOTE: Grey literature evidence may not presented in tables.