

# Priority setting for future European OSH research

## *From research challenges to research questions*

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PEROSH project OSH Evidence – Clearinghouse of systematic reviews

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## Background

The “OSH Evidence group” consists of experts coming from Institutes of the Partnership for European Research in Occupational Safety and Health (PEROSH) and collaborative partners. The main objective of this working group is to facilitate knowledge transfer from scientific research into policy making or otherwise to promote the use of evidence in OSH practice and policy. A second objective is to coordinate the conducting of systematic reviews in the field of occupational health and safety to prevent duplication of work and to bring together expertise in this area.

Activities of the group, so far, have been focused on the development of a database that brings together the results of systematic reviews in the field of OSH. The database is organized by questions that could arise from practice and provides answers to these questions in the form of systematic reviews. The questions can be of any type, be it about etiology, prognosis, diagnosis or intervention. By making systematic reviews available from different sources and presenting them in a systematic way, we hope that knowledge is taken up more easily. However, systematic reviews also provide a good departure point for research priorities.

## Introduction

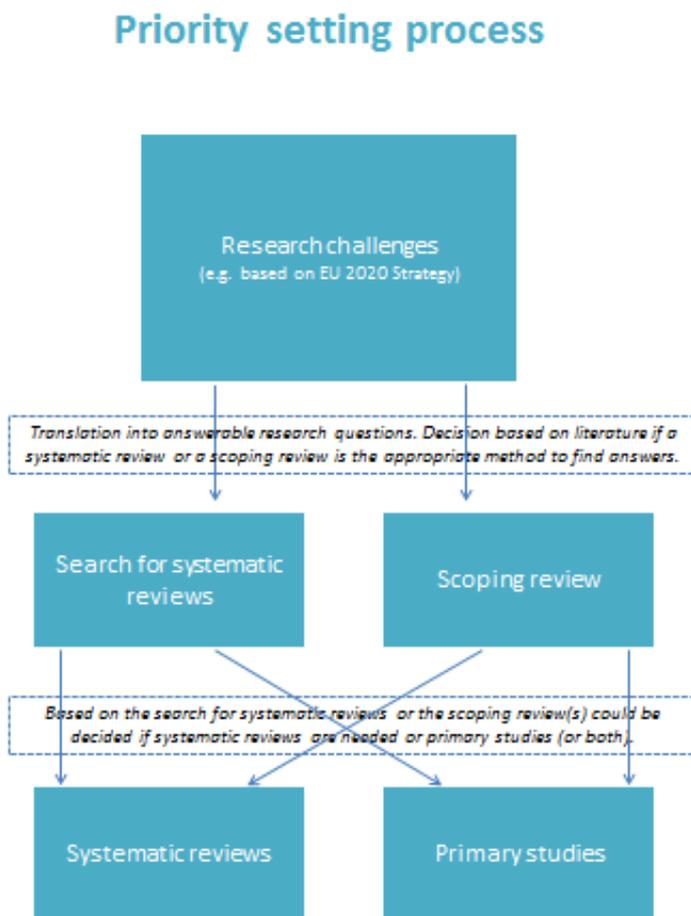
Priorities for research are usually based on long term objectives, and are determined by social, global and political trends. PEROSH follows the EU2020 Strategy for smart, inclusive and sustainable growth, which implies the contribution to healthy, safe, innovative and sustainable workplaces, and keeping people healthy and longer at work.(1) Trends that need to be taken into account in OSH research are the demographic change, globalisation, new technologies and new or increasing occupational exposures.(1, 2) When overall goals and trends are identified, the next step is to find out what we already know and how to locate gaps in our knowledge. These gaps will provide clear guidance on where to direct our research efforts. Systematic reviews provide the best overview of existing knowledge of a clearly formulated research topic. Therefore, it is important to locate available systematic reviews. Such a search will provide us with three different options for research priorities.

First, the result can be that no one has made a synthesis of available studies in the literature in the form of a systematic review. This should be an incentive for PEROSH to undertake such a review of the literature as a first research priority to find out if primary studies are done and what their results indicate for future primary research.

Secondly, the result can be that there is no systematic review available but that it is also difficult to formulate the question in concrete terms to locate such a review. In that case it would be very helpful to first undertake a so-called scoping review. The scoping review would lead to a better mapping of the available evidence and result in one or more precise questions for systematic reviews. Subsequently, these systematic reviews should be undertaken and summarize what is already known on a topic.

Thirdly, the result can be that there are one or more recent systematic reviews available. From these existing reviews implications for research can be taken to formulate concrete objectives for primary

Figure 1: Results of Priority Setting Process



studies. For example a systematic review on the effect of shift work on breast cancer recommended to first develop better validated questionnaires to measure exposure to shift work and to undertake cohort studies instead of more case-control studies.(3)

In this report, the OSH Evidence group reports about the exploration of the gaps in knowledge with regard to the PEROSH research challenges. We will first explain how we explored the gaps in knowledge and then report on concrete examples taken from the research challenges.

## Methods

The overall PEROSH research challenges are described in a PEROSH paper titled: “Sustainable workplaces of the future – European research challenges for occupational safety and health”.(1) This paper was a joint effort of the PEROSH members. The member institutes were consulted to identify which topics they considered the major trends and future challenges in OSH. This consultation led to the prioritisation of seven main research areas that are important and innovative in terms of preventing ill health and occupational accidents. The main overarching challenges were:

- Sustainable employability to prolong working life
- Disability prevention and reintegration
- Psychosocial well-being in a sustainable working organisation
- Multifactorial genesis of work-related musculoskeletal disorders (MSDs)
- New technologies as a field of action for OSH
- Occupational risks related to engineered nanomaterials (ENM)
- Safety culture to prevent occupational accidents

For each research challenge, the paper gives a description of the priority and the research needs at European level. These research challenges still need refinement and taking account of what is already known of these topics.

Based on the research challenges text, the OSH Evidence group set out to translate the research needs in answerable research questions to enable a search for systematic reviews. An answerable question contains the elements that define a research project: participants, intervention or exposure, control condition and outcome (acronym PICO). The next step was to search databases for existing systematic reviews and when these were available to extract their recommendations for research. Reliable search methods to locate systematic reviews have been developed as part of the OSH-evidence project and are available on the website of PEROSH ([www.perosh.eu](http://www.perosh.eu))

In the process of formulating answerable questions, it was decided if this specific question could be answered with a systematic review or if a scoping review would be more appropriate. The difference between scoping reviews and systematic reviews is summarized in table 1.

Table 1 : Main differences between scoping reviews and systematic reviews.(4)

| Systematic review                                | Scoping review                                |
|--|---|
| Focused research question with narrow parameters | Research question(s) often broad              |
| Inclusion/exclusion usually defined at outset    | Inclusion/exclusion can be developed post hoc |
| Quality filters often applied                    | Quality not an initial priority               |
| Detailed data extraction                         | May or may not involve data extraction        |
| Quantitative synthesis often performed           | Synthesis more qualitative and typically not  |

|   |  |
|---|--|
|   | quantitative   |
| Formally assess the quality of studies and generates a conclusion relating to the focused research question | Used to identify parameters and gaps in a body of literature |

A scoping review is considered to be more appropriate if:

- The research topic is very broad
- Many different study designs might be applicable
- The research topic refers to a complex area that has not been reviewed comprehensively before

A systematic review was considered appropriate if:

- The research question is well-defined
- Appropriate study designs can be identified in advance
- The degree of evidence is important (5)

A *scoping review* should give an overview of a broad OSH topic and summarize findings of research, describe existing approaches and gaps in research. If many high quality studies are available, a *systematic review* focused on a specific research question can identify, appraise, select and synthesize all high quality research evidence and deliver quantitative data on an OSH topic.

The results of a scoping review could lead to various systematic reviews. For example: the research question of a scoping review could be “which interventions are available to prolong working life and what is known about their effectiveness”. This would result in a list of potential interventions, the population in which the interventions are investigated, and a limited description of their effectiveness. The description of the effects is limited, because scoping reviews do not include a quality assessment of the included studies. Based on these results one or more well-defined questions may be phrased, such as: “Do economic incentives prolong the working life of ageing workers (55+)?”

For both scoping and systematic reviews it is important to phrase clear answerable questions. However, the elements these questions should contain are different for scoping and systematic reviews. Systematic reviews focus on a specific research question to enable an answer based on all empirical evidence. To this end, we use the ‘PICO’-format, and demand that all PICO-elements are part of the question; P=participants, I=intervention/exposure, C=comparison/control, O=outcome. Research questions for scoping reviews are broader and less focused, but it still has to be an answerable question. Levac et al (5) recommend to:

- Clearly articulate the research question that will guide the scope of inquiry. Consider the concept, target population (P), and outcomes of interest (O) to clarify the focus of the scoping study and establish an effective search strategy.
- Mutually consider the purpose of the scoping study with the research question. Envision the intended outcome to help determine the purpose of the study.

- Consider rationale for conducting the scoping study to help clarify the purpose.

To compose a priority list of topics for reviews, we distinguished between topics for systematic reviews and topics for scoping reviews. For the scoping reviews we will describe the target population, intervention or exposure(s) and the intended results of the scoping reviews. Both, for systematic reviews and for primary studies, we will describe the PICO elements of the research questions, i.e. participants, intervention/exposure, comparison/control and outcome.

For practical reasons, we limited our search for systematic reviews of five topics named specifically the research challenges. However, this does not cover all PEROSH research challenges because most challenges contain a multitude of specific research questions

## 1. Sustainable employability to prolong working life

### Research challenge

Sustainable employability to prolong working life was identified as one of the main research challenges in the PEROSH position paper. This topic was summarized as follows:

Demographic change will be a major driver for labour market developments in Europe. These developments will also have a huge impact on occupational safety and health. For governments, enterprises and citizens alike, it will be of crucial importance to prolong working life in a healthy and productive manner. Research should contribute to a paradigm shift in OSH from its focus on work as a risk factor of ill health to work as a source of vitality, empowerment, healthy ageing and participation in society. A multi-actor approach should be developed to create a common ground. Working conditions, education and training and motivation to prolong working life are the main topics.

The European Agency for Safety and Health at Work (EU-OSHA) has identified research priorities as well. In their report on priorities for OSH research in Europe, they identified two research priorities that are similar to sustainable employability: 'older workers' and 'early retirement versus prolonging working life'. More specifically, priorities refer to physical and psychosocial working conditions, health and work ability, and the effect of interventions.(2)

It can be concluded that the PEROSH research challenges and the EU-OSHA research priorities are rather similar. In general, research questions could be divided into questions concerning determinants and questions concerning interventions.

### Current evidence

The OSH Evidence database already contains four research questions and related systematic reviews on the topic of sustainable employability. With regard to *determinants* the following research questions were formulated based on the research challenges in this field:

- Are psychosocial work characteristics risk factors for early retirement?
- Is physically demanding work a risk factor for early retirement?

With regard to *interventions*:

- What interventions are effective in preventing early retirement in older workers?
- Do economic incentives prolong the working life of ageing workers?

Searches for systematic reviews have been conducted following the OSH Evidence methods. They resulted in two systematic reviews. Both were published in 2010. One is the review by Van den Berg et al (6), which focuses on determinants of early retirement and included psychosocial work characteristics as well as physically demanding work. The other systematic review is by McDermott et al (7) and includes interventions to maintain the health and work ability of older workers. There were no systematic reviews of the effect of economic incentives. Below we will discuss the results of the searches.

#### *Determinants of early retirement*

The conclusion of Van den Berg et al is that poor health and poor work circumstances are important factors in decisions to retire early. Social support and appreciative leadership style may be buffers in this process. They based their conclusions on eight longitudinal studies. (6)

#### *Interventions to prolong the working life of ageing workers*

McDermott et al examined the literature on occupational health approaches aimed at maintaining health and work ability of older workers. They found a limited number of interventions studies targeting older workers. They suggested tailoring interventions to meet specific age-related health management strategies of different age groups. A life course approach to occupational health management might offer such an opportunity.(7)

Economic incentives are often mentioned as a way to entice older workers to keep on working. We did not find any systematic reviews of this topic. However, we do know that there are studies available that could be synthesized. During our search we encountered two studies that evaluated the effect of economic incentives. One Norwegian study found that financial incentives strongly influence retirement behaviour where the tax system dramatically reduces economic incentives for full-time work.(8) A German study examined the effect of the introduction of permanent benefit reduction for early retirees on the duration until benefit claim and the duration until exit from gainful employment. The benefit reduction caused a postponement of claims by about 14 months and a delay of employment exit by about 10 months on average.(9)

## **Research priorities sustainable employability**

### **Scoping reviews**

Since the research topic 'Sustainable employability to prolong working life' is a complex area in which many research questions have not been reviewed extensively, explorative research is still needed. Scoping reviews will be suitable for this research need. Again we may distinguish between determinants and interventions.

Research questions for scoping reviews could be:

- Which working conditions are related to transitions out of work in ageing workers?
- Which interventions are available to prolong working life and what is known about their (cost)-effectiveness?

### **Systematic reviews**

The question “Do economic incentives prolong the working life of ageing workers?” could not be answered by a systematic review. No systematic reviews were found and but studies were available. This indicates a need for a systematic review.

### **Primary studies**

From the two existing systematic reviews, we extracted the following information on future studies. Van den Berg et al based their conclusions on eight longitudinal studies and they were surprised about the small number of studies given the current debate to extend working careers. They concluded that evaluative research is needed to determine the effectiveness of interventions on actual retirement behaviour.(6) McDermott et al recommended a life course approach to occupational health management and concluded that such an approach demands longitudinal studies, with a long-term follow up.(7)

Future studies should contain the following elements:

**P (Population):** The reviews do not make recommendations with regard to the study population.

**E (Exposure):** The reviews do not make recommendations with regard to exposure.

**I (Intervention):** Van den Berg et al concluded that the effectiveness of interventions aimed at actual retirement behaviour needs to be examined.(6) McDermott et al recommended a life course approach.(7)

**C (Comparison):** The reviews do not make any comparison recommendations.

**O (Outcome):** Van den Berg et al concluded that future research should focus on the discrepancy between retirement intentions and determinants of actual retirement and the consequences of these discrepancies for policies aimed at continuing work.(6)

## **2. Psychosocial well-being in a sustainable organisation**

### **Research challenge**

In the PEROSH research challenge document this area is described as follows:

“Research in this area should contribute to a better understanding of the determining factors of physical, psychological and mental health and their impacts, and of the positive factors that may improve well-being including the development of integrated approaches to the management of psychosocial risks.”

This research challenge contains many different elements for which the available evidence can be mapped. We discerned the following three major categories: knowledge of the psychosocial risk factors that impact on physical and mental health, positive factors that impact on mental health and well-being, interventions or control measures for the management of psychosocial risk factors. Of these we choose the following answerable question to search for evidence:

What is the effect of psychosocial working conditions on common mental disorders?

## **Research priorities psychosocial factors**

With this PICO structured question we formulated in- and exclusion criteria and subsequently a search strategy that was run in the database PubMed.

The search of PubMed yielded 546 references of which 14 systematic reviews fulfilled our inclusion criteria. These were published in the past ten years and had evaluated the effect of one or more psychosocial risk factors on mental health and well-being.(10-23) The scope of the psychosocial factors varied from positive factors such as engagement and support to negative factors in the psychosocial work environment. The scope of the outcomes varied from well-being to stress-related disorders such as depression and burn-out.

The quality of the reviews was assessed with the AMSTAR checklist of which the maximum attainable score is 44 points. Only one review scored less than 50% of the maximum score and most of them were of reasonable to good quality.

From the existing reviews, it appears that current evidence is mostly based on influential work stress theories: job demand–control theory of Karasek, the effort–reward imbalance model of Siegrist and the concept of organizational justice. Psychosocial risks factors described in these models are psychological job demands (workload, work pressure), work decision latitude (control over the work tasks), social support from colleagues and supervisors in Karasek’s theory, an experienced imbalance between high effort spent at work and low reward received in Siegrist’s theory, and procedural justice (whether decision-making procedures include input from affected parties, are consistently applied, accurate and ethical) and relational justice (whether the treatment of workers by supervisors is fair, polite and considerate).

All review authors agree that there is evidence that the perception of a number of psychosocial work factors are related to adverse mental health outcomes such as depression or burnout. However, the quality of the evidence varies and needs improvement by conducting better studies.

### **Scoping reviews and systematic reviews**

Given the number of reviews and the relative good quality of these, there does not seem to be a need for new systematic reviews currently.

### **Primary studies**

We collated the implications for research in a qualitative way for the four PICO elements and the study design. From each review, we copied new recommendations until no new recommendations were found. If more than one review recommended a specific study element, we added the references to that review to the recommendation.

Future primary studies should focus on the following study elements.

**P (Population):** Studies are needed that evaluate the effect of psychosocial risk factors separately for working men and working women because emotional demands and job insecurity might have a differential effect in men and women. This would also contribute to the understanding of mediating pathways.(16) Also Zangaro et al suggest that role of gender in the relationship of support and burnout should be better studied.(15)

In future studies on the relation between psychosocial risk and common mental disorders, the participants need to be screened for prior mental disorders since the chance of over-reporting of negative working conditions is higher in participants with existing mental disorders.

**E (Exposure):** There is a common understanding in the reviews that an objective assessment of exposure is needed to better assess the relation with common mental disorders. The majority of the current studies use subjective measures and it is unclear how well these relate with objective measures. Crawford et al and Nahrgang et al suggest the use of outside (non-working) observers, the use of job analysis or external rating from multiple sources which may be helpful to provide objective measures of working conditions.(10, 21) De Boer et al suggest that exposure intensity should be measured.(23) Also Nieuwenhuijsen et al advocate a more thorough and accurate assessment of exposure where duration and intensity of self-reported exposure needs to be better taken into account.(11)

Studies should investigate mediating pathways between work characteristics and common mental disorders, and the pathways from prior mental ill health to perception of current working conditions and common mental disorders.(14) Zangaro et al suggest that mediating pathways such as leadership and demographic factors that explain the association between autonomy, job stress, workplace communication and job satisfaction should be studied better.(15) For burn-out, underlying pathways which explain the relation of support with exhaustion and with depersonalization and personal accomplishment also need to be explored.(16)

For exposure to positive factors, studies should evaluate what factors lead to engagement including factors beyond working conditions like individual differences, autonomy, meaningfulness and availability.(10, 21)

There is a great need to better understand the nature of support (positive or negative) and its effects.(15) Along similar lines, Luchman et al suggest that relative effectiveness of instrumental vs. emotional support should be studied, to know which one of the two or both have implications in practice and theory, especially for understanding the social processes that underlie supervisor and co-worker support.(20) Effect of social support / other resources, work related support and non-work related support on different aspects of burnout needs to be studied.(16) Nahrgang et al suggest that job demand model should be explored across all industries. (21)

Understudied psychosocial factors that are specifically mentioned are transformational leadership (10), interpersonal conflicts and emotional demands (11).

As to study designs, longitudinal or experimental studies or alternative methodologies on the relation between psychosocial risk factors and outcomes like stress related disorders would help to clarify the causality.(11, 15, 16, 18, 21)

There is also a common understanding across reviews that studies are needed to establish the effect of preventive interventions on the incidence of stress related disorders (11) and other mental health outcomes. Intervention studies should test whether modifying work-related stressors leads to better mental health in working populations.(10, 14, 15) Along the same lines, Kuoppola et al suggest that more research on the effects of health promotion is needed, especially on job well-being and early retirement.(12) More specifically, intervention studies in employees should evaluate the effect of changing factors like hours of work, organizational management style, workload, work control/autonomy, etc. on stress and job satisfaction.(16)

**C (Comparison):** The reviews do not make any comparison recommendations.

**O (Outcome):** Intermediary outcomes like engagement, organizational citizenship behaviour (defined as: behaviour that promotes the effective functioning of the organization), job satisfaction (various facets) need to be studied further.(10, 16, 17, 21) The reviews did not make any recommendations about the measurements of common mental health disorders.

### Conclusion psychosocial risk factors and common mental disorders and well-being

The implications for research from existing reviews are partly in line with the research needs formulated in the PEROSH Research Challenges paper but also partly not in line. In line are the call for studies on engagement and its determinants and studies of differential effects of stress in men and women. However, in contrast to the reviews, the PEROSH paper lacks a call for objective exposure assessment, longitudinal and intervention studies and the role and effect of support.

## 3 Occupational risks related to engineered nanomaterials (ENMs)

### Research challenge

In the PEROSH research challenges paper this topic was summarized as follows:

“Engineered nanomaterials present new challenges to understanding, predicting and managing health risks to workers. As nanotechnology applications and uses expand, safety of these emerging materials is identified as one of the research priorities. It has been shown that the physical characteristics of nanoparticles can influence their effects in biological systems, but results from available studies are insufficient to elucidate the potential health concerns. Research efforts have to address knowledge gaps in potential toxicity of nanomaterials, occupational exposure measurement and effective risk management procedures. In this area, European level collaboration is an obvious choice due to the complexity of the issues.”

Research needs were formulated at the European level amongst others for the “Research on exposure control and risk management”. It was concluded that there is a need to conduct quantitative evaluation of efficiency of ventilation and that the following issues should be investigated: containment efficiency of ventilation devices, robustness of the containment with respect to disturbances, influences of the engineered nanomaterials (ENM) source and surface contamination. The result of the research will be used to develop risk management guidance.(1)

For valid recommendations, you need to have knowledge of the existing healthcare research and what works and not works or better than another.

## Research Priorities Nanomaterials

With respect to ventilation/ventilation devices it is already possible to formulate an answerable question that is suitable for a systematic review and which can be translated into a PICO format.

- Is ventilation effective in reducing nanoparticles?

The search for systematic reviews has been conducted following the OSH evidence clearinghouse methods. The search could not locate any systematic reviews for this question. We found only two narrative reviews.(24, 25) However, these did not qualify as a systematic review because a systematic literature search in at least one electronic database is missing, which is one of the minimum inclusion criteria for a review to be included in the OSH evidence clearinghouse database. Furthermore the selection criteria of the literature and critical appraisal of the validity/quality of studies are missing.

Therefore we recommend conducting a systematic review for this question.

Both narrative reviews we found in our search for systematic reviews could also be considered as scoping reviews to a certain extent.

Mostofi R et al (2010) reviews the literature on the filtration performance of mechanical filters and respirators against nanoparticles.(24) It includes the discussion about filtration mechanisms, theoretical models, affecting factors of the filtration efficiency, and testing protocols for respirator and filter certification. The authors concluded that it is very difficult to draw any scientific conclusion from previous studies and this is due to the lack of understanding on the effectiveness of filter media for capturing nanoparticles. Because the methodologies and protocols adopted are not standardized: the experiments are carried out at various conditions (temperature, airflow rate, RH, measurement techniques etc.), therefore the validation of the procedure has been limited and has made it difficult to compare the results of studies.

Schulte P et al (2008) reviews a conceptual framework for occupational risk management as applied to engineered nanomaterials and describes an associated approach for controlling exposures in the presence of uncertainty.(25)

Via hand-searching (not systematically) we have found a more recent paper of the same working group by Kuempel et al.(26) In this article the authors provide an overview of translating current hazard research data and risk assessment methods for nanomaterials to the development and

implementation of effective risk management guidance. They suggest to ensure protection of workers' health, that research is still needed to develop (i) sensitive and quantitative measures of workers' exposure to nanomaterials, (ii) validation methods for exposure controls, and (iii) standardized criteria to categorize hazard data, including better prediction of chronic effects.

Further research questions for scoping reviews could be e.g.:

- What are the risks of exposure to nanomaterials for human health (including dose-response relationship)?
- What are reliable and valid ways of measuring nanoparticles?

## 4. New technologies as a field of action for OSH

### Research challenges

New technologies were identified as one of the main research challenges in the PEROSH position paper. This topic was summarized as follows:

The emergence and rapid development of new technologies are changing the working conditions and working environment. New technologies have a lot of potential to deal with existing and well-known OSH questions such as e.g. the design of the man-machine interface, the real time monitoring of work environment parameters. Simultaneously, new technologies stimulate research in a number of new domains of scientific development such as the development and application of smart and functional materials. Challenge is to reduce possible OSH risks at an early stage by usage of these new technologies. Moreover the development of new technologies may lead to the emergence of new hazards and risks and overrule known solutions. Research should therefore support the development of a common European position with regard to new technologies and OSH in order to anticipate the possibilities and consequences of technology implementation.

There are many issues referring to the development of new technologies due to the intense use of computers and information and communication technologies in almost all fields. EU-OSHA stated that in spite of many benefits for all, the new technologies must be well under control and the risks need to be assessed and integrated into OSH aspects.<sup>(2)</sup> Main topics under discussion are ambient intelligence (Aml), smart personal protective equipment, intelligent man-machine-interfaces, ambient-assisted working (AAW), sensors for measurement and other purposes and actuators, internet, exposure to electromagnetic fields, but also change of work organization, conditions and working time, psychosocial and physical effects on workers. Definitely the new technologies have strongly changed working conditions and still do.

Due to the complexity of this topic there is a need to define and limit specific research question for OSH. So the OSH Evidence group decided to focus first on teleworkers. Telework means that workers do not need to come to a central office; they work at home, in local or satellite telework centres or are mobile workers. The following question was formulated for searching systematic reviews: What are the effects of telework on employee's well-being and health?

The European Foundation for the Improvement of Living and Working Conditions has published several reports and working papers on teleworkers and gave a short overview on the different aspects of health and safety in telework including legal aspects and social security issues.(27)

The searches for systematic reviews were done following the methods paper of the OSH Evidence group. In spite of focusing just on teleworkers the search terms for literature search needed further attention since there are many synonym used for telework in the literature, e.g. mobile work, remote work, e-work, virtual work/office or telecommuting. There are a lot of descriptive papers on special aspects of telework, but there were just two systematic reviews:

In 2011, Crawford et al conducted a systematic review using the methodology of York University and gave a good overview on advantages and challenges for remote and mobile workers (RMWs) on an organizational and individual level.(28) The RMWs represent just a subgroup of teleworkers, since they mainly spend their working time away from home or office base, hence having other strains due to driving and intense contact to clients. The Crawford review focused on four questions:

- What health effects are associated with remote and mobile working?
- What psychosocial effects are associated with remote and mobile isolated working?
- What ergonomic factors affect those involved in working in a mobile and remote environment?
- What organizational/management factors have been identified as influencing remote and isolated workers?

The authors stated that limited research is available, but they could present results on the four questions above.

In 2007, Gajendran et al conducted a meta-analysis focusing on psychosocial effects for telecommuting.(29) They defined different variables as “psychological mediators” (perceived autonomy, work-family conflict, relationship quality – supervisor/coworker) and studied the relationships with different outcomes. They calculated correlations between telecommuting and outcomes and draw several conclusions for trends.

The conclusions from the two reviews of Crawford and Gajendran are summarized using the PICO structure.

**P (Population):** Teleworkers under study should be clearly defined in future studies since there exist different types of telework depending on branch and tasks.

**E (Exposure):** Because there are different potential hazards in different job settings of telework, exposure should be clearly differentiated and described in future telework studies. Mobile teleworkers have other risks than teleworkers in home offices. For mobile teleworkers factors such as driving hours, smoking, age, vehicle design can have a negative influence on well-being and should be included in exposure assessment. For all types of teleworkers negative psychosocial factors (lack of communication or human interaction, time pressure, overlong working hours) as well as positive psychosocial factors (perception of telework like flexibility, autonomy) should be included in exposure assessment.

**E (Intervention):** Prevention or intervention can reduce hazards through specific strategies adapted to the target group. Musculoskeletal problems can be reduced by improvements of vehicle design

and adjustment within vehicles in addition to ensuring adequate breaks when driving for long periods. Support service for RMWs should be developed more. OSH guidance for managing teleworkers is needed. Problems can effectively be solved through informed human resources policies.

**C (Comparison):** The comparison group should be clearly defined like the population above.

**O (Outcome):** Crawford et al found that most frequent injury sites were neck, shoulders and lower back. Long driving and vehicle design issues were linked to lower back pain. Psychosocial factors were associated with musculoskeletal symptom reporting and demand and control. There is a need for research on the general health of RMWs.(28)

Gajendran et al concluded for well-being for RMWs (29) that there are small but favourable effects on perceived autonomy, work-family conflict, job satisfaction, performance, turnover intent, and stress; that there are no straightforward, damaging effects on the quality of workplace relationships or perceived career prospects; that high intensity of telecommuting seems to impair co-worker relationship, but not supervisor relationship.

## Research priorities

The research question “What are the effects of telework on employee’s well-being and health?” could partly be answered by available systematic reviews.

Given the wide scope of the problem there seems to be especially room for scoping reviews such as:

- What are the risks for mental health and well-being associated with telework?
- Which interventions improve mental health in teleworkers and how can these best be provided?

## 5. Disability prevention and reintegration

In the PEROSH research challenges paper, this priority topic for future OSH research was summarized as follows:

“About 6% of the working-age population leave the labour market permanently due to disability. The primary diagnostic causes for disability retirement are musculoskeletal diseases and mental disorders. Priority areas for disability prevention are young workers with long careers, ageing workers with a growing amount of chronic diseases and partial disability, and workers in heavy and hazardous occupations. The following actions are needed: (i) updated systems and strategies for occupational health and safety protection and improvement of the working conditions leading to work disability, (ii) both national and corporate-level strategies, solutions and management of sickness absence, disability, job retention and return to work”.

This is a broad topic consisting of different issues that need to be considered. Using the PICOS approach, we focused on the question “Do interventions/reintegration programs successfully promote RTW among people with mental disorders?”

We ran the search in two electronic databases, EMBASE and PubMed. Additional hand searching was done to make sure that we did not miss important papers. After the literature screening by two independent reviewers, three up-to-date systematic reviews of very good (Arends 2012, van Oostrom 2009) and good (Furlan 2011) quality fulfilled the OSH Evidence inclusion criteria. The AMSTAR-R Checklist was used to rate the quality of the three reviews. The included reviews were scored as follows: Arends 2012 - 44/44 points, van Oostrom 2009 - 39/44 points, and Furlan 2011 - 29/44 points.(30-32)

Our aim was to find out what works for RTW among the ones diagnosed with a mental disorder (ICD10 F00-F99).

The reviews differed in the methodology that they used, the included interventions and also outcomes but partially also based their results on the same primary studies. They conclude that there is insufficient evidence for the effectiveness of interventions in a limited number of studies.

## Research Priorities

All reviews recommend in common the necessity for more high quality research on work-directed interventions on sick leave reduction by the ones with common mental disorders.

### P (Population)

- Lack of studies on gender differences. A gender-specific effect should be studied separately for men and women as disability can be differently perceived by men and women. More studies on men were available. Future studies should include more women and should focus research on participants with certain job types that are prone to adjustment disorders (e.g. distress complaints and burnout), such as nurses and teachers.(30)
- Because of the large standard deviations related to mean days until RTW, which leads to a loss of power, it is recommended to have a study sample size of at least 300 participants.(30)

### I (Intervention)

- More research on sick leave measurement and on interventions preventing job loss in patients with chronic disabling disorders such as common mental disorders are needed.(31)
- Lacking consensus on how to measure and pool sick leave. Research on validity of sick leave measurement is needed. Assessment tools need to be developed and validated for diagnosing adjustment disorders.(30)
- Research on multidisciplinary rehabilitation is lacking. Further research may consider exploring further possible interventions, in addition to CBT and PST interventions, and try to evaluate the whole RTW-process.(30, 31)
- It is recommended that future studies attempt to analyse the participants according to their baseline working status (working or on disability/sick leave) in order to address more specifically whether an intervention is effective to prevent or to manage work disability/sickness absence.(32)
- More research on interventions for preventing job loss in patients with mental health is needed. (30-32) Van Oostrom et al showed a lack of effects on health outcomes and recommended that

all stakeholders in the RTW process (worker, supervisor, healthcare providers, unions, insurers) should agree on a common goal, which is the facilitation of return to work.(31)

### **C (Comparisons)**

- It is recommended that comparison conditions such as 'usual care' should be better defined and described in order to be able to compare the effects of different studies.(30)

### **O (Outcomes)**

- All three reviews reported lacking evidence of effectiveness of worker-directed clinical interventions such as medications, psychological therapy, modified working hours, modified job tasks or both in workers with depression (30, 32) or other common mental disorders (31). Work-directed interventions could work for specific outcomes such as the MSE but more research on sick leave reduction amongst the ones diagnosed with a mental disorder is needed.(31)
- In order to allow better comparisons, researchers should agree on the use of outcome measures for sickness absence.(31) More studies considering different types of work-related outcome measures (e.g. work functioning, work productivity) besides sick leave days and time until RTW are recommended to better understand how workers are performing following RTW.(30)
- In the available literature, there is also a need for better outcome measures, and a consensus of what should be measured when approaching productivity or loss of productivity.(32)

### **S (Study design)**

- More studies needed with a controlled design, especially randomized trials (RCT). Future studies should pay more attention to proper blinding of participants, care providers and data analysts to the kind of interventions they are receiving and to controlling of co-interventions and compliance with the treatment protocol by care providers.(30, 32) Blinding workers in this kind of workplace interventions might not be easy, but the use of cluster randomized trial designs may help to facilitate this.(32)
- Due to lack of primary studies, the reviews underscore not just the necessity for more evidence, but also the need for high quality primary studies on intervention approaches available to address the problem of work disability and poor work functioning (e.g. in workers with mild to moderate depression).(32)
- More high-quality economic evaluation studies of effective worksite mental health interventions are needed to get more insight into the economic impact of worksite mental health interventions. Cost-benefit analyses from the employer perspective are also recommended.(31, 32)

## 6. Conclusions and recommendations

This report shows that an additional step is needed to turn research challenges into research priorities. Even though we could not cover all research challenges that were proffered in the Perosh paper, we believe that this report adds important information to direct our future research projects.

For most of the research challenges systematic reviews were available that summarized the existing knowledge and gave concrete recommendations for future research. The literature researches also revealed where there are gaps in our knowledge either because research had not been properly summarized such as for nanomaterials or because systematic reviews showed which primary research was missing such as studies on objectively measured psychosocial factors.

This report also shows that research challenges contain a large number of concrete questions and that it is sometimes unclear what kind of information we are interested in such as for sustainable employment or psychosocial factors. In that case a scoping review could help to formulate more concrete questions for systematic reviews.

We conclude that it is feasible and helpful to search for systematic reviews to inform decisions about research priorities. This will result in concrete proposals for either scoping or systematic reviews and for primary research. More concrete directions for research priorities will also lead to a more efficient use of research resources.

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