European Agency for Safety and Health at Work

EUROPEAN RISK OBSERVATORY REPORT

EN 5

ISSN 1830-5946

Expert forecast on emerging psychosocial risks related to occupational safety and health

European Agency for Safety and Health at Work

Expert forecast on emerging psychosocial risks related to occupational safety and health

European Agency
for Safety and Health
at Work

Expert forecast on emerging psychosocial risks related to occupational safety and health

Authors:
European Agency for Safety and Health at Work:
Emmanuelle Brun and Malgorzata Milczarek

Topic Centre Risk Observatory:
Nele Roskams and Rik Op De Beeck, Prevent, Belgium
Krista Pahkin, FIOH, Finland
Michel Berthet and Evelyne Morvan, INRS, France
Karl Kuhn and Simon Kaluza, BAuA, Germany
Marlen Hupke, BGAG, Germany
Angelika Hauke and Dietmar Reinert, BGIA, Germany
Maria Widerszal-Bazyl, CIOP-PIB, Poland
Jesús Pérez Bilbao and Margarita Oncins de Frutos, INSHT, Spain

In cooperation with:
European Agency for Safety and Health at Work:
Eusebio Rial González

TNO — Work and Employment, Netherlands:
Irene Houtman, Anneke Goudwaard, Marije Evers and Martin van de Bovenkamp

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 2007

ISBN 978-92-9191-140-0

Printed in Belgium

PRINTED ON WHITE CHLORINE-FREE PAPER

TABLE OF CONTENTS

Foreword **4**

Executive summary **6**

1. Introduction **11**

2. Methodology **15**

2.1. Implementation of the experts' survey 16

2.2. Reliability of the results 18

2.3. Limitations of the methodology 19

2.4. Experts' participation 20

3. Main emerging risks identified in the survey **23**

4. Literature reviews **29**

4.1. New forms of employment contracts: precarious work 30

4.2. Irregular, flexible working time 38

4.3. Job insecurity 49

4.4. Work intensification 58

4.5. Ageing workers 68

4.6. Violence and bullying 76

5. Further risks mentioned in the experts' forecast **85**

6. Conclusions **91**

Annexes **95**

Annex 1: Quantitative results of the second and third rounds 96

Annex 2: Results from the 14 respondents to both second and third rounds 102

Annex 3: References 108

Foreword

Significant changes that have taken place in the world of work during recent decades have resulted in emerging risks in the field of occupational safety and health. These changes have led — besides physical, biological and chemical risks — to emerging **psychosocial risks**. Indeed, the *Fourth European working conditions survey* [13] showed that, in 2005, 20 % of workers from the EU-15 and 30 % from the 10 new Member States believed that their health is at risk because of work-related stress. In 2002, the annual economic cost of work-related stress in the EU-15 was estimated at EUR 20 000 million.

The need to identify and anticipate emerging risks related to occupational safety and health (OSH) has been emphasised on several occasions at the European level. More particularly, the Community strategy on health and safety at work 2002–06 mandated the European Agency for Safety and Health at Work to 'set up a risk observatory'. In order to realise its objectives, the European Risk Observatory identified and explored emerging occupational safety and health risks by (i) an expert survey by means of the Delphi method and (ii) the analysis of scientific literature. This way, the targeting of resources as well as interventions and strategies to tackle emerging risks can be better, timely planned and enhanced in effectiveness.

This report presents the results of the expert forecast on emerging psychosocial OSH risks. The experts proposed 42 psychosocial risks, and rated eight of these risks as **strongly emerging**, 19 as **emerging**, 14 items as **undecided**, and one item as **non-emerging**. Literature reviews explore more in depth the main emerging risks, singled out in the forecast in terms of context, workers at risk, health and safety outcomes and prevention, and the need for future research. The survey and the literature studies revealed that emerging psychosocial OSH risks are often related to technical and organisational changes, as well as to some socioeconomic, demographic and political changes, including the phenomenon of globalisation.

The results of the expert survey on emerging psychosocial risks, as well as the results of the forecasts on physical, chemical and biological risks carried out by the European Risk Observatory, are based on scientific expertise and should be seen as a basis for discussion among stakeholders to set priorities for further research and actions. On 1 and 2 December 2005, the European Agency for Safety and Health at Work organised the 'Promoting OSH research in the EU' seminar, where the results of the four forecasts were discussed among representatives from major European OSH research institutes and from UNICE, the ILO, the Research DG and the Employment, Social Affairs and Equal Opportunities DG. As a next step, the Agency will organise a further workshop specifically dedicated to psychosocial risks in the workplace and bring together high-level representatives from the OSH community — and possibly from further disciplines concerned with the issue — as well as policymakers and social partners. The aim of the workshop will be to consolidate the expert forecast and explore concrete ways to tackle the psychosocial emerging risks identified in this forecast, as well as to stimulate EU research networking activities related to the priorities identified.

The Agency would like to thank TNO — Work and Employment (Netherlands) for carrying out the expert survey, and the members of the Topic Centre Risk Observatory for their contribution to the drafting of this report.

The Agency would particularly like to thank the respondents to the survey, whose participation was essential for the accomplishment of the project.

The Agency would also like to thank its focal points, expert group and advisory group for their valuable comments and suggestions.

European Agency for Safety and Health at Work

Executive summary

During recent decades significant changes have taken place in the world of work which have resulted in new challenges with regard to workers' occupational safety and health. These changes have led — besides physical, biological and chemical risks — to emerging psychosocial risks, which are related to the way work is designed, organised and managed, as well as the economic and social contexts of work.

This report summarises the results of an expert forecast on emerging psychosocial risks related to occupational safety and health. In addition to a questionnaire-based survey of experts, a literature review was conducted in order to support and complement the findings.

An `emerging OSH risk´ is any occupational risk that is both new and increasing.

Within the scope of this project, an 'emerging OSH risk' has been defined as any occupational risk that is both new and increasing.

By new, it is meant that:
- the risk was previously unknown and is caused by new processes, new technologies, new types of workplace, or social or organisational change; or
- a long-standing issue is newly considered as a risk due to a change in social or public perception; or
- new scientific knowledge allows a long-standing issue to be identified as a risk.

The risk is increasing if:
- the number of hazards leading to the risk is growing; or
- the likelihood of exposure to the hazard leading to the risk is increasing (exposure level and/or the number of people exposed); or
- the effect of the hazard on workers' health is getting worse (seriousness of health effects and/or the number of people affected).

A Delphi study was run in three consecutive rounds to avoid individual, non-scientifically founded opinions.

To perform this expert forecast on emerging psychosocial risks, a Delphi study was run in three consecutive rounds to avoid individual, non-scientifically founded opinions. This method was also chosen to verify whether a consensus is reached among the respondents.

In the first round, experts were addressed in order to propose and prioritise risks which in their opinion are emerging. Based on the results of the first survey round, a second questionnaire was developed. All items mentioned in the first round were fed-back and rated by the experts in the second survey round. A five-point Likert scale (1 = strongly disagree to 5 = strongly agree) was employed. This procedure was repeated in the third survey round.

Generally, 62 experts in the first survey round, and 79 experts in the second and third rounds, were invited to participate in the survey, following their nomination by the Agency's focal points and the members of the Topic Centre on Research — Work and Health (TC/WH). There were 28 valid questionnaires for the first survey round, 21 for the second round and 16 for the third round, and these were returned from 13 Member States of the European Union (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom) as well as the USA and one international organisation (the International Labour Organisation (ILO)). The response rate varied between 45 % (first survey round), 27 % (second survey round) and 21 % (third survey round). As a condition of participation, the experts were asked to have at least five years' experience in the field of OSH and psychosocial risks. The experts mostly worked in the field of psychological

research. Many were additionally involved in consulting, teaching and training activities, and some in labour inspection and policy development.

The top 10 emerging psychosocial risks identified in the survey

The top 10 emerging psychosocial risks revealed by the experts' forecast are related to the following five main topics: (i) new forms of employment contracts and job insecurity, (ii) the ageing workforce, (iii) work intensification, (iv) high emotional demands at work, and (v) poor work–life balance.

New forms of employment contracts and job insecurity

Concerning the first main topic, new forms of employment contracts and job insecurity, the experts stressed that the new forms of employment and contracting practices, including precarious contracts (e.g. temporary or on-call contracts) and the trend in companies towards lean production and outsourcing, are important factors affecting the occupational health and safety of many workers. Workers in these types of contract are more vulnerable than, for instance, permanent workers. They usually carry out the most hazardous jobs, work in poorer conditions, and often receive less (OSH) training, which increases the risk of occupational accidents. Also, the experts highlighted the risk of marginalisation as a consequence of successive short-term contracts and the resulting discontinuity in work careers. Workers' isolation caused by new forms of working patterns such as telework or temporary work is also put forward. These implications, in the context of unstable labour markets, increase workers' feeling of job insecurity, which augments the level of work-related stress and may have a negative impact on workers' health.

An increasing number of jobs are described as precarious.

Scientific literature supports the results of the experts' forecast. An increasing number of jobs are described as precarious, atypical or contingent work. In scientific literature it is often associated with non-standard forms of work, such as temporary, part-time, on-call, day-hire or short-term positions, and also with the increase in the prevalence of self-employment. Additionally, work at home and multiple jobs contribute to the increasing significance of 'non-standard' forms of work. There is also growing evidence that there are specific risks for health and safety in the workplace connected with the conditions that characterise these forms of work. The increasing number of temporarily employed workers is associated with a fragmentation of legal responsibilities, and these workers are under-represented in health and safety committees. Some sources indicate that personal protective equipment is made available less often to temporary workers than to permanent workers. A synopsis of the literature review of the influence of irregular forms of employment on workers' OSH revealed that non-permanent workers face higher job insecurity, poorer job conditions, higher job demands and more occupational accidents. Moreover, stress-related tension and exhaustion appear to be more severe for precariously employed workers than for workers in permanent jobs, although there are also studies where this conclusion has not been proven.

Job insecurity is defined as an overall concern about the continued existence of the job in the future, and also as a perceived threat to various job features such as position within an organisation or career opportunities. This phenomenon is especially observed in the context of organisational changes that include reorganisation, outsourcing, mergers and acquisitions, and often redundancies as a way of tackling increased competitiveness. The main theoretical bases to explain the negative health

effects of job insecurity are, for most researchers, stress theories. Studies usually indicate the relationship between job insecurity and poorer mental health, measured usually with the general health questionnaire (GHQ). Burnout, job-induced tension, and depression were also observed. The aggravation of physical health as a cause of job insecurity was also revealed, although this relationship has been analysed less frequently.

The ageing workforce

A further emerging risk that the experts strongly agreed on is the OSH risks for the ageing workforce, which they see as a consequence of both the ageing population and the higher retirement age. The experts emphasised the fact that ageing workers are more vulnerable to poor working conditions than young workers. Additionally, the failure in providing ageing workers with lifelong learning opportunities increased the mental and emotional demands upon them, which may affect their health and increase the probability of work-related accidents.

Scientific literature also stresses the actual and further rise in the proportion of older employees and discusses the resulting consequences for the occupational safety and health of older employees. Ageing can be understood as a dynamic and differentiated process of change in which functions decline (e.g. muscle strength, sight, short-term memory or speed of perception) at the same time as other skills develop (e.g. competence to judge, steadiness or sense of responsibility). The specifics of the physical and psychosocial work environment additionally influences the work performance and ability of older workers. Thus, it is stressed that general conclusions about the performance of ageing workers cannot be drawn, owing to differences in their working environment and conditions, and the individual differences concerning decreasing and increasing abilities linked to age. Similarly, the accident statistics are inconsistent. In some studies the number of accidents increases with age, whereas in other studies it decreases. Societies, organisations and employees still face difficulties, in terms of OSH, in managing the consequences of the trend towards an older workforce in a satisfactory way . It is emphasised that, in order to allow healthy and safe work during a prolonged working life, general working conditions need to be improved.

Work intensification

A growing number of workers experience high pressure at work.

Experts involved in the forecast see the next identified risk, work intensification (high workload and work pressure), as a consequence of the reduction of workplaces linked to the aspects mentioned in relation to new forms of employment contracts and job insecurity, and also of the growing amount of information to handle at work as a result of the introduction of new information and communication technologies (ICT) into the workplace. A higher workload, and more demands shared between fewer workers can lead to an increase in work-related stress. Within this context, workers may also fear to be assessed more upon their efficiency and the outcomes of their work, and hence tend to work longer working hours in order to finish their task, sometimes without receiving adequate compensation (in the form of free time or financial compensation) and social support. All of this may result in more stress in workers and affect their health and safety at work.

The literature review also shows that work intensification has been a significant feature of the changes taking place in companies in the majority of developed countries since the 1980s. A growing number of workers state that they experience high levels of pressure stemming from high-speed tasks and/or strict deadlines, lifting heavy

weights and arduous postures. European statistics indicate that almost half of all European employees work at very high speed for three quarters or more of the time. In comparison with previous years, this tendency is on the increase. The relevant literature broadly associates work intensification with a deterioration in working conditions, whether they are assessed in terms of physical or psychological discomforts, nuisance or occupational risks. This may lead to negative effects on employees' health. According to the European working conditions survey (2000), the higher the pace constraints, the more probable the workers' perception that their health is threatened. The most common health problems reported by workers are backache, muscular pains, fatigue and stress.

High emotional demands at work

Growing emotional demands at work especially concern the healthcare and the service sector.

The experts involved in the Delphi study agreed that one of the emerging risks is related to high emotional demands at work. Moreover, workers may try to hide their difficulties in coping with these demands as a reaction to the fear of losing their job, which can be a source of additional stress. Some experts are of the opinion that, although the issue is not new, it is a growing concern, especially in the healthcare and service sector, which is growing and where competition is increasing. Some respondents identified bullying as a contributing factor to these increased emotional demands.

The problem of violence and bullying in workplaces has created special interest in the past few years and has resulted in many scientific publications related to this issue. The European Commission defines workplace violence as: '*Incidents where staff is abused, threatened or assaulted in circumstances related to their work, including commuting to and from work, involving an explicit or implicit challenge to their safety, well-being or health*'. This problem affects all types of occupation and activity sectors, although the prevalence is higher in the services sector. For both the victims and witnesses, violence and bullying are important sources of stress and thus negatively affect physical and mental health. Post-traumatic stress disorder (PTSD), deterioration of self-esteem, anxiety, depression, apathy, irritability, memory disorders, and even paranoiac disorders and suicide can appear as a consequence of violence or bullying. The somatic pathologies, such as organic, functional and sleep disorders, alterations in the cortisol cycle, loss of appetite, hypertension, vomiting, chronic fatigue, and back, muscular and joint pain, as well as headaches, can also appear.

Poor work–life balance

Poor work–life balance may lead to stress and other negative health effects.

Finally, poor work–life balance was also identified by the experts as one of the top emerging psychosocial risks. It has been stressed that all of the changes in work organisation mentioned above may lead to higher pressure on workers and can spill over into private life. Additionally, phenomena such as more women at work, single parents and households with 'dual careers', with less family support and in some cases with more dependent older relatives, result in an increase in the number of workers for whom a good work–life balance is especially important. The experts emphasised that failure in achieving a decent work–life balance may lead to stress and other negative health effects for workers.

According to the relevant literature, irregular working hours, especially combined with the lack of possibility for employees to arrange their work to a certain extent to suit their personal needs, often causes problems affecting work–life balance and employees' health. Non-standard hours such as shift, weekend and night work can be especially disruptive for work–life balance when an employee is in a precarious

employment situation. Casual work, combining high work intensity and variable and unpredictable working hours, leads to work–life conflict and has detrimental effects on well-being.

To provide as complete as possible a picture of potential emerging risks in the world of work, three other expert forecasts including literature reviews were also conducted. They dealt with physical, chemical and biological risks. The identification of new and emerging risks by the European Risk Observatory is aimed at early anticipation in order to prevent any possible negative effects of these risks on workers' safety and health. This way, the targeting of resources as well as interventions and strategies to tackle future risks can be better planned, enhanced in effectiveness and assessed in time. The results of the expert survey on emerging risks should be seen as a basis for discussion among stakeholders to set priorities for further research and actions.

1.

INTRODUCTION

Significant organisational and demographic changes are observed in the world of work.

During recent decades, significant changes have taken place in the world of work [1][2][3]. Economic liberalisation was followed by the dissemination of free trade and the beginning of globalisation. Improved technologies and new, growing fields of work (such as the information technology sector) supported a change from classical, traditional systems of industrialisation to a new, service economy. Additionally, increasing customer demands in the quality of services and products resulted in strong competition between companies.

In this context, to compete more effectively, many companies have restructured and downsized their workforce, moved their production to lower-cost sites, increased their reliance on non-traditional employment practices (outsourcing, temporary work, part-time work or flexible work) and implemented new work methods such as lean production and just-in-time production [1][3][4][5]. These strategies are aimed at increasing profits and decreasing costs in order to remain competitive, and result in work intensification and the prevalence of precarious contracts. Regarding the employees, these developments lead to increased feelings of job insecurity and worries about the future [6].

Besides, strong demographic changes can be observed. Of special importance is the steady increase of the proportion of older people in industrialised societies due to decreasing fertility rates and higher life expectancy. In some countries, retirement ages have been raised to stabilise social welfare systems. Physical disabilities and occupational diseases may occur more frequently among older workers, as they are more vulnerable to poor working conditions. This also has an impact on absenteeism and work performance [7][8]. Societies, organisations and employees still face difficulties in managing the consequences of the trend towards an ageing workforce in a satisfactory way. Demographic changes can still be regarded as a challenge for occupational safety and health. The European Agency's *Ageing workers and occupational safety and health — Prevention report* [9] explores in depth the specific occupational safety and health issues related to an ageing workforce, and describes more particularly national and European policies as well as good practices.

All of the phenomena mentioned above are observed in Europe [7], in the USA and in many other developed countries [10]. Besides some positive effects, scientific research revealed that these trends also have harmful effects on work and employment conditions as well as on workers' health [3][10][11]. Work intensification and job insecurity are directly linked to the occurrence of stress [2]. People might discriminate against older workers because there is a perception that older workers' mental and physical skills may decline [9]. Furthermore, especially for older workers, work intensification and prolonged working life participation can foster the development of physical diseases such as musculoskeletal disorders [2]. As a result, new risks and new challenges for both workers and employers emerge.

More than 20 % of EU workers reported work-related stress.

In 2002, it was estimated that a substantial proportion of European employees work under working conditions that presumably are causes of stress and ill health [12]. The *Fourth European working conditions survey* [13] showed that, in 2005, 20 % of workers from the EU-15 and 30 % from the 10 new Member States believed that their health is at risk because of work-related stress, and reported muscular pains. However, health and safety at work is not only essential for workers' well-being but is a very important economic factor for companies [1][7]. In 2002, the European Commission reported on costs of about EUR 20 000 million in the EU-15 each year due to work-related stress [12]. National statistics are alarming as well. In France, EUR 1 300 million was estimated as the cost of work-related pain in the lower back in 2002 [14]. Figures obtained in the Netherlands (in 2001) indicated that psychological and

musculoskeletal disorders each caused about 22 % (EUR 3 000 million) of the total costs of work-related sick leave and disability in the country [15]. Similarly, German statistics indicate significant increases in absenteeism and the number of days lost caused by psychological disorders since 1994. The estimated economic cost of these disorders in 2001 in Germany was about EUR 3 000 million [15]. These data prove that new solutions for OSH have to be developed in order to adequately manage the changes in the world of work.

The need to identify and anticipate emerging risks related to occupational safety and health has been emphasised on several occasions at the European level [7][16]. More particularly, the Community strategy on health and safety at work 2002–06 mandated the European Agency for Safety and Health at Work to 'set up a risk observatory'. In order to realise its objectives, the European Risk Observatory identified and explored emerging occupational safety and health risks by (i) an expert survey by means of the Delphi method and (ii) the analysis of scientific literature. In this way, emerging risks in the workplace, as well as areas where more research is needed, can be identified early and appropriate action can be taken.

This report presents the results of the expert forecast on emerging psychosocial OSH risks. Psychosocial risks are understood to be those aspects of the design, organisation and management of work, and its social and environmental context, which can cause psychological, social or physical harm [17]. The results of the forecast are complemented with literature reviews which explore in more depth the main emerging risks singled out in the survey in terms of context, workers at risk, health and safety outcomes and prevention, as well as the need for future research.

To provide a comprehensive picture of the world of work, besides the report on psychosocial OSH risks, three other reports have also been prepared. They present the results of expert forecasts and literature reviews on emerging physical, biological, and chemical OSH risks.

What are emerging risks?

An 'emerging OSH risk' has been defined as any occupational risk that is both new and increasing.

By new, it is meant that:

- the risk was previously unknown and is caused by new processes, new technologies, new types of workplace, or social or organisational change; or
- a long-standing issue is newly considered as a risk due to a change in social or public perception; or
- new scientific knowledge allows a long-standing issue to be identified as a risk.

The risk is increasing if:

- the number of hazards leading to the risk is growing; or
- the likelihood of exposure to the hazard leading to the risk is increasing (exposure level and/or the number of people exposed); or
- the effect of the hazard on workers' health is getting worse (seriousness of health effects and/or the number of people affected).

2.

METHODOLOGY

2.1. Implementation of the experts' survey

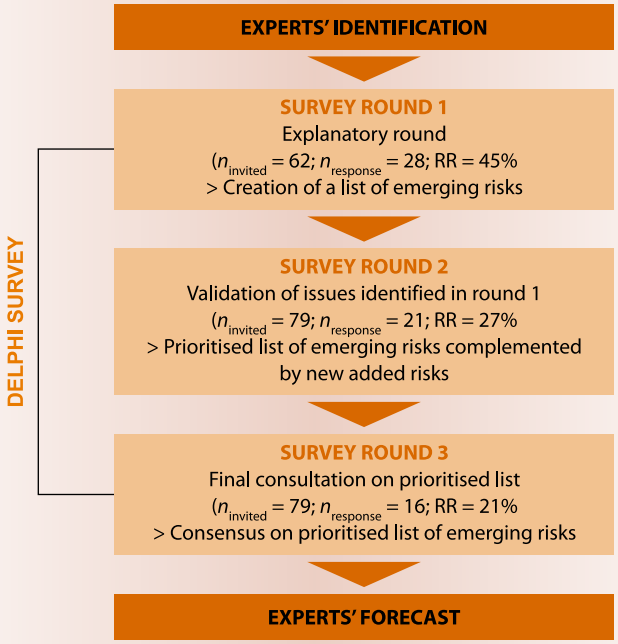
The forecast on psychosocial risks was obtained through an experts' survey carried out in three consecutive survey rounds in 2003 and 2004. In this matter, the Delphi method was used in order to reach a broad consensus and to avoid non-scientifically founded opinions.

Delphi method [18]

The Delphi method is a widely used methodology to build up information on topics for which only uncertain or incomplete knowledge is available. There are several variations of the Delphi method, but all of them are based on an iteration process with at least two survey rounds in which the results of the previous rounds are fed back and resubmitted to the experts for a new evaluation. The feedback process ensures that the experts are aware of the views of other experts and gives them the possibility to revise their first evaluation. At the same time it limits the chances of individuals being unduly influenced by group pressures, which could lead to experts not daring to offer their real opinions, thus leading to distorted results.

The Delphi method adopted for formulating the experts' forecast on emerging risks in this project consisted of three survey rounds (Figure 1). Only the answers from experts eligible for participation were analysed (see Section 2.4. 'Experts' participation').

Figure 1: Delphi process implemented for the experts' forecast on emerging psychosocial risks



First survey round

A first survey round carried out in 2003 aimed to identify the risks that the experts reckoned to be emerging. The first questionnaire (Annex 1) was developed based on the experience gained from the expert forecast on emerging OSH physical risks started in 2002. So as to trigger the identification of potential emerging risks, keywords from the sections 'psychological and physiological issues', 'organisational work' and 'political, social and economic issues' of the OSH thesaurus developed by the Agency and the Topic Centre on Research — Work and Health (TC/WH) were suggested to the respondents in the questionnaire. Further keywords were added in order to provide a more comprehensive and representative coverage of the psychosocial field and to give some insight into the aggregated and more detailed levels.

Experts identified potential emerging risks, specified their causes and their expected effects.

The questionnaire invited the experts to identify potential emerging risks and to specify their causes and their expected effects, to briefly justify why they reckon the risks are emerging, and to weight their relative importance by dividing 100 points among the risks.

In this round, as in all further ones, the experts were mainly approached by e-mail.

The following indicators were calculated:

- the number of experts who mentioned a specific emerging risk;
- the mean value (MV) of the points attributed to a risk, which indicates the weight the experts allocate to the risk;
- the standard deviation (SD) of the mean value, which shows the degree of consensus amongst the experts: the smaller the SD, the higher the consensus.

The SDs were extremely large, which is to some extent due to the 100-point ranking method chosen. Indeed, the items could not be rated independently from each other, as opposed to a non-comparative scaling process such as the Likert scale. Moreover, this method required each expert to prioritise the risks they had identified on their own. As each expert came up with a different list of risks in this first round, any comparison of ratings between experts for similar items is actually difficult.

Second survey round

The second questionnaire-based survey round was carried out in the first half of 2004 and aimed to validate and complement the list of potential emerging risks identified in the first step.

Unlike the first round, the rating method consisted of a non-comparative scaling process whereby the respondents were asked to rate each issue independently from the others on a five-point Likert scale. The first box of the scale meant 'strongly disagree that the issue is an emerging risk', the middle box stood for 'undecided' and the last box for 'strongly agree that the issue is an emerging risk'. The experts were given the chance to add new risks to the list.

For each risk, the mean values of the ratings and the standard deviations were calculated.

Third survey round

As the last step towards reaching a consensus, a third consolidation round was carried out in the second half of 2004. The third questionnaire also consisted of a non-

The prioritised list of emerging risks was established at the end of the third survey round

comparative scaling process whereby the respondents were asked to rate each issue independently from the others on the same five-point Likert scale as used in the second round.

The prioritised list of emerging risks established at the end of the third survey round forms the expert forecast on emerging psychosocial OSH risks.

How to interpret the results

The values discussed in this report refer to the second and third survey rounds, using the five-point Likert-scale rating method.

The parameters of interest are:

- **the mean value of the ratings given to each item:** the higher the mean value, the stronger the acknowledgement that the item is an emerging risk;
- **the standard deviation of the mean value:** a reduction of standard deviation from the second to the third round indicates an increase in consensus.

The comments that the experts added to their ratings provide additional background information as to how to interpret the ratings.

The following areas have been defined for the interpretation of the mean values (MV), based on the definition of the five-point Likert scale used in the survey (see above), and in order to have a reasonable balance of items between the different areas:

- the risk is strongly agreed to be emerging if the mean value of the rating is above four ($MV > 4$);
- a mean value between 3.25 and 4 means that the item is considered to be an emerging risk ($3.25 < MV \leq 4$);
- as a mean value is unlikely to be exactly equal to 3, the undecided area has been extended from 2.75 to 3.25, which means that the status of a risk is regarded as undecided if the mean value is strictly within this interval ($2.75 \leq MV \leq 3.25$);
- there is agreement that the risk is not emerging if the mean value is between 2 and 2.75 ($2 \leq MV < 2.75$);
- there is strong agreement that the risk is not emerging if the mean value is below 2 ($MV < 2$).

2.2. Reliability of the results

Delphi studies usually end after two to four survey rounds [19]. With regard to the present Delphi survey, a consensus among the participants could be reached in the third round for the majority of the items and it was therefore decided to end the Delphi survey at the third round. Indeed, when considering only the answers from the 14 experts who responded to both the second and the third survey rounds, a

comparison of the standard deviations (SDs) of the second round with the third round shows that most SDs decreased from one round to the next (see Annex 1): out of the 42 items rated in both rounds, 23 SDs decreased — seven of which for the eight items strongly agreed as emerging, 13 for the 20 items rated as emerging risk, and only three for the 13 items in the category undecided. This means that the consensus among experts was globally stronger for the items rated as strongly emerging and less strong for the items rated as undecided.

Although the same experts were invited to participate in the second and third rounds, different persons actually responded to each round: 14 experts answered to both second and third rounds, and two additional experts participated only in the third round. In order to decide whether to base the forecast only on the answers of the participants in the third round who also responded to the second round (n = 14), or on all answers from all participants to the third round (n = 16) — including the two who did not participate in the second round — the standard deviations were calculated for both population samples separately and compared (see Annex 2). Globally, the two additional experts who participated in the third but not in the second round did not distort the results as, in the third round, only 10 SDs out of 42 are slightly lower, without these two experts who did not participate in the second round. This means that only for these 10 items the ratings of these two additional experts have led to a slightly weaker degree of consensus between the respondents. Therefore, the ratings from all the experts who participated in the third survey round have been taken into consideration in order to have a forecast based on more participants.

2.3. Limitations of the methodology

The study relies on the goodwill of the experts to complete the questionnaires, with no financial compensation for their contribution. Additionally, the respondents had to understand written English and to be able to formulate their answers in English, as the questionnaires were not translated. This has certainly had an effect on the response rate and may be seen as one of the major limitations. Indeed, the higher the number of participants, the more reliable and representative the forecast.

There are also limitations with the initial phase in which risks are defined. Analysing and compiling the free-text answers to the open-ended questions of the first 'brain-storming' survey round is a difficult exercise. Indeed, the answers received were very variable in terms of the amount of information and details provided, the level of specificity of the issues brought up, and of the quality of the written English. As opposed to a workshop, in such a questionnaire-based process there is no opportunity for a moderator to ask the participants for clarification, to re-focus their answers on OSH when they are beyond the scope of the study, or to provide them with the information they may need to answer the question adequately. These factors impede the setting of clear risk descriptions, which is essential to avoid misunderstanding on the items to be rated in the further rounds.

A further issue is the difficulty of finding the right participants. On the one hand, respondents with a deep but specific expertise may be too focused on their own area of work and mention only their own topics and activities in the survey. Conversely, generalists with broader knowledge may lack the expertise to judge whether an issue is actually emerging.

Last, but not least, owing to the nature of forecasting activities, the evidence may still be inconclusive for some of the emerging risks mentioned in the survey. However, this does not mean that these risks should be excluded from the forecast, as this would make the European Risk Observatory fail to accomplish its main objective of anticipating risks and stimulating debate. Rather, particular care should be taken to discuss the findings with the relevant stakeholders in order to validate any conclusions and decide on the need for any further work on the topic. In this way, the European Risk Observatory will fulfil its mission to stimulate debate and assist policymakers in identifying priorities for action and research.

2.4. Experts' participation

Selection of experts

The expertise was collected and used with full awareness of the principles and guidelines of the European Commission [20].

Selection criteria were defined so as to ensure a broad coverage of qualified expertise across Europe. For the first exploratory survey round, the experts had to meet the following criteria:

- have at least five years' experience in the field concerned; and
- have authored at least two publications in this field.

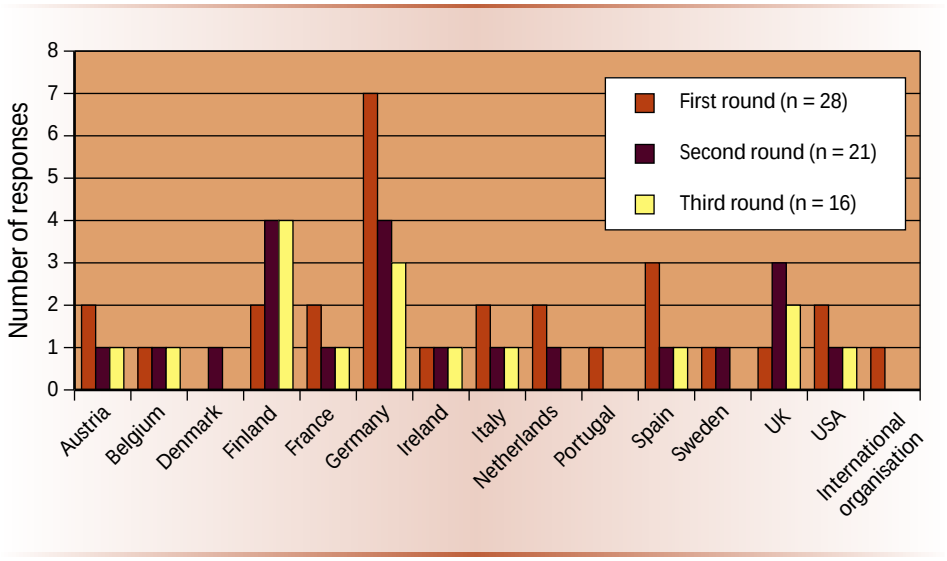
For the second and third rounds, the second criterion was loosened to also include experts with a less academic but still very high level of expertise.

The Agency's focal points and TC/WH members were invited to nominate potential participants to the survey from Member States. They also mentioned two experts from the USA and one from an international organisation (the International Labour Organisation (ILO)), who were also invited to participate in the survey.

Responses

In total, 62 experts were identified by the focal points and the TC/WH members and invited to participate in the survey. For the second and third rounds, additional experts were contacted in an attempt to increase the number of responses. However, the response rates were rather low and slimmed with each survey round: 45 % for the first round, 27 % for the second and 21 % for the third (see Figure 2). This phenomenon is commonly observed in longitudinal studies.

Figure 2: Country of origin of the respondents to the first, second and third rounds of the survey

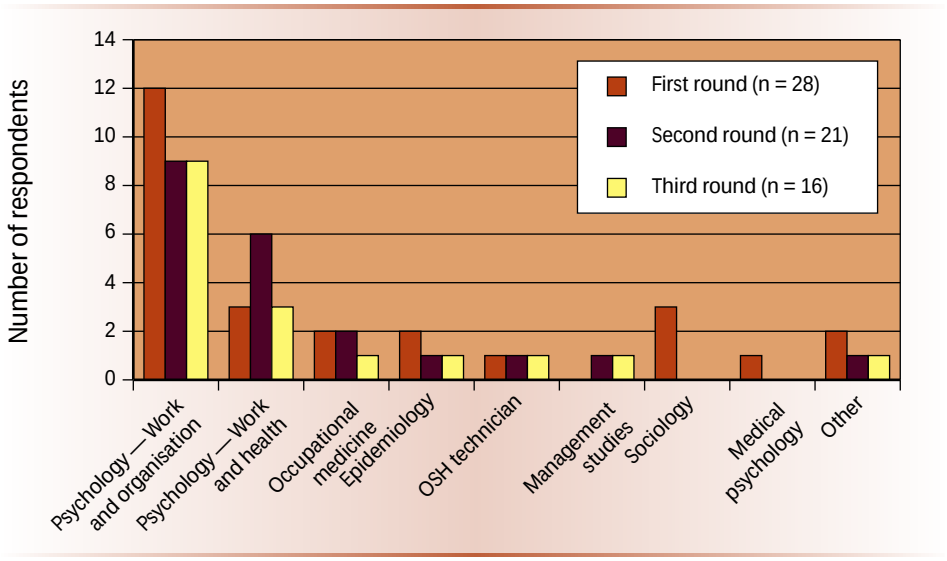


Characteristics of respondents to the survey

For all three survey rounds, the majority of respondents had expertise in the field of psychology, particularly in the area of work and organisational psychology (see Figure 3). There are two possible explanations for this phenomenon:

- the identification of participants to the survey may have been biased towards experts in psychology from the beginning of the process; or
- amongst the experts invited, mainly psychology experts felt addressed by the survey and actually responded.

Figure 3: Fields of activities of the respondents



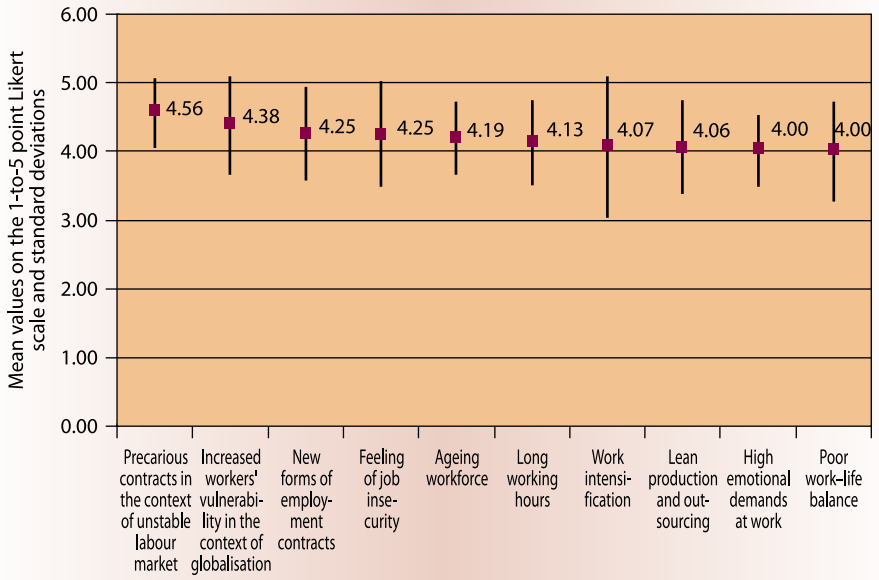
Most experts were involved in research. Many were additionally involved in further activities such as teaching, management or consulting activities. In some cases, the experts were involved in the labour inspectorate or in policymaking and standards development.

3.

MAIN EMERGING RISKS IDENTIFIED IN THE SURVEY

In this chapter, the top emerging risks identified in the survey (see Figure 4 and Table 1) are discussed in the light of the respondents' comments. The mean values and exact standard deviations of all items are listed in Annex 1.

Figure 4: The 10 most important emerging psychosocial risks identified in the survey



(NB: MV > 4: risk strongly agreed as emerging; 3.25 < MV ≤ 4: risk agreed as emerging)

The experts' comments, which are compiled in the following paragraphs, indicate that the top emerging risks are closely interrelated. In the following paragraphs, the top emerging risks will be grouped thematically under the following topics:

- 'New forms of employment contracts and job insecurity', in which the items 'precarious contracts in the context of unstable labour market', 'increased workers' vulnerability in the context of globalisation', 'new forms of employment contracts', 'feeling of job insecurity' and 'lean production and outsourcing' will be discussed based on the comments provided by the respondents;
- 'OSH risks for the ageing workforce';
- 'Work intensification', in which both items 'long working hours' and 'work intensification' will be dealt with;
- 'High emotional demands at work';
- 'Poor work–life balance'.

New forms of employment contracts and job insecurity

The new forms of employment and contracting practices, including precarious contracts (such as temporary, on-call or part-time contracts), and the trend in companies towards lean production and outsourcing are important factors affecting the occupational health and safety of many workers nowadays. According to the experts, workers in these types of contract are more vulnerable than, for instance, permanent workers. Indeed, they usually carry out the most hazardous jobs, work in poorer conditions, and often receive less (OSH) training, which increases the risk of

occupational accidents. The example of workers in outsourced firms was emphasised: consequences of these forms of employment may mean less training opportunities, de-skilling and a decrease in their job control. More generally, in the context of unstable labour markets, workers increasingly have a feeling of job insecurity, which augments the level of work-related stress and the negative impact on workers' health. Also, the experts highlight the risk of marginalisation as a consequence of successive short-term contracts and of the resulting discontinuity in work careers. It was further mentioned that new forms of working patterns such as telework or temporary work, as well as the growing need for mobile workers, may result in workers' isolation.

According to the experts, one factor contributing to this phenomenon is the stronger international competition in the context of the globalisation of labour markets, which pushes companies, for example, to move abroad, to reduce the number of workplaces and to adopt the contracting practices described above, so as to cut costs and remain competitive.

OSH risks for the ageing workforce

Complex human-machine interface

The experts strongly acknowledged the issue of OSH risks for the ageing workforce as emerging risks, which they see as a consequence of both the ageing population and the higher retirement age. The respondents additionally pointed out this issue in a separate item (older workers (MV = 3.94)), in which they underlined the health and safety consequences of jobs not adapted to their condition, and the fact that ageing workers are more vulnerable to poor working conditions than young workers. Further comments addressed the necessity of providing ageing workers with lifelong learning opportunities. Failure to do so would mean increased mental and emotional demands upon them, which may affect their health and increase the probability of work-related accidents.

Work intensification

Intensification of work (high workload and work pressure) is another important emerging risk revealed in the forecast. This phenomenon is, say the experts, partly a consequence of the reduction of workplaces linked to the aspects mentioned above (see 'New forms of employment contracts and job insecurity'), and also of the growing amount of information to handle at work as a result of the introduction of new information and communication technologies (ICT) into the workplace. This means that there is a higher workload and more demands shared between fewer workers,

and hence an increase in work-related stress. Within this context, workers may also fear to be more assessed upon their efficiency and the outcomes of their work, and hence tend to work longer working hours in order to finish their task, sometimes without receiving adequate compensation (in the form of free-time or financial compensation) and social support. All of this may result in more stress in workers and affect their health and safety at work. The experts indicate that more research is needed to better understand the effects of excessive or less regular and predictable working time on workers' health and on their difficulties to balance working and non-working time.

High emotional demands at work

Not only is a high level of work-related emotional demands rated as an emerging risk, but also the fact that workers may try to hide their difficulties in coping with this high level of emotional demands, which is seen by the respondents as a reaction to the fear of losing their job. According to the experts surveyed, this creates additional stress on them. Some experts are of the opinion that, although the issue is not new, it is a growing concern, especially in healthcare and in the service sector, which is growing and where competition is increasing. Some respondents identified bullying — more particularly at the example of emotional blackmail — as a contributing factor to this increase in emotional demands. It is interesting to note that the issue of bullying and violence (MV = 3.44) in the service sector — as well as in education — was emphasised in a further separate item as being an emerging risk.

Poor work–life balance

According to the experts, the issue of poor work–life balance is a growing concern affecting more and more workers. Changes in work organisation, such as a higher demand for flexibility, new work arrangements, higher demand for mobility on the labour market and intensification of work may lead to higher pressure on workers and to a spillover into private life. In addition, changes in the characteristics of the workforce, which counts more women at work, single parents and households with 'dual careers', with less family support and in some cases with more dependent older relatives, result in more workers for whom a good work–life balance is all the more important. Failure in achieving a decent work–life balance may lead to stress and other health consequences for workers. The respondents again emphasised the problems of reconciling family and work life (MV = 3.80) as an emerging risk in a separate item.

Last, but not least, they underlined that more research is needed to better understand the relationship between poor work–life balance and ill-health, and that it would be important to analyse separately the subsequent health outcomes in women and men.

Table 1: The top 10 emerging psychosocial risks identified in the survey (n = number of experts answering the specific item in the third round; mean value (MV); standard deviation (SD))

MV > 4: risk strongly agreed as emerging 3.25 < MV ≤ 4: risk agreed as emerging

Top 10 risks	n	Mean value (MV)	Standard deviation (SD)
Precarious contracts in the context of unstable labour market	16	4.56	0.51
Increased workers' vulnerability in the context of globalisation	16	4.38	0.72
New forms of employment contracts	16	4.25	0.68
Feeling of job insecurity	16	4.25	0.77
Ageing workforce	16	4.19	0.54
Long working hours	16	4.13	0.62
Work intensification	15	4.07	1.03
Lean production and outsourcing	16	4.06	0.68
High emotional demands at work	16	4.00	0.52
Poor work–life balance	16	4.00	0.73

4.

LITERATURE REVIEWS

This section contains six literature reviews that explore in more depth the main emerging risks singled out in the forecast in terms of context, workers at risk, health and safety outcomes and possible prevention measures.

The specific risks identified by the experts are often interrelated, and connected with different aspects of the psychosocial work environment. Considering the existing trends in research, which are associated with the emerging risks identified in the forecast, the following six topics have been chosen:

- 'New forms of employment contracts: precarious work' (Chapter 4.1);
- 'Irregular, flexible working time' (Chapter 4.2);
- 'Job insecurity' (Chapter 4.3);
- 'Work intensification' (Chapter 4.4);
- 'Ageing workers' (Chapter 4.5);
- 'Violence and bullying' (Chapter 4.6) ([1]).

The papers selected for these reviews all originate from scientific peer-reviewed journals, from reputable research or OSH organisations, or from conference proceedings, which are reviewed by a scientific committee.

4.1. New forms of employment contracts: precarious work

4.1.1. The concept of precarious work

The world of work has been subject to tremendous changes over the past two decades, and flexibility and fast adjustment to these new working conditions strongly characterise the challenges that many people face in their workplaces nowadays [21]. An increasing number of jobs are often described as precarious, atypical [22] or contingent work [10]. There is growing evidence that there are specific risks for health and safety in the workplace connected with the conditions that characterise these forms of work [23].

But how can precarious work be defined and distinguished from 'standard' work and what forms of precarious work are prevalent? Rodgers and Rodgers proposed four dimensions of precarious work [24]:

- the low level of certainty over the continuity of employment;
- low individual and collective control over work (working conditions, income, working hours);
- low level of protection (social protection, protection against unemployment, or against discrimination);
- insufficient income or economic vulnerability.

([1]) Although 'violence and bullying' was not an item mentioned as such among the main emerging risks, this topic was specified as an aspect of the item 'high emotional demand'. Since the subject of emotional demand is very broad, it was decided to limit the literature review to the violence and bullying issue, which has created a special social interest recently.

Temporary, part-time work
© Berufsgenossenschaftliches Institut Arbeit und Gesundheit (BGAG), Germany

Precarious work can also be defined as employment with low quality in general and little opportunity for training and career progression. Precariousness is caused by a combination of these elements rather than by one aspect only. Work bearing such characteristics is generally considered to increase the risk of illness and injury [25].

Precarious work is related to low quality employment, with little opportunity for training and career progression.

Precarious work takes different forms on today's job market. In the scientific literature it is often associated with non-standard forms of work such as temporary, part-time, on-call, day-hire or short-term positions and also with the increase in the prevalence of self-employment [26]. Additionally, work at home and multiple jobs also contribute to the increasing significance of 'non-standard' forms when considering precarious work [27]. Of course not all forms of 'non-standard' work can be characterised as 'precarious' but there is certainly a higher general risk of precariousness in those forms than in permanent employment [26].

However, it should be mentioned that some benefits related to atypical work arrangements are also possible. A part-time job or flexible working hours can help to reconcile private and working life (but only when they correspond to workers' needs; see also Section 4.2). Moreover, the study on unemployed people showed that being employed on a temporary contract facilitates finding a permanent job in the future, which is described as a stepping-stone effect [28]. It is important to distinguish between different kinds of temporary job, though. Casual or seasonal jobs are less likely to be associated with some positive effects than a temporary job viewed as a probation period [29].

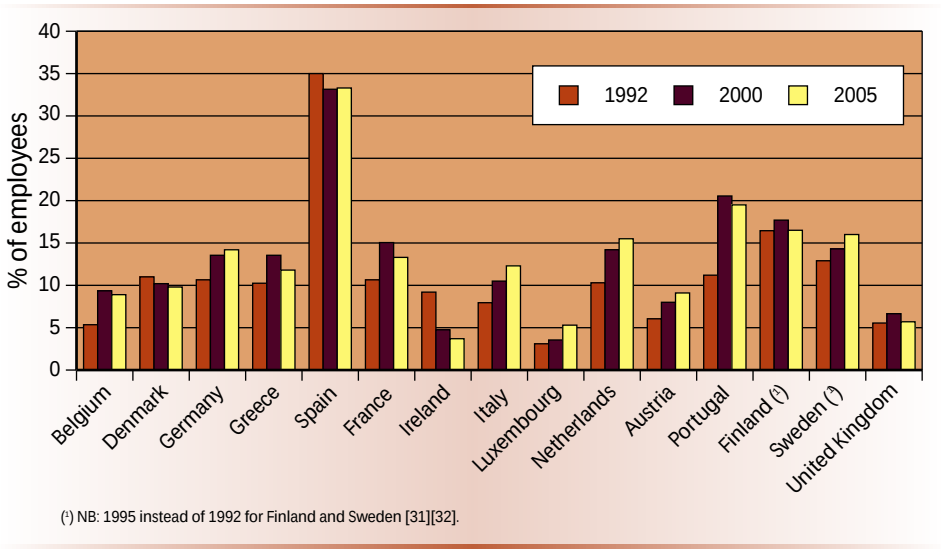
4.1.2. Prevalence of precarious work

In many EU countries there is a growth in temporary employment.

Of course, precarious work conditions are not a new phenomenon in our working culture. The first half of the 20th century was strongly marked by a struggle of the workforce to gain job security and control [23], which finally resulted in huge improvements in working conditions. But the sustained recession of the 1980s and early 1990s, with its substantial privatisation and the development of new technologies, has led to a shift towards the re-creation of a 'flexible workforce' by the outsourcing of many functions [27]. Outsourcing, as well as subcontracting and the use of private employment agencies, increases the prevalence of non-standard forms of employment [30]. There is, for instance, a growth in employment with a low level of continuity certainty, mainly due to temporary contracts in recent decades, although

such a trend is not observed in all European countries [31][32]. Moreover, the prevalence of temporary employment varies significantly in different EU countries. According to the Eurostat data [32], temporary contracts are especially prevalent in Spain (33 % of all employees had this kind of contract in 2005), and quite popular in Portugal (19 %), Finland (16.5 %) and Sweden (16 %), whereas they are rather rare in the United Kingdom (6 %), Luxembourg (5.3 %) and Ireland (4 %) (see Figure 5). Among the 12 new Member States, this kind of work was more popular in Poland (26 % in 2005) and Slovenia (17 %), and less spread in Malta (4 %) and Estonia (3 %). Overall, in 2005, 14.5 % of employees from EU-25 countries had a temporary job.

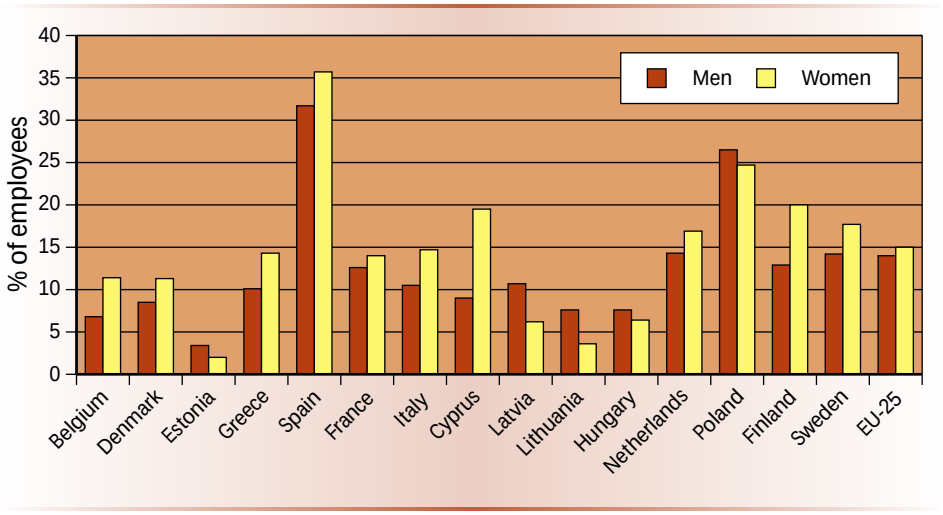
Figure 5: Temporary employment in Europe (EU-15) [32]



(1) NB: 1995 instead of 1992 for Finland and Sweden [31][32].

Generally, women work slightly more often under temporary contracts than men do. Eurostat data [32] showed that in 2005, in all EU-25 countries, 15 % of women and 14 % of men had a temporary job. There are, however, differences between the single countries. Figure 6 depicts the prevalence of a temporary job among women and men in those European countries in which the differences are more significant. In 2005, temporary work was more prevalent among women, for example in Cyprus (19 %

Figure 6: Temporary employment in selected European countries (2005) [32]



women vs 9 % men), Finland (20 % women vs 13 % men) or Italy (15 % women vs 10 % men), and more spread among men, for example in Latvia (11 % men vs 6 % women) or Lithuania (8 % men vs 4 % women).

As far as sectors are concerned, the *Fourth European working conditions survey* [13] showed that (in 31 European countries) temporary contracts were the most prevalent in hotels and restaurants (21 %), education and health (15 %) and the wholesale and retail trade (14 %).

Additionally, the employees who seem to be at a special risk of precarious employment are migrant workers. According to the analysis of the national data presented in the report by the Dublin Foundation [33], in many countries temporary contracts are more prevalent among migrant workers than among national employees. Sources cited in the *Literature study on migrant workers* (report by the European Agency for Safety and Health at Work) [34] indicate that migrant workers often have part-time jobs, with high work uncertainty, low wages and poor working conditions.

Dangerous construction site. Author: Peter Rimmer

Temporary work is also widespread among young employees (which is, to the same extent, related to training and probation periods). Statistics show that in 2005 in the EU-25 over 37 % of workers under 25 were employed on temporary contracts (compared with 12 % in the total working population) [35].

4.1.3. Working conditions associated with precarious work

A growing body of research indicates that changes to work organisation associated with outsourcing adversely affect occupational safety and health (OSH) for outsourced workers as well as for those who remain at a company [36].

Temporary workers are more often exposed to adverse working conditions.

Temporary workers are more often exposed to adverse conditions in their physical work environment, such as noise, painful and tiring positions, and repetitive movements. They have also less control over working times, often work in less skilled jobs and have less insight into their work environment, mainly resulting from a lack of training [21][37][38].

Fewer opportunities for training and lifelong learning are specifically characteristic of non-permanent or atypical employment [39]. A study by the Organisation for Economic Cooperation and Development (OECD) [40] found that in 12 investigated European countries, temporary workers were far less likely to receive formal training.

Regarding OSH, the increasing number of temporarily employed workers is associated with a fragmentation of legal responsibilities, and they are under-represented in health and safety committees [10]. Some sources indicate that personal protective equipment is made available less often to temporary workers than to permanent workers [41]. As a consequence, fewer and fewer workers are reached by OSH

measures and adequately trained in the field of OSH. This trend has been compounded by the decreasing influence of trade unions that often play a key role in the implementation of OSH measures and communication of OSH issues. People working for temporary job agencies are often more vulnerable, as the scope of OSH responsibility between the employer, the temporary job agency and the temporary workers is often not clearly defined [38].

Moreover, a recent Italian survey [42] carried out on a sample of 800 workers in different economic sectors showed that atypical workers tended to underestimate work-related risks. In fact, as regards psychosocial risks, 57.8 % of atypical workers versus 41.4 % of standard workers tended to consider that they are very rarely or never exposed to these risks. Consequently, a negative impact on risk awareness and on how workers manage occupational risks is observed.

Table 2 summarises the differences between permanent and irregular work and stresses the risk of precariousness in the latter [43]. It suggests that permanent workers have access to more training, have greater control over their work process and find more reward in their jobs. Non-permanent workers face higher job insecurity, worse job conditions, higher job demands and more occupational accidents.

Table 2: Synopsis of the literature review of the influence of irregular forms of employment on workers' OSH [43]

Conditions of employment	Irregular (part-time, temporary, fixed term)	Normal (full-time permanent contract)
Job insecurity	+	–
Access to training	–	+
Career prospects	–	+
OSH	–	+
Exposure to hazardous/ dangerous work conditions	+	–
Working in painful/ tiring conditions	+	–
Control over work processes	–	+
Job demands	+	–
Rewarding job	–	+
OSH training	–	+
Occupational accidents	+	–
Monotonous/repetitive work	+	–

(NB: + = higher/more; – = lower/less)

4.1.4. Implications of precarious work for workers' health: theoretical background

According to some researchers, precarious work leads to stress, and thereby increases the risk of workers to suffer from health problems. Research shows that stress can lead to a permanent change in physical functioning and, therefore, to illness [44]. Additionally, there are also cognitive-behavioural factors such as increased drinking or smoking during periods of stress that result in a higher risk of illness [44].

The relationship between work conditions, stress and illness can be explained by means of several stress models. Referring to Karasek's job demands-control

model [45], work strain combines two dimensions: job demands and job control. When control is low and demands are high, a job can be characterised as high straining or high stressing and increases the risk of work-related illness or injury. The model was further developed by adding social support as the third dimension. Research showed that the risk for a range of mental and physical health problems increases when high job strain is combined with low workplace social support [46]. There have also been efforts to extend the model by other dimensions such as job insecurity, which was assumed to have an influence on the development of mental and physical health problems as well. Indeed, research proved that job insecurity increases psychological distress and somatic complaints [47]. However, as the demands-control model is based on organisational environments and structures found mainly in permanent jobs [26], its applicability to explain job strain in non-standard and precarious work is limited.

Different stress models can be used to explain the relationship between precarious work and stress.

Another stress model that can be used to understand the relationship between precarious work and stress is the model by Siegrist [48]. According to this model, stress occurs if an imbalance between effort and reward on the job (such as good salary, promotion or other kinds of appreciation) is perceived. Siegrist supposes that the resulting stress negatively influences health and may cause different kinds of ill health (e.g. coronary diseases).

To explain the impact of precarious work on mental health, the vitamin model [49] can also be employed. It provides nine variables of the environment which are hypothesised to influence mental health. These are: opportunity for control, opportunity for skill use, externally generated goals, variety, environmental clarity, availability of money, physical security, opportunity for interpersonal contact, and valued social position. According to the specific employment situations, several of these variables can be insufficiently represented or not be represented at all and have an impact on mental health. Such consequences can be cognitive problems (e.g. inability to concentrate), anxiety or depression [50], as well as nervousness, fear, job dissatisfaction and lack of sociability and friendship relationships. These factors have been found to be strongly associated with precarious work [51].

Currently, there is an increasing movement towards more complex stress models in research by highlighting more occupation-specific factors [26], but no clear models have emerged yet.

4.1.5. Influence of precarious work on workers' health

The implications for illness and injury connected with precarious work are varied. A study examining the effects of employment strain on health revealed that stress-related tension and exhaustion appear to be more severe for precariously employed workers than for workers in permanent jobs. Health is generally reported to be poorer in working conditions with high employment strain [23]. Data from France and Spain show much higher levels of occupational accidents for temporary workers than for permanent workers [51].

Stress-related tension and exhaustion appear to be more severe for precariously employed workers.

The implications of precarious work for health and safety are to some extent comparable to the implications of unemployment, as both forms share certain characteristics: first of all, uncertainty. As unemployment is strongly associated with mortality, morbidity, harmful lifestyles and reduced quality of life, similar outcomes might be proposed for precarious work [37]. For example, studies by Nylén et al. [52]

and Kivimäki et al. [53] show that mortality among part-time and fixed-term employees is significantly higher than among permanent workers.

Nevertheless, the effects of different forms of precarious employment vary in some points and are not always negative. Self-employed workers, for example, enjoy greater control over working time and have a higher level of autonomy. However, at the same time they have very little social support. Part-time employees also show less health-related absenteeism and report less stress, particularly when they chose voluntarily to work part-time [41][51].

Figure 7: Health outcomes related to different kinds of employment [51]

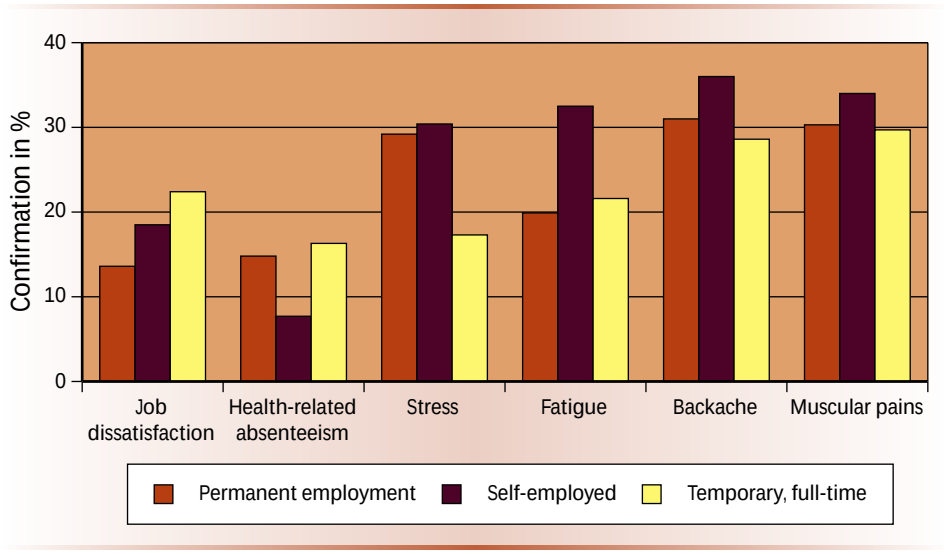


Figure 7 shows the prevalence of several health implications related to different kinds of employment for a sample of European employed or self-employed people from the EU-15 Member States in 2000. Self-employed workers reported the worst outcomes for most of these different health aspects while temporary workers do not generally suffer more from health impairments than do permanent employees. Job dissatisfaction is most reported by temporarily employed people. This fact has also been found in a study by Bardasi and Francesconi (2004) [54].

A few studies report no different implications at all for the health of precariously employed workers in comparison to permanent workers [54]. For example, there is no evidence showing that temporary or part-time employment had negative long-term effects on mental health among British men and women during the 1990s. Worse health outcomes were only found for some kinds of jobs such as in lean production or self-employment when compared with other forms of employment [38][39]. In the UK study on call centres [55], employees with non-permanent contracts reported even better well-being than permanent employees. Fixed-term or temporary workers were less anxious, less depressed and more satisfied with their job. Such differences have not been found for part-time workers. A study among workers with different work contracts in Brazil showed no statistically significant health outcomes at all [56].

More studies, which include the specificity of different atypical contracts, workers' needs and general context of work environment, are needed to establish the relationship between precarious work and possible negative health effects.

4.1.6. Possible prevention measures

The state of research, but also the status of temporary workers in companies, creates difficulties in developing proper prevention and intervention strategies to lower health and injury risks [3]. National laws and guidance on worker involvement and participation concerning OSH policies do not always include the special case of temporary work arrangements [10]. However, documents that deal with temporary workers exist in some Member States. For example, the *Management of health and safety at work regulations* (UK) [57] oblige employers to provide temporary workers, before they start their work, with the necessary information to carry out their work safely. This information is related to occupational qualifications or skills which are needed in a given job, and health surveillance that is required to be provided to these employees.

Seasonal work

Over the past decade there have also been a number of attempts in different countries to start prevention programmes focusing on temporary workers (e.g. the 'Injury and illness prevention model program for employers of intermittent employees' by the Department of Industrial Relations of California [58], or a Swedish programme concentrating on small enterprises [59]). The Californian programme is basically a guideline for employers to establish their own illness and injury prevention programme for intermittent or seasonal workers. The programme includes elements related to, for example, communication on health and safety with temporary employees, hazard assessment, accident investigation or training and instruction on general and job-specific safety and health practices. It provides checklists for risk assessment at several workplaces often occupied by temporary workers, such as in amusement parks, fruit and vegetable manufacturing or logging. The Swedish approach consists of a system of regional safety representatives and an underlying approach to workers' participation.

The number of such programmes is still small and little knowledge exists about their effects. This problem is more general, as facts about the effects of all prevention and intervention programmes are very often scarce, since it is difficult to measure the outcomes. There is, for example, great difficulty in including control groups in study designs as technological innovations and market conditions change too quickly [3].

4.1.7. Needs for future research

Although there is evidence that precarious work, or at least certain aspects of it, have a negative effect on workers' health and safety, more research is needed to identify specific risk factors.

Research in this field often faces significant difficulties in measuring the negative effects or strains, because negative health effects due to precarious work do not occur immediately. Furthermore, temporary contracts often do not last long enough to

provide the possibility of measuring negative health effects for researchers [60]. Thus, there is a need to develop appropriate research methods in this field.

There is also a need for proper illness and injury prevention and intervention strategies concerning precarious forms of work. It is necessary to adjust such programmes and strategies to the specific context and conditions of a given country.

4.2. Irregular, flexible working time

Flexible working time arrangements are seen as some of the most important elements in the reorganisation of work. Working time is becoming increasingly diversified among workers. This implies that the traditional methods of organising working time are being increasingly challenged. Employers continue to raise the necessity for more flexibility in working hours to cope with competition. The 'Establishment survey on working time 2004–2005' (conducted in the EU-25) indicated that 42 % of European establishments employed people who regularly had to work in non-standard hours (during the night or at the weekend) [61]. According to the report, *'Flexibility and working conditions: a qualitative and comparative study in seven EU Member States'* [62], the evolution of working time patterns in the service sector is caused by extended opening hours to meet customers' demands, especially in the banking and retail sectors, where all possible measures are used to match the workforce to market demands. This includes irregular working hours, shift work and part-time work, usually combined with non-permanent employment. The classic working time patterns in these sectors are virtually discontinued.

There is a lack of a suitable and generally accepted working definition of irregular or flexible working hours. The increasing variety of different systems of working time existing between the boundaries and limits set out by legislation impedes a clear-cut definition on working time and working time arrangement [62][63]. Thus, irregular and flexible working time can include a different range of working time arrangements that deviate from the so-called 'standard working time'. Some researchers go as far as considering even very rigid systems, such as regular shift work or certain types of part-time work, as flexible working hours [64].

According to the Saltsa group ([2]), a distinction has to be made between irregular (variable) and flexible working time. Irregular, variable working hours refer to the working hours that are variable from day to day or from week to week. Flexibility refers to the fact that working hours can be influenced. In this respect, 'flexible working hours' involve a continuous choice on behalf of employers, employees or both, regarding the amount and the temporal distribution of working hours' [65]. Flexibility can thus be seen from the viewpoint of the employer or from that of the employee. In general, as the Saltsa group concluded, individual flexibility is positive for the employee if they can choose within some boundaries their working hours. Otherwise, flexible working hours can cause different health problems.

([2]) Saltsa is the Swedish programme for problem-oriented research in Europe. The aim of the programme is to contribute to a better European working life by producing and disseminating applicable research results of high scientific standards and political relevance.

Flexible working time is often called quantitative internal flexibility or temporal flexibility in order to make a distinction between the other types of flexibility, such as numerical flexibility (the need to vary the labour inputs in terms of the numbers of workers employed and their employment status, for example, work on demand or temporary agency work) or functional flexibility (changing of the tasks and skills of the employee to improve productivity or geographical flexibility to make use of outsourcing and subcontracting) [62].

4.2.1. Different kinds of irregular and flexible working time

Shift work (night work, evening work and weekend work)

Shift systems concern periods of six to 12 hours at once and a shift team that alternates on two, three or four shifts in a 24-hour period. Traditional shifts start at 6.00 a.m., 2 p.m. and 10 p.m. but there are several variations on this [66].

Shift work is largely used in the industrial sector in order to avoid the shutdown of the production process and to maximise the use of expensive equipment and production means. Shift work in the evenings or at weekends is also common in other sectors, such as parts of the service sector that provide services around the clock: hotels and restaurants, and parts of the health, transport and public security sectors, but it is also becoming more common in less traditional subsectors such as retail and repair [5].

In 2000, 19 % of EU-15 workers worked nights, 43 % worked evenings, 17 % worked every Saturday.

About one in five employees in Europe are involved in shift work that involves night work and over one in 20 workers in extended working hours. In 2005, about 17 % of all employees in the EU-25 countries had shift work [13]. According to the report, *Time and work: the duration of work* (based on the data of the *Third European survey on working conditions — 2000*, in the EU-15), 19 % of employees work during nights. One third of them work between one and four nights a month, one third between five and nine nights a month, and one third work 10 nights or more a month. Evening work between 6.00 p.m. and 10.00 p.m. is more prevalent. Of the employees, 43 % regularly work during evenings, and 47 % also work at least one Saturday per month, with 17 % working every Saturday. Sunday work concerns fewer employees (24 %), but 5 % of them work every Sunday [5]. In the establishments that demand employees to work unusual hours, a significant part of the workforce is often compelled to do this on a regular basis [61].

Overtime, extended working hours and compressed work weeks

Overtime refers to those hours worked beyond the normal agreed working hours [61]. The different systems make it increasingly difficult to define the term. The number of systems for compensation also makes it difficult to distinguish clearly between overtime and regular hours. In some cases, overtime becomes 'regular', with virtually all of the employees working overtime.

Almost 30 % of the employees work more than 10 hours a day at least one day per month [5]. According to the report *Time and work: the duration of work*, a rather large proportion of employees (around 17 % of full-time employees and 14.2 % of all employees) work long working hours (defined here as more than 45 hours per week) [66].

Extended working hours occur when the hours of the standard shift are extended. It implies a high number of hours worked either during a day or a shift or a high number of days worked per week. Extended working hours generally refer to a working week of more than 48 hours or to 10- to 12-hour shifts instead of eight-hour shifts [66].

14 % of all European employees work longer than 48 hours per week.

According to the *Fourth European working conditions survey* [13], 14 % of all European employees work longer than 48 hours per week. Long working hours (> 48 hours/week) are especially prevalent among self-employed workers (44 % vs 9 % of other employees). A reduction in the number of people working more than 48 hours per week has been observed in the period 1991–2005, although this trend is related mainly to the working hours in the EU-15.

Extended working hours can also permit the employee to have a day off in exchange every week. This is usually referred to as a compressed work week [67]. The employee often asks for these kinds of arrangement, but sometimes it is the employer who initiates the option to establish longer business hours to maximise production. Under this plan, employees work the usual 40 hours in four 10-hour days. The fifth day is a day off. Another option is the 9/80 schedule: this option allows employees to work their usual number of hours in a two-week pay period in nine days. The 10th day is a day off [67][68].

Unpredictable working hours

Irregular or unpredictable hours of work seem to be among the most difficult atypical or non-standard working time patterns. An example of this kind of working time is on-call work, where workers are required to stay available when needed. This is often the case for medical and emergency staff, and workers responsible for maintaining crucial public services, such as gas and electricity. Also casual work can be put under this heading, since it consists of very short and sometimes unpredictable periods of employment that are mixed with periods of unemployment. This pattern is used frequently in the construction sector and the hotel and restaurant sector.

Unpredictable working hours and on-call work seem to be among the most difficult atypical working time patterns.

Emergency workers

Another irregular time pattern mentioned is a variant of on-call work, the so-called zero hours contracts [69]. In this case there is a formal agreement between employer and worker but without a fixed commitment by the employer concerning the number of days a week, month or year on which workers will have work. It gives the workers no guarantee of work, but they agree to be available if and when the employer demands. Nevertheless, the relationship between the employer and worker is not characterised by 'mutuality of obligation'. The employer is not obliged to find work and the employee is not obliged to accept what is offered. In this case, the worker stays without any remuneration when there is no work available or accepted. This means also that workers sometimes are notified at very short notice. These kinds of contract exist mostly in the catering and retail sector. Another variant of non-standard contract related to irregular working hours is freelance work, when a person provides services to an employer without a long-term commitment to them.

Sometimes the nature of the job obliges workers to work non-standard hours: examples include mobile representatives and sales persons or transporters travelling from customer to customer during the night, sometimes spending long days away from home or from the office [67].

Part-time work

In the past decade the proportion of part-time workers has increased in most European countries. It is the best-known form of 'atypical' working time arrangement. According to the *Establishment survey on working time 2004–2005* [61], at least one part-time worker was employed in 64 % of all the establishments (the survey covered companies with at least 10 employees). The possibilities for part-time work increase with the size of the company. Part-time work can be 'regular' as well as 'irregular' (e.g. hours varying from day to day or from week to week), can be organised in different ways and depends on the kind of work that has to be done. The traditional organisation is to work a certain number of fixed hours a day; another possibility is working full days only on certain days or weeks of the month.

The proportion of part-time workers has increased in most European countries during the past decade.

Part-time work gives the employee a good opportunity to combine work and family life, depending, of course, on the regime and structure of the part-time work (e.g. the distribution of the working time). In the EU, part-time work is especially popular in the Netherlands (34 %) and United Kingdom (29 %), and rare in the Czech Republic (6 %) [13].

4.2.2. Workers' groups most at risk

Although the majority of EU workers have typical work schedules [13], gender, age and socio-professional differences are observed in terms of the prevalence of atypical work schedules. Some employees seem to be especially at risk because of flexible or irregular working time.

Gender

Generally, women are less affected by atypical work schedules than men. The differences are largest for night work and work involving three or more alternating shifts. Men are also more likely to work long working days (more than 10 hours a day, more than five times per month) than women (21 % vs 9 %) [13]. For the other forms of atypical work, such as irregular time schedules and weekend work, the discrepancy is narrow [5]. Part-time work is more prevalent among women (33 %) than men (4 %) [13].

Age

Older workers (between 55 and 64) are less affected by, but not excluded from, atypical work, such as night work, shift work, weekend work and irregular schedules, than the younger age groups. For instance, in 2005, about 20 % of the EU-25 employees in the age range 24 to 39 reported shift work, whereas there were 16 % of such employees in the age range 40 to 54, and 11 % among those aged 55 and over [13]. Nevertheless, workers aged 65 and over are involved in atypical time schedules such as weekend work, irregular schedules and other atypical schedules specific to the service sector [5].

Socio-professional categories

Atypical working time schedules also vary according to socio-professional category. Generally, executives are most affected by long working hours and irregular working time schedules. Industrial workers are mainly affected by night and shift work. Service and sales employees are most involved in weekend work and irregular working time. The highest proportions of employees with long working hours are found in private companies [5].

Atypical working hours are prevalent among middle-aged service/sales workers, executives, technicians and industrial workers.

Restaurant

The sectors with the biggest proportion of staff working long hours (more than 10 hours a day, more than five times per month) are skilled agricultural and fishery (45 %), agriculture (38 %), legislators, senior officials and managers (37 %), hotels and restaurants (28 %), armed forces (26 %) and transport and communication (25 %) [13].

Shift work is prevalent in the plant and machine operators and assemblers (35 %), hotels and restaurants (29 %), service, shop and market sales (26 %) and manufacturing and mining (25 %) sectors. Part-time work is most common in the hotels and restaurants (31 %), education and health (26 %) and the wholesale/retail trade (26 %) sectors [13].

In general, employees affected by long working hours and difficult time schedules are usually middle-aged men from four categories: service/sales workers, executives, technicians and industrial workers [5].

Additionally, the type of contract and the years of service in a company determine the probability of working in a certain time schedule. An employee with a temporary employment contract (fixed term, temporary agency or apprentice contract) is more likely to work part-time or to have a short working time. Very often, temporary employees work irregular hours. For permanent employees the probability of working part-time decreases with seniority.

The *Third European survey on working conditions — 2000* [70] showed that the self-employed generally work longer hours than employees. The discrepancy would amount to almost eight hours per week. Nonetheless, the working time of self-employed workers depends on the country. The longest hours are worked in Luxembourg (over 58 hours), and the shortest working hours can be found in the Netherlands (34.3 hours). These figures, however, should be treated with caution, since the status of the self-employed differs across the countries and the working time registry is not so strict in the case of self-employed workers who define the working time on their own [62].

4.2.3. Consequences of irregular and flexible working time on workers' health

Flexible work patterns can have an impact on the quality of work and employment, and on the quality of life as a whole. Nevertheless, most of the studies agree that none of these working time arrangements can be judged entirely good or bad for employees. It depends largely on the handling of the arrangements, on the manner in which the flexibility measures are implemented and on the degree of choice that employees have to regulate their working life and to better match their work with their private lives [64][66][67][68].

Research has shown that flexible working time, including the possibility for employees to arrange their work to a certain extent to their personal needs, is seen as positive,

while irregular, variable working time is mostly seen as negative for the employees and their well-being. It is thus necessary to discriminate between the effects of a forced and a freely chosen flexible working time. The latter is mostly called 'flexitime', referring to different working time arrangements that enable the employees to adapt working time more to their personal needs [66].

According to Janssen and Nachreiner [64] who conducted two studies on the effects of irregular, variable working hours on the health of employees, increased impairments in the health of the employees are linked with a high variability and a lack of control over their working hours (company-controlled flexibility). If this flexibility was paired with company-controlled working time, it led to a further decrease in the psychosocial and physical well-being. It is also noted that autonomy works as a buffer in this respect. However, the *Fourth European working conditions survey* [13] has shown that for more than half of all workers (56 %) there is no possibility of changing their working time arranged by the company.

A high variability and a lack of control over working hours result in impairment of workers' health.

In companies where flexible working time arrangements were introduced both to improve work–life balance and to better adapt to the workload of the company, managers as well as employee representatives report higher job satisfaction and a better adaptation of the working hours to the workload [61].

Irregular, flexible working hours and work–life balance

Generally, employees who have a regular and predictable work schedule and not extended working hours perceive their work–life balance more positively [13]. Irregular working time arrangements may lead to negative effects by blurring the boundaries between working and private life. Situations where the variability is high and the flexibility low often cause problems in the work–life balance and the employees' health [71]. Also part-time work can affect well-being. This can be due to the fact that part-time workers may have more responsibilities in their family life. A Dutch survey data report for EWCO (European Working Conditions Observatory) also concluded that evening, night or weekend work can cause fatigue and disrupt an employee's life, but on the other hand, can give some workers the chance to facilitate the reconciliation of work and private life [72]. For both genders the extent to which their working hours match their personal needs is important, however, for male workers, the interference between working life and private life can be predicted by the extent to which their partner's working time is adapted to family life [73].

Irregular working hours not adjusted to workers' personal needs lead to poor work–life balance.

Working mother

Non-standard hours such as shift, weekend, and night work can be especially disruptive for work–life balance when employees are in a precarious employment situation

Non-standard hours, combined with casual work and high work intensity, are especially disruptive for work–life balance.

(e.g. casual and temporary work). This is probably linked to the fact that they have less control over their hours than full-time employees. Results of the research on the relationship between working hours and OSH in precarious employment in hotels and restaurants [74] revealed that more stable and controllable working hours appeared to diminish work–life conflict and its negative consequences. Casual workers reported excessive work pressure and long working hours, contributing to work–life conflict. Evening and weekend work were particularly problematic. Adverse effects influencing their health included poor sleep, irregular exercise, unhealthy and irregular meals, and disrupted social and family life. Many full-time employees, on the other hand, reported that although they sometimes worked long hours, they had a satisfactory level of control. In summary, casual work combining high work intensity, and variable and unpredictable working hours can lead to work–life conflict and have detrimental effects on well-being.

According to the *Fourth European working conditions survey* [13], most European employees are satisfied with their work–life balance. Nevertheless, over 20 % from the EU-27 reported that their working hours did not suit their family or social commitments very well. There were also variations among different European countries. In the EU-15, 19 % of workers reported poor work–life balance, in the 10 new Member States 27 %, and in the two candidate countries 36 % (in 2005). Additionally, over 40 % of employees from the EU-27 who worked long hours reported being dissatisfied with a balance between work and family life.

Irregular, flexible working hours and workers' health

Shift work can lead to disruption of several psychological and physiological functions of the body.

A great deal of research concerns the influence of shift work on the well-being of workers. It has been proven that night shifts can have especially detrimental effects on workers' physical and mental health. Additionally, variability and unpredictability of the working hours are aggravating factors in the negative health effects of shift work.

Working in shifts, and especially night shifts, can cause a serious discrepancy between the circadian timing system and environmental synchronisers, leading to a disruption of several psycho-physiological functions of the body (e.g. the sleep/wake rhythm). This shift work maladaptation syndrome (or 'shift lag syndrome') can in the short-term lead to fatigue, sleepiness, insomnia, disorientation, digestive problems, irritability, poor mental agility and reduced performance, which in turn can lead to human error at work and occupational accidents (see below). In the long term, this can result in more serous disturbances and diseases such as peptic ulcers and heart disease. It should be mentioned that personal susceptibility (related to, for example, age, gender and personality) has an influence on this as well [75].

Harrington [66] notes that physiological problems associated with shift work, and especially with night shifts, disrupt sleep patterns and lead to sleep loss that can add up to two hours a day. Other effects are the negative impact on the quality of sleep. Fatigue is also one of the frequent complaints of employees working 'abnormal' hours. This is especially apparent after a night shift, less evident after a morning shift and least noticeable on the afternoon shift.

Not only the medical effects, but also the social impact on the well-being of workers should be mentioned here. Workers engaged in shift work can experience disruptions in their social and family life, which can lead to social isolation [66][76]. There are also questionnaire-based studies and case reports that link shift work and stress. Other adverse effects from shift work that are frequently mentioned are anxiety and depression. Nevertheless, these data have to be treated with caution because of the lack of information on possible pre-existing work experiences in the shift work

population [66]. Moreover, the ability to adapt to shift work decreases with age. Older workers should be allowed to work shorter shifts or obtain shorter working hours [77].

On-call work can also, according to a study about physicians on call [78], severely affect sleep, which in turn can lead to many problems such as chronic sleep disturbance and waking fatigue, alcohol or drug misuse or abuse, depression, malaise, personality changes, and difficult interpersonal relationships. However, an investigation on the effects of on-call shift work on the health of workers of a gas and electricity company [79] has shown that there was no evidence of an increase in specific health complaints compared with the control group. Nevertheless, on three aspects of a measure of psychological balance, on-call workers scored significantly worse than the control group: 'social disturbance', 'satisfaction with private life' and 'global well-being'.

On-call work can result in 'social disturbance' and decrease satisfaction with private life and well-being.

Hospital doctors are also particularly at risk from a combination of shift work and long and unpredictable hours during on-call work. A study on junior hospital doctors [80] has shown that they routinely exceed 55 hours per week, often working continuous shifts of up to 32 hours. Extreme cases of working 70 hours without proper rest periods also exist. This causes poor mental health as a result of extreme fatigue and stress.

Operating theatre

Extended working hours and workers' health

According to a literature review on working time and its effects, most studies agree that working long hours (working more than 48 hours per week on a regular basis) is an important occupational stressor which reduces job satisfaction, multiplies the effects of other stressors and increases the risk of problems with mental health. There is also strong evidence that workers perceive working long hours as detrimental to their work–life balance [81].

Working long hours reduces job satisfaction and increases the risk of problems with mental health and work–life balance.

Similarly, a NIOSH report provided an integrative review of 52 recently published research reports in the USA that examined the associations between long working hours and health outcomes. There was a pattern of poorer performance on psychophysiological tests, especially when the employees worked long shifts and when shifts of more than 12 hours were combined with more than 40 hours a week. Some of these studies mentioned that the 9th to 12th hours of work were associated with feelings of decreased alertness and increased fatigue, lower cognitive function, declines in vigilance on task measures, or increased injuries [82].

The report *Time and work: duration of work* [5] showed that employees clearly perceive increased working time as being linked to health and safety risks. Employees tend to blame their work as being a risk to their health and as the reason for their health problem if they are forced to work long hours. This link is also made when it comes to specific health problems such as headaches, fatigue, anxiety and insomnia. Employees who are in atypical working time schedules also blame this for a number of health

problems. Night work, working days of more than 10 hours and the changing of schedules within a month are seen as particularly detrimental to their health. Almost 70 % of the employees who work at least one night per month are of the opinion that their work affects their health. The effects most mentioned are insomnia, stress, fatigue and irritability.

Additionally, the relationship between long working hours and stress or psychological health seems to be mediated by individual factors such as the amount of control the workers feel and the way they regard their job [81]. Bourdeaud'hui and Vanderhaeghe [83] studied to what extent overtime had an influence on work stress, well-being, and work–life balance in the Flemish workforce. They concluded that overtime increases the number of workers with work stress and problems in their work–life balance. This is true for all studied groups, independent of gender, age, family situation, sector, job, company dimensions, and management or non-management function. The level of work stress is lowest if the worker does not work overtime and highest if the worker has to work overtime and is not compensated for it. The researchers also found that if overtime concurs with the risk factors of high workload and low autonomy, this can increase the work stress. This means, for example, that workers with low autonomy, high workload and overtime without compensation report the highest prevalence of work-related stress. However, high workload plays a more important role in the increase of work stress than low autonomy or working overtime.

Reduction of working time can lead to work intensification and time pressure.

According to the *Third European survey on working conditions — 2000* [70], employees experienced an intensification of their tasks between 1995 and 2000. In his 'Shorter working time, flexibility and intensification' [84] paper, Askenazy emphasises the fact that shorter working times do not necessarily improve well-being at work. He uses the French experience to prove that the shortening of working time, combined with a more flexible working time and increasing work intensity, does not lead clearly to an improvement in workers' well-being. This is particularly the case if a competitive environment drives the reduction of time that is introduced to preserve the company's performance. In that case, it can lead to work intensification and time pressure. Moreover, the reduction of working time increased stress for more than 30 % of the workers questioned, and tensions between colleagues even if the employees reported higher autonomy. The consequences of shorter working time on well-being thus depend on the design of working-time management.

Another article [85] pointed out that a reduction in the working time in France led to work intensification for one in five employees, and that 44 % of the workers did not have enough time to finish their tasks. According to Estrade, Méda and Orain [86], almost half of the workers did not feel a difference in their working conditions; a quarter of the workers (mostly management) did see an improvement but the remaining quarter (many non-qualified women) noticed a deterioration. Nevertheless, according to Afsa and Biscourp [87], almost all the studies that link the reduction of working time to working conditions are based on the questionnaire 'RTT et modes de vie' (Working time reduction and ways of living) [88]. The questionnaire studied only the companies that reduced the working time to 35 hours and did not learn anything about the working conditions in the companies that did not shift to 35 hours, which makes it difficult to measure the real impact of the working time reduction [87].

All in all, it should be mentioned that the evidence on the relationship between working hours and workers' health is somewhat equivocal and inconclusive, possibly due to the different ways of measuring stress and psychosocial health outcomes [89]. Janssen and Nachreiner [64] note that there is a general lack of reliable information on

Fishery worker

the effects of flexible working arrangements on the health and well-being of workers. Spurgeon et al. [90] indicate that there is a particular shortage of studies that focus solely on the relationship between long working hours and health problems related to stress, such as gastrointestinal disorders, musculoskeletal disorders, and depression of the immune system.

Another problem arises from the lack of well-controlled and comparative studies. Consequently, there is no clear evidence-based recommendation for the design of flexible working hours [64]. However, it appears that it is important for workers' well-being that they are involved in the decisions about how their working time is organised.

Irregular, flexible working hours and occupational accidents

There is some evidence that irregular working hours may have an effect on work-related accidents. This is thought to originate from the increased fatigue resulting from long working hours, influencing workers' behaviour and attention during work. The occurrence of human error, often cited as a risk factor in occupational accidents, may depend to a certain extent on sleep-related factors and the biological rhythm of the human body. The disruption of the body's biorhythm combined with sleep deprivation and fatigue may lead to inefficiency, especially during morning hours. Also, a higher incidence of injuries was noticed for evening and night shifts than for day shifts [67]. According to a study by Hänecke et al. [91], who studied more than a million German injury reports, there is a higher risk of injuries after the eighth and ninth hour at work for all shifts.

Irregular working hours may increase the risk of work-related accidents.

Nonetheless, although the link between increased fatigue, lowered performance and high rates of accidents seems logical, there are not many studies clearly supporting this link. Underreporting of accidents and incidents, and other factors resulting from a lack of training and inexperience may also have an impact on safety during work. The existing safety culture of a company also plays an important role in the development of adverse effects during shift work [67].

4.2.4. Possible prevention measures

Moderation of variability and possibility to control working hours reduce negative health effects.

Evidence shows that irregular and flexible working hours are especially impairing for the health and well-being of the worker if the autonomy of the worker is low (company-controlled flexibility). This leads to the conclusion that those who are autonomously controlling their working hours show fewer negative health effects. However, the effects of the variability are not completely compensated by worker autonomy and still need to be addressed. Recommendations to avoid these effects should therefore include, besides control over workers' variability in working time, a moderation of variability in working time. If, on the other hand, the variability in working hours cannot be avoided, it is crucial that this is planned well in advance to provide a certain reliability as a planning basis for the employees [64][74].

With regard to shift work, recommendations to minimise any subsequent, unfavourable health effects mostly concentrate on the three eight-hour shift rotation. Since night work causes a disproportionate amount of health problems, it should be reduced as much as possible. A semi-rapid to rapid rotation, with two to four similar shifts in a row, is preferable to slow rotation (five or more following similar shifts) because the fast scheme interferes less with the biological rhythm. However, a rotation that is too rapid (e.g. with a change every day) is not recommended either, since it leads to cumulative fatigue. The periodicity of rotation plays a role for health when the shift work implies a non-standard sleeping period. This means that when the sleeping pattern is not disrupted by the shifts, there will be no health impact. A clockwise rotation is also preferred to a counter-clockwise rotation. A later start of the morning shift (which normally starts at 6.00 am) is also preferable as it reduces the shortening of the previous sleeping period. It should also be mentioned that the period of resting time in between shifts should be long enough: the resting period between two or more night shifts and the day shifts should be at least 56 hours (two complete nights). The duration of shifts should not exceed 10 to 12 hours. Other factors that have an impact on the health of shift workers are the physical and psychosocial demands and intensity of work. These aspects should be taken into account during the design of the work organisation. Allowing the workers to design their own shift schedule can be an important step in improving their well-being and performance at the same time, as they take responsibility for achieving the targets [66][76].

In addition, irregular or unpredictable working hours are best avoided or limited where possible, especially if the latter is combined with other risk factors (such as long hours, circadian disruption and sources of stress) which are beyond the workers' control. Furthermore, workers should be always consulted about the organisation of their working time [67].

4.2.5. Future perspectives and challenges

First of all, there seems to be a consensus about the fact that there is no clear-cut definition of flexible working time. This leads to blurred concepts and inconsistent conclusions on the subject, because it mixes up different forms of interventions (e.g. part-time work and night work). This means that the different mediating factors are not always taken into account and the specific health and safety effects are unknown or non-comparable [64][66]. In addition, the high variability in work schedules makes it difficult to give precise and accurate comparisons and conclusions on the health outcomes [82].

Different factors can influence the effect that overtime has on health and safety (e.g. the time of day, number of hours worked per week, number of consecutive days

worked, and number of rest days). Few studies have examined in what way and to what extent long working hours influence health outcomes in different groups (older workers, women, persons with pre-existing health problems, and workers with hazardous occupational exposures). The fact that some of these studies do not report these factors makes it very difficult to compare the data [82].

According to Spurgeon [67], a lack of data on irregular and unpredictable working hours in scientific research is evident. Few researchers have studied the effect of irregular and unpredictable working hours (e.g. work on call) on the mental health of workers. What is needed, in her opinion, is a comprehensive understanding of what can be the outcomes of these various work patterns. In order to develop proper interventions and recommendations, we need to clarify what are the acute psychological and social effects of uncertainty about the timing of the next period of work, and how important is the specific nature of the work or the degree of worker control in modifying or exacerbating these effects.

The organisation and optimisation of working time remain a major challenge, but evidence suggests that when it is managed in an effective way, taking into account the needs of both employers and employees, working time can also be used to promote the well-being of the workforce.

4.3. Job insecurity

4.3.1. Introduction to the phenomenon of job insecurity

Owing to globalisation and rising competitiveness, organisations strive to increase their effectiveness, often by means of reorganisation, outsourcing, mergers and acquisitions. As a general rule, these changes involve redundancies. In the 1980s and 1990s most developed and undeveloped countries perceived a rise in job insecurity [92]. Surveys showed that in 1996, 44 % to 79 % (depending on the country) of the respondents in the EU-15 did not perceive their job as secure [92].

An increase in job insecurity has been observed in most countries during recent decades.

The above situation on the job market finds its reflection in the state of research on job insecurity. This research was intensified in the second half of the 1980s and in the 1990s. It is interesting that earlier, with just a few exceptions [93], owing to more stability in the job market, it was first of all the polar opposite of job insecurity which was investigated — i.e. 'job security'. Job security was seen as an important factor influencing satisfaction and work motivation [94]. As insecurity on the job market increased gradually, the focal point of the researchers' interest moved from job security to 'job insecurity'. It was already possible to include 72 studies on job insecurity in a meta-analysis published in 2002 [95].

There is no uniformity in the approach to research concerning the conceptualisation and measuring of the phenomenon of job insecurity. Some researchers have adopted a global view and defined job insecurity as an overall concern about the continued existence of the job in the future [95][96]. To measure job insecurity, they use two main kinds of global measures: those focusing on cognitive aspects, i.e. perceived probability of job loss [97], and those focusing on emotional aspects, i.e.

fear of job loss [98]. There are also global measures which combine both of the above aspects [99].

Other researchers consider job insecurity as a multidimensional concept which, in addition to the threat of job loss, encompasses factors such as threats to various job features, for example, position within an organisation or career opportunities [100][101][102]. A multidimensional measure that is used particularly often is Ashford, Lee and Bobko's scale [101], which measures five dimensions:

(i) perceived threats to the job itself,
(ii) importance of the job,
(iiii) perceived threats to job features,
(iv) importance of the job features,
(v) feeling of powerlessness towards these threats.

Some original modifications of this scale are also used [103]. As there are reasons to believe that different global measures, as well as different elements of multidimensional measures, lead to different results, further research is needed to clarify the way in which job insecurity is best measured.

4.3.2. Workers' groups most at risk

11 % of employees from the EU-15, and 25 % from the 10 new Member States report that they might lose their job in the coming six months.

Generally, results of the *Fourth European working conditions survey* (EWCS) [13] showed that 13 % of workers from EU-25 countries considered that they might lose their job in the following six months. Nevertheless, significant differences between the EU-15 and the new Member States were noticed since, in the EU-15, 11 % of employees reported that they might lose their job in the near future, whereas 25 % of employees thought that in the 10 new Member States and 19 % in the candidate countries (Romania and Bulgaria). The problem of job insecurity is especially significant in the Czech Republic (32 %), in Slovenia and Poland (27 %), and in Lithuania and Bulgaria (23 %).

The *Eurobarometer* 44.3 survey showed that employees in the industrial and service sectors feel greater job insecurity than employees in the public administration sector [92]. Similarly, the fourth EWCS [17] showed that most European workers who considered that they were likely to lose their job in the near future were employed in hotels and restaurants (20 %), or as plant and machine operators and assemblers, or in the elementary occupations (19 %).

A Finnish study [103] revealed that the relationships between job insecurity and the economic sector (private vs public) are complex and depend on the aspect of job insecurity which is taken into account. If job insecurity is assessed by means of a job worry scale, then Finnish employees, both men and women, working in the private sector perceived more job insecurity than employees in the public sector. If job insecurity is measured by means of a multidimensional job-related change scale, it could be shown that Finnish women from the public sector experienced more job insecurity than those from the private sector [103]. This trend was not found for men.

Most studies state that better-educated employees feel less job insecurity than those who have a lower level of education [99][104]. This results probably from the fact that better-educated people know that in case of dismissal it will be easier for them to find a new job. The results of the *Eurobarometer* 44.3 survey also showed that, in general, the relationship between education and insecurity is negative, although weak [92]. However, the same source reveals that in some European countries (France, Italy, Austria and Denmark) those with the highest level of education report their job most likely to be insecure [92]. Therefore, maybe it is a specific economic situation in a given country and recent restructuring which determine which social groups (of what level of education) will feel more job insecurity.

Economic sector, level of education, socio-economic status and gender can influence perceived job insecurity.

Some studies from the UK emphasise the importance of the socioeconomic status: white-collar workers at a lower level of the professional hierarchy felt more job insecurity than white-collar workers at higher-levels [105]. Significantly, it was the higher job insecurity of workers at lower levels that explained their higher susceptibility to different illnesses (see also Section 4.3.4).

No relationship was found between gender and job insecurity in a longitudinal study carried out in Sweden [99]. The fourth EWCS [17] also did not show such differences as far as considering the probability of losing a job during the following six months is concerned. However, the *Eurobarometer* 44.3 survey revealed some relationships between gender and job insecurity. In some countries (e.g. Finland, France and Spain) women more than men perceived job insecurity, in other countries (e.g. Italy, Greece, the Netherlands and Ireland) the opposite was true and there were more men than women who perceived job insecurity [92]. It seems that women's marital status affects their job insecurity [106]: single women report more job insecurity than married women. This was not found for men [106]. It is also worth stressing that, concerning the consequences for employees' health and attitudes at work, job insecurity leads more often to negative health effects in men than in women [96][106][107]. Nevertheless, there are also reports, although less frequent, that women can be more susceptible to exhaustion resulting from perceived job insecurity [108].

The relationship between job insecurity and age is also unclear. Some researchers do not find any significant relationship between those variables [99], while others believe that older workers experience higher levels of job insecurity [97]. On the other hand, according to the fourth EWCS [17] data, in most European countries job insecurity decreases with age. Nevertheless, in Finland, the Netherlands and the United Kingdom the opposite tendency is observed [92].

Finally, it appears from the analyses by Ferrie et al. [106] that those social groups which are in difficult financial situations are most at risk of job insecurity. The researchers found that the risk of job insecurity significantly increases in the case of persons who report daily material deprivation, low family incomes, low personal incomes (this applies only to men) and lack of financial security for the coming 10 years.

4.3.3. Causes of perceived job insecurity

Perceived job insecurity depends on objective organisational conditions and their perception by workers.

The roots of perceived job insecurity lie in both objective organisational conditions and the way they are perceived by workers.

Objective organisational conditions

Longitudinal studies carried out in three Finnish organisations showed that changes in the objective conditions of the organisation within the past year (assessed on the

basis of its financial documentation) appeared to be the best predictor of perceived job insecurity [102]. The level of job insecurity depends on how the current economic situation of the organisation is perceived. When it is perceived as poor, job insecurity is higher [103]. It is also important if reorganisations involving job losses took place recently. Workers who survived reorganisations will display significant job insecurity for a long time. Future reorganisation plans also contribute to the rise in job insecurity [101]. Another objective factor contributing to job insecurity is the type of employment contract. Non-permanent job contracts were connected with greater job insecurity [103].

Employees' perception of organisational conditions

The way employees perceive organisational conditions depends on the following factors:

(i) individual characteristics (age, education, gender, unemployment experience, financial situation of a family),
(ii) psychosocial job characteristics (e.g. job control, social support, and communication problems),
(iii) personal characteristics and attitudes (e.g. self-esteem and pessimism).

Individual characteristics

Important socio-demographic characteristics of employees concerning job insecurity, such as age, gender, education, socioeconomic status (SES) and financial situation of a family, were already mentioned in the previous paragraph (see Section 4.3.2 'Workers' groups most at risk').

Psychosocial job characteristics

Job characteristics which contribute to greater job insecurity are those which increase the feeling of unpredictability and uncertainty [103]. An example of such a characteristic is poor communication within an organisation. Employees are often insufficiently informed about planned changes and their expected consequences. While cross-sectional studies showed that there is a relationship between poor communication within an organisation and job insecurity [103], longitudinal studies did not confirm these results [104][109]. It was confirmed, however, that the application of a restorative strategy by the management (when information which reassures employees is given, first of all to workers already 'aware of' the threat of dismissal) leads to a decreased feeling of job insecurity one year later [110]. Job ambiguity, which means ambiguity concerning objectives and methods of work as well as concerning praise and negative feedback linked to the level of performance, also contributes to job insecurity [101]. Insufficient job control was also found to be linked to a higher feeling of job insecurity. Furthermore, a low level of skill discretion, high job demands and low social support were related to higher job insecurity [101]. Cross-sectional [101] and longitudinal studies [106][110] confirmed these results. A study carried out by Ferrie et al. [106] on civil servants in London showed that employees displaying low job control reported job insecurity more than twice as much as staff with high job control. Employees with low skill discretion reported job insecurity more than one and a half times more often (women) or two and a half times more often (men) than persons with high skill discretion. Persons with low social support reported job insecurity about two and a half times more often than persons with high social support at work. High job demand was a predictor of perceived job insecurity only in the case of women [107].

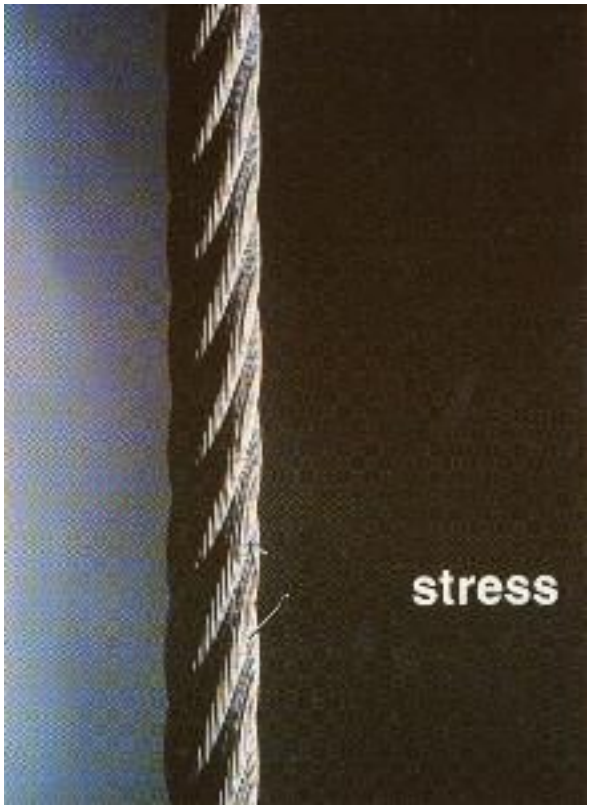
Personal characteristics and attitudes

Some researchers believe that personality factors are of special significance when job insecurity is long lasting [110]. It was found that increased job insecurity is connected with low self-esteem [102][103], negative affectivity [111], external locus of control [101], low sense of coherence [112], high level of pessimism and a tendency to emotional reactions in situations of high demand [106]. Personality factors seem to be more closely related to emotional aspects (measured through job worry scales) than to rational aspects measured by uncertainty scales [103]. One personal characteristic which significantly influences perceived job insecurity is the job involvement which an employee has displayed before. It appears that persons with high job involvement respond with especially great anxiety in the face of expected reorganisations, and their job insecurity level is significantly higher than that displayed by people with low job involvement [103]. In the former, the relationship between job insecurity and an employee's health is also stronger [112].

Personality factors seem to be of special significance when job insecurity is long lasting.

It is noteworthy that, except in the longitudinal study by Kinnunen et al. [102] which showed that low self-esteem precedes high job insecurity, all other studies quoted here were cross-sectional. Therefore, they showed the coexistence of individual characteristics and increased job insecurity, but not the cause-effect relationship between them. Hence, it cannot be ruled out that some of the abovementioned characteristics are not only antecedents, but also — at least to some extent — consequences of long-lasting job insecurity.

4.3.4. Consequences of job insecurity for employees' health



Artists: Rafał Bogusławski, Wojciech Bąkiewicz, Adam Peringer
Courtesy of the Occupational Safety Poster Competition organised by the Central Institute for Labour Protection – National Research Institute, Poland

Much attention has been given to the issue of the health consequences of job insecurity. The main theoretical bases to explain the negative health effects of job insecurity are for most researchers stress theories [113]. The phenomenon of stress has often been linked to mental and physical illness. For instance, correlations to coronary heart diseases [114], musculoskeletal diseases [115] or depression [116][117] were found.

Studies indicate the relationship between job insecurity, stress and poorer mental health.

Concerning job insecurity, researchers often focused on its effects on mental health, whereas the effects of job insecurity on physical health were considerably less often investigated. Furthermore, some studies analyse the influence of job

insecurity on work attitudes which are also related to workers' well-being. In this regard, mostly cross-sectional studies prevail, but more and more longitudinal studies are also being carried out [99].

Thus, studies usually indicate the relationship between job insecurity and poorer mental health. In this kind of study, mental health was usually measured with the general health questionnaire (GHQ) [118]. It is a scale developed for the purpose of detecting non-psychotic mental health symptoms (such as sleeping problems, anxiety and depression) in the population. In a few studies other indicators of mental well-being were used, for example burnout [119], job-induced tension [120] and depression [106]. The meta-analysis by Sverke et al. [95] included 37 surveys concerning this issue, carried out in the years 1980–99 among a total number of 14 888 respondents. This analysis showed that the average correlation between job insecurity and poorer mental health was $r = -0.24$. In other words, the higher the job insecurity, the poorer the mental health. The relationship was also confirmed by longitudinal studies, which unequivocally showed that job insecurity should be treated as the cause of worsening mental health and that a reverse relationship, which means the effect of worse mental health on later job insecurity perception, although theoretically also possible, is statistically irrelevant [105]. The aspect of job insecurity that is connected with decreasing mental health is first of all the fear of job loss, while the threat to important job features seems to be less important [121]. The impact of job insecurity on mental health is more frequently reported in men, and sometimes it seems to be irrelevant for women [96][107][109].

High job insecurity is connected with somatic ailments and appearance of long-lasting illnesses.

The relationship between job insecurity and physical health has been analysed less frequently. The abovementioned meta-analysis [95] included 19 studies with a total number of 9 704 respondents. The average correlation between the two variables was $r = -0.16$, which means that the higher the job insecurity, the poorer the physical health. High job insecurity is connected with worse self-reported health, more frequent somatic ailments (e.g. headaches and spinal aches) and the appearance of long-lasting illnesses. Some studies found the above relationships only for men [107][109], others also for women [107]. In Switzerland, a survey carried out in 2002 revealed that 37 % of workers who feared losing their job suffered serious functional disorders such as headaches, back pains and sleeping disorders, compared with 17 % of those who did not fear losing their job [122]. A few studies use physiological health indicators and show that job insecurity might be connected with heightened systolic and diastolic blood pressure [107][109], with ischaemia [107] and with higher BMI [107].

All in all, there is, however, less evidence of the relationship between job insecurity and physical health than between job insecurity and mental health. Longitudinal studies did not significantly confirm the influence of job insecurity on somatic ailments one year later [105]. Authors of these studies pointed out that the issue of the cause–effect relationships between job insecurity and physical health should still be considered to be open, as the period of one year might have been too short (or too long) to reveal the appearance of somatic ailments.

4.3.5. Job insecurity and attitudes towards work

Perceived job insecurity affects attitudes towards work.

Perceived job insecurity also has an effect on attitudes towards work, which finds its reflection in such areas as job involvement, job commitment, trust in the organisation and intention to quit. Although trust in the organisation (i.e. positive expectations of the intentions or behaviour of others ([3])) is the least researched of the four

([3]) Rousseau et al. [123] defined trust as 'a psychological state comprising the intentions to accept vulnerability based upon positive expectations of the intentions or behaviours of another' (p. 395).

abovementioned areas, at the same time its relation to job insecurity is stronger than in any other area: the average correlation is $r = -0.50$ [95][101]. This indicates that the threat of job loss significantly impinges on the psychological contract between an organisation and the employee and the trust on which this contract is based. As could be expected, such a situation also brings about a feeling of inequity, which is an additional stress factor, besides job insecurity itself [124].

Although cross-sectional studies have indicated many times the relationship between job insecurity and lower organisational commitment (the average correlation in the studies is $r = -0.36$ [95]), this relationship has not found confirmation in longitudinal studies [111]. Longitudinal studies, however, point to one more important effect of job insecurity, which is worsening social relationships within an organisation, both among colleagues and with superiors [111].

There is an interesting relationship between perceived job insecurity and turnover intention. It appears that persons who fear job loss are, at the same time, more inclined to quit. The correlation relationship between both phenomena is commonly confirmed (the average correlation in 26 studies included in the meta-analysis [95] was $r = 0.28$). The psychological validity of such behaviour becomes clearly understandable in view of the results of the study by Hellgren et al. [121], which showed that a turnover intention correlates only with the job insecurity understood as the anticipation of changes in important job features, whereas it does not correlate with job insecurity understood as anticipated job loss.

Several studies indicate the relationship between job insecurity and task performance levels. Many studies, however, do not confirm this relationship [95][101].

There are also data pointing to the effect of job insecurity on job exhaustion. Finnish employees with high insecurity displayed significantly higher job exhaustion one year later [102]. It is not clear, however, whether this effect is higher in women [103] or in men [126].

Many studies stress the relationship between job insecurity and job satisfaction. The meta-analysis by Sverke et al. [95] summarises 50 studies on this relationship, with a total number of 28 885 respondents. The average correlation between job insecurity and job satisfaction was $r = -0.41$, so it can be described as high. It has not been, however, unequivocally explained yet what role individual variables play in this relationship, including positive/negative affectivity (i.e. tendency to react to events with positive/negative emotions). Some researchers point out that this apparent relationship disappears when the effects of positive/negative affectivity are controlled [116], while others argue that even if individual variables are controlled, the relationship between job insecurity and job satisfaction is relevant. It is important from a practical point of view that job insecurity is related to safety motivation and safety knowledge through job satisfaction (mediation effect). In other words, employees who perceive their job as insecure are less satisfied than employees with high job security and, in turn, less willing to observe safety procedures and improve their knowledge of industrial safety. This may result in dangerous behaviour which, in turn, leads to more accidents [127].

Discrepancies in the outcomes of these studies result from the fact that the effects of job insecurity depend on a number of additional factors. The most important moderators are: gender, occupational status, personal variables, social support and job insecurity measurement methods. The personal variables which moderate the relationship between job insecurity and health as well as attitudes towards work are:

Personal variables and social support moderate the relationship between job insecurity and health.

- sense of control: persons with external locus of control ([4]) react to job insecurity with greater lowering of mental health [125];
- positive/negative affectivity: although it is usually expected that people with negative affectivity will react more strongly to job insecurity [113], such an outcome has not always been found [121];
- emotional intelligence: it is anticipated that low emotional intelligence will be conducive to stronger relationships between job insecurity and health effects, since it leads to lower ability to cope in social situations [129].

There is evidence that social support is also an important moderator, both in the workplace and at home. The greater the support, the less likely job insecurity will have a negative effect on health [119].

Moreover, the strength of the association between job insecurity and its outcomes seems to depend on the type of job insecurity measured. It was revealed that studies using multidimensional instruments find stronger associations between job insecurity and its outcome than studies using single item measures [95].

4.3.6. Possible prevention measures

Job insecurity is not believed to be an inevitable consequence of organisational changes which involve personnel reduction [130]. To avoid high levels of job insecurity, the organisation can undertake preventive measures (first-degree prevention), as well as measures to weaken the negative effects of job insecurity on health (second-degree prevention).

An especially important element of the first type of prevention is organisational communication. The management could pay attention to inform employees in good time about the planned changes, even if this information might be painful. The validity of such a policy has been confirmed by a study [120] which shows that job insecurity is more detrimental to a worker's health than certainty, even about job loss. It was established experimentally [131] that realistic information during a merger helps employees to adapt to the situation, and therefore prevents negative health effects. Admittedly, the longitudinal study [102] did not confirm that the intensity of communication within an organisa-

Organisational communication and social support are important in the prevention of job insecurity.

Company meeting

([4]) Concept of 'locus of control', developed originally by Rotter [128], is related to the generalised people's beliefs concerning the source of control over their life events. People with 'internal locus of control' consider things to be caused by their own activities (skills or efforts); those with 'external locus of control' believe that the source of life events is external to them, and they have no influence on what happens.

tion has an effect on the job insecurity perceived a year later, but, as the authors believe, the period of time between disclosing the information and its effect might have been too long in this study. It is important for the management to communicate with employees not only before any planned changes but also afterwards. In the latter situation, it is important to convince remaining employees that their jobs are still secure. A restorative strategy is stressed in this context [103] in order to reassure remaining employees about job security.

Before the planned changes, the management might also use the services of outplacement agencies, which, through their job advisors, can help employees choose a new job and organise retraining for a new career. A more elementary policy to prevent employees from excessive job insecurity is to make them familiar with the idea of 'the boundless career' and to train them on how to take ownership of their career path [132], and also how to remain flexible and open to change.

In the case of people who already experience high job insecurity, it is very important to provide them with social support, both in the workplace and at home. As mentioned above, support buffers the negative effects that job insecurity has on health. The institutional form of such support is counselling employees who feel high job insecurity [115].

4.3.7. Future research needed

Although considerable research has dealt with the problem of job insecurity, there are some issues that need further clarification.

Consensus in the conceptualisation of job insecurity and more longitudinal studies are needed.

Elaborating the consensus on optimal conceptualisation of the concept of job insecurity, as well as development of an instrument adequate to this conceptualisation, is of crucial importance for further systematisation and enlargement of knowledge concerning job insecurity. Presently, various conceptualisations and various measurement instruments are used, so that the comparability of results is not always possible. As job insecurity as a multidimensional concept leads to stronger outcomes [95] than the global approach, the multidimensional scale seems to be more sensible. However, there is a need to achieve consensus as to which dimensions are worthy of attention.

There is a need to undertake more longitudinal studies, as so far there is not much research of that kind. The majority of the studies in this area are cross-sectional, which can only indicate the connections between job insecurity and other constructs, but they are not able to prove causal connections. For example, the relationship between job insecurity and job satisfaction, found in 50 studies, cannot be taken as proof that low job satisfaction is caused by job insecurity. The inverse connection is also possible. Only longitudinal studies using cross-lagged analyses could show the strength of the above tendencies and which of them dominates.

It is also important to pay more attention to moderator variables, especially those that can be influenced by management, for example social support, organisational support, worker participation and the role played by unions. If these factors were buffers in the job insecurity–health outcomes relationship, organisational interventions directed toward reducing the negative impact of job insecurity on health and adverse behaviour, should include them.

4.4. Work intensification

4.4.1. Introduction

Work intensification has been a significant feature of the changes taking place in companies in the majority of developed countries since the 1980s. European ([5]) and national ([6]) surveys as well as numerous research projects confirm the widespread nature of this phenomenon. They show that harmful effects, arduousness and occupational risks, believed to be on the decline due to the technological and organisational improvement of working environments, have actually tended to increase [133][134][135] ([7]).

In-depth investigations of the issue of work intensity and its trends are currently being carried out from various angles: these include country [136], gender [137][138], age [139], employment status [140][141], forms of labour [142][143][144], specificity of sector (services or industry), and organisational and technological changes [145][146][147]. This research has allowed a description and an analysis of the phenomenon of work intensification in relation to two other trends in the world of work: (a) the perceived deterioration in working conditions and the reversal trend in the improvement of occupational safety; and (b) the rise in negative health effects such as musculoskeletal disorders (MSD), as well as stress and other psychosocial risks (bullying, violence). Often, a causal link is postulated between work intensification and the recent changes taking place in enterprises (relative to time management, technology, flexibility and control) but, most of the time, there are insufficient statistical data to prove the negative or positive effects on occupational safety and health [148]. Nevertheless, numerous studies indicate specific dimensions of work and organisation which can be targeted to combat the negative effects of this phenomenon. A growing number of

Textile company.
© Institut National de Recherche et de Sécurité (INRS), France

([5]) The European Foundation for the Improvement of Living and Working Conditions has been carrying out periodical surveys in all countries of the EU since 1991. The last survey was performed in 2005, and the results are available on the Foundation's website (http://www.eurofound.europa.eu/).

([6]) See for example, the French surveys, carried out by INSEE and the Ministry of Labour (DARES) and based on interviews with employees, in 1984, 1991 and 1998 (http://www.travail.gouv.fr/etudes-recherche-statistiques/statistiques/conditions-travail/80.html). One can also consult the SUMER surveys (*surveillance medicale des risques*) carried out by occupational physicians, in 1993 and 2002, which reveal the main occupational risks employees are exposed to (http://www.travail.gouv.fr/etudes-recherche-statistiques/statistiques/sante-au-travail/87.html).

([7]) In the UK, however, a tendency towards stabilisation has been observed. The progress of this phenomenon may have lost momentum [136].

workers state that they experience high levels of pressure stemming from high-speed tasks and/or strict deadlines, lifting heavy weights, arduous postures, and long distances to cover.

4.4.2. Definition of work intensification

Different societal, economic and organisational trends explain the development of work intensification.

The difficulty in arriving at a clear and general definition of work intensification stems from the diverse points of view on the issue and from the various forms of work concerned. Théry [149] suggests a definition based on a synthesis: 'A complex, multi-faceted phenomenon associating a multitude of constraints: shift in production organisation modes towards a permanent drive for automation, integration of trade constraints (deadlines, flexibility, reactivity, diversity), shift in work organisation towards greater autonomy and more worker responsibility, greater individualisation of human resource management and changes in work evaluation and control mechanisms.'

Work intensification can also be described as a densification phenomenon. For Hélardot and Druhle [150], work density expresses the challenge of a plethora of requirements, related not only to the immediate work but also to the continuous task synchronisation, and the possibility of interruption: 'Work is even more dense when it does not include a period of relaxation or respite to alleviate muscular and nervous tension'. In terms of time, densification expresses action stripped of time periods with no added value, unnecessary travel and movements, but also, as Clot [151] points out, the disappearance of space to 'breathe', relax and unwind.

4.4.3. Sources of work intensification

While the role of organisational and technological innovations in work intensification has been widely acknowledged, conflicting results make it impossible to draw any firm conclusions in terms of a deterministic chain of causalities [147][152][153]. Another way to address this issue is to investigate why employees have 'accepted' these reorganisations and the ensuing intensification of work [154][155][156][157] ([8]).

The societal and economic reasons that explain the development of work intensification as well as the broad organisational trends behind this phenomenon are pointed out below.

Radical changes in use of time

Modifications to the structure and the nature of work activity time are observed.

Considerable modifications to both the structure and the nature of work activity time can be observed. Time is the ultimate primary resource and its use in society is now subject to a constant search for improvement. Within 50 years, for example, the 'exploitation' of night-time hours has undergone radical change. Night-time activity has increased to the point that certain processes which were discontinuous in the past have now become continuous. Furthermore, in certain circumstances, the temporal amplitude can be reduced. This is the case for night-time intervention to carry out repairs and maintenance on major traffic arteries, the time for which regularly decreases due to the increase in nocturnal traffic.

([8]) Three reasons are put forward: (a) dwindling union membership, which may have destabilised the negotiating power of employees concerning the issue of working conditions and tipped the scales in favour of employers; (b) the fear of redundancy in a situation of mass unemployment, which may play a part in employees accepting these conditions; and (c) the impact of a growing number of collective and individual wage or job promotion incentives.

In terms of work, a number of modifications have been noted: an increase in temporal pressure bearing down on employees; the necessity to work in a hurry; the impossibility to control their own work rhythm; the requirement to speed up activity; the impossibility of anticipation [158]. According to Volkoff [158], 'The engines are made to "operate at excess capacity"', 'the people are run at full capacity', and the 'periods considered not to be productive in terms of added value are being compressed'. Some research also shows that this leads to fewer possibilities for learning 'on the job', and, as a consequence, the probability of incidents and accidents may increase [159].

Technologies at the service of 'just-in-time' work

Just-in-time work has become common in all spheres of business.

In certain professions, schedules can change at any time [160]. This is broadly facilitated by computer and telephone technology. Further, the use of just-in-time production has become common in all spheres of business in order to save resources such as money and time. Working activities are placed in direct and reciprocal dependency. 'Downstream pulls, upstream pushes. And if you have a problem you are stigmatised as the one who interrupted the flow' (Veltz, quoted by Volkoff [158]). In this organisational scheme, interrupting your activity for any reason may trigger multiple and chained disruptions. Consequently, an action performed by one person can produce invisible, but expensive and potentially penalising, effects on others. Errors, delays, hazards, malfunctions and unexpected occurrences can lead to high costs.

Flexibility as a requirement

The relationship between companies and the market leads the former to 'stick to the demand'. Whereas in the past the constraints stemming from the organisation of production and those of marketing were separated, today they are increasingly interrelated. Gollac and Volkoff [161] talk of 'the hybridisation of these two forms of organisation'. The requirement of flexibility must be associated with that of general stock reduction, which can weaken the flexibility to react to changes in demand. It should also be noted that the life-cycle of objects (material or immaterial) has been shortened, which increases the requirement of adaptation at every level of the research, design, manufacturing, marketing, distribution, sales, aftersales and recycling processes.

Sometimes, this culture of urgency is a sign of poorly thought out management which, with the passage of time, turns out to be mediocre and even inefficient. In this context, time constraints do not allow for information flows, training, anticipation, taking stock of the current situation and learning from experience.

Distribution of supervision and evaluation measures

New evaluation measures can give employees the feeling that they are on constant probation.

Supervision constitutes a set of processes intended to ensure monitoring of the activity. More and more supervision in more diffuse and implicit forms is apparent [162]. This has been greatly helped by the development of new technologies. For example, computerisation allows tighter surveillance, a new formalisation of work sequences and, consequently, an improved ability to identify 'dead' time. It also allows new evaluation measures of a nature that gives employees the feeling that they are on constant probation. Results achieved in the past are no guarantee of their current status within the company. According to findings by Perilleux [162], such distribution of control can generate an obvious perception of intensification by the employees concerned.

4.4.4. Workers most at risk

Results of the fourth EWCS [13] indicated that in 2005, 46 % of the employees (from 31 European countries) worked at very high speed three-quarters or more of the time. In comparison with the previous years, this tendency is on the increase. About 30 % of workers reported that they did not have enough time to get the job done. High-skilled blue-collar workers are more exposed to temporal constraints (32 % report high speed and 36 % tight deadlines) than their white-collar counterparts. A high pace of work is also more prevalent among young workers.

Almost half of the European employees work at very high speed three quarters or more of the time.

Additionally, in the case of about 90 % of workers in the wholesale and retail trade, hotels and restaurants as well as educational sectors, the pace of work is determined by direct demands from other people. About 60 % of workers in agriculture and fishing as well as the electricity, gas and water supply sectors have to keep numerical and performance target demands. A pace of work determined by colleagues affects over 60 % of employees in the construction sector. Machinery dictates the rhythm of work to 40 % of workers in the manufacturing and mining sectors [13].

4.4.5. Work intensification and its consequences for occupational safety and health

It cannot be stated categorically that work intensification has a negative impact on quality of work or on workers' health. As Perilleux [162] writes, work intensification, a source of internal tension, can be attractive when it presents itself as an opportunity to be exposed to (and be modified through) contact with a plethora of exciting challenges. In certain conditions (including a high level of autonomy or a high level of social support), intensification can lead to individual investment and learning, greater worker responsibility, social reward and job satisfaction.

However, the relevant literature broadly associates work intensification with a deterioration in working conditions, whether they are assessed in terms of physical or psychological discomforts, nuisance or occupational risks. This may lead to negative consequences in employee health [163][164]. According to the European working conditions survey (2000), the higher the pace constraints, the more probable is workers' perception that their health is threatened [138]. In 2005, the most common health problems reported by workers were backache (29 %), muscular pains (28 %) and fatigue and stress (27 %) [13].

The impact of work intensification on health is also confirmed by other epidemiological results as well as extensive research on the workplaces. For ergonomic studies see for example Coutarel [165] and Gaudart et al. [166], sociological studies [167], historical and ethnological aspects [168], psychological studies of work and development [169], and occupational physicians' studies [170]. Exposure to time pressures obviously affects the ways of accomplishing a task (in terms of posture, procedures, information, tools, etc.). For example, the ways that enable an assembly line worker to work fast are not always those that help to avoid excessive pain in upper limbs or neck. As Laville et al. [171] showed three decades ago, time pressure combined with the need for sustained alertness results in painful muscle cramps.

Intensity obviously affects the working conditions experienced by workers through varied and complex ways. Even if certain types of health impairment (stress and MSD) have been researched much more than others, there is a degree of consensus that work intensification can have an influence on all types of health and safety issues as a result of the changes in the conditions where there is exposure to risk factors [172]. In

particular, it has been reported that work intensification often causes employees to neutralise the safety systems of machinery and equipment in order to work faster and maintain production rates, which may lead to injuries. At the present time, the link between accident and work intensification, although suggested by some authors [152][173][174], has not been researched extensively.

Work intensification can have a direct influence on the occurrence of MSD and stress-related diseases.

The results of different studies indicate that work intensification can have a direct influence on the occurrence of epidemics of MSD and stress-related diseases [2][175][176]; however, the connection remains multi-causal in nature. The causality models in most widespread use suggest that the harmful character of work intensity most probably does not depend on one isolated aspect of work (work rhythm pressure or tight deadlines), but on the interrelationship with other aspects of the situation (personal, work or job-related).

Artist: Bartłomiej Ignaciuk
Courtesy of the Occupational Safety Poster Competition organised by the Central Institute for Labour Protection – National Research Institute, Poland

Stress ranks high in research papers examining the impact of work intensification on health. A state of stress 'occurs when there is an imbalance between a person's perception of the restrictions imposed on him or her by the environment and the perception this person has of his or her own resources to deal with these constraints' ([9]). According to the model of Karasek [45] (see also Chapter 4.1.4), working conditions combining high levels of job strain and limited decision-making latitude can increase the risk of developing physical or mental health problems. Furthermore, a lack of social support can aggravate this risk [46]. In addition, Siegrist has shown the harmful effects of effort–reward imbalance [177]. Increased pathological risks of high stress to the cardiovascular system [114][178] ([10]) and more recently to the occurrence of strokes [179] have been established. The link between long periods of stress and an increased susceptibility to infections, hypersensitivity, cancer and ulcers has also been indicated [180]. As far as mental health is concerned, afflictions are related to nervous breakdowns or anxiety attacks [181]. These conclusions are in line with the results of the ESTEV survey (1998, based on the longitudinal approach carried out over five years in France) which confirm the pathogenic nature of intense work [182]. Finally, although there is a lack of comprehensive research data on the issue of suicide, its connection to work stress, and therefore work intensity, has also been taken into consideration recently.

Musculoskeletal disorders (MSD) of the upper limbs and back are today the main cause of acknowledged work-related diseases. Regarding their occurrence, many authors consider it as a possible consequence of work intensity. One of the reasons is that this global epidemic is emerging in a general context of work intensification.

([9]) According to the definition provided by the European Agency for Safety and Health at Work (http://osha.europa.eu/good_practice/risks/stress).

([10]) This issue is dedicated to the state of research concerning the connection between work and cardiovascular health.

Another reason is that they are lesions attributed to repetitive movements under heavy time constraints (see, for example, Hoogendoorn et al. [183]). MSD risk factors (biomechanical factors: repetitive gestures, excessive efforts, static work, extreme articular positions; psychosocial factors and stress; and activity-specific factors such as cold or vibrations) do not disappear from work situations, nor does their tendency to accumulate, as the results of a number of recent surveys suggest [184]. But, in fact, there are very limited longitudinal epidemiological data available on this issue (for an exception, see Vézina et al. [185]). Besides, although the onset of MSD often has a sudden and evolving 'epidemic' type nature, not everybody is affected at the same time or in the same place. A number of victims recover while others start suffering from afflictions in different forms [186]. This diversity of cases reflects the enormous impact of the problem.

4.4.6. Possible organisational measures to reduce work intensification

There are some mechanisms and organisational dimensions that, by affecting the way in which individuals execute their activities, can increase or reduce work intensity.

Different organisational dimensions can increase or reduce work intensity.

Designing work

A characteristic of the framework of productive activity has been the subject of a great deal of research. One of the most innovating approaches is that of Hatchuel [187], who introduced the idea of design of work and work prescription. Work prescription is defined as 'prescription of any formal or informal requirements bearing on job, regardless of their source. A salesperson receives prescriptions from management but also from the clients' [188]. Work prescription can sometimes be extremely constraining for employees. This is the case for service relationship situations, in which the sources can be multiple (management, customers, institutions, etc.), as can the forms of relationships with these sources. Moreover, Hatchuel terms 'reciprocal prescription' as the fact that the action of one actor partly regulates that of others. This is also the case for work situations in project management. Reciprocity is even more important when each actor depends on the knowledge of the other; however, this situation must not be confused with that of actors whose role is to dictate the action of others. In the first case, it can be situated in a horizontal and even ascending mode, whereas in the second it remains uniquely descending.

Better work design can result in the reduction of work intensity.

In this context, a 'confined' work environment is characterised by properties that allow a designer to have (almost) total control over the artefacts related to working conditions (plant location, installation, machinery, tools, tasks and procedures). In a highly confined situation (e.g. the manufacturing sector), the design effort can vary in importance according to the strategic choices of the enterprise. Conversely, in unconfined situations (e.g. bus driving), control over the artefacts is often impossible and the field of design is necessarily limited.

Work confinement is closely related to work intensity. It facilitates causal analysis and direct observation of work intensification (planning, speed, rates, complexity, etc.), and thus enables the development of a work appraisal which, in turn, can influence the possibilities of regulation and control. As Hatchuel points out, 'Reducing intensity is necessarily a re-confining strategy: a reflexive effort on the artefacts that define work and the resources that it needs'. Put another way, better work design can result in the reduction of work intensity.

Adapting the workload

Tackling workload means firstly identifying the requirements at work and next, the means which enable employees to meet these demands [189]. Masson suggests an analytical matrix with three dimensions.

1. **Prescribed workload** encompasses the concepts of prescription and design developed by Hatchuel [187], and reflects the expected workload in relation to the level of work confinement.
2. **Actual workload** covers constant variations unique to the production of goods and services, variations that often put predictive quantification and schedules to the test. The analysis also highlights hazards and disruptions (delay, breakdown, lack of information, etc.). Furthermore, this analysis reveals regulations (predetermined or improvised) used to respond to these hazards and setbacks.
3. **Perceived workload** is the resultant cost (physical, mental and psychological) as it is perceived by workers, associated with other subjective criteria such as the objectives of the action, the sense attributed to the work, recognition processes, the employee's plans, etc.

Construction site

Workload (within the framework of these three meanings) represents an intermediary object, situated between the determining factors and results of the activity (part of which is the health of the workers). This object allows an evaluation (there are descriptors in all three dimensions) and discussion and/or negotiation [190]. On all three levels an intervention is possible, even if different actors are involved. For example, better work design for the first, enhanced factual response to variations and hazards for the second, and taking more heed of complaints or more active recognition of efforts made for the third. Regulation modes, which are primarily a response to excessive workload, concern work organisation (e.g. the ability to deploy back-up personnel for urgent orders). They can also be 'invented' by the employees as a coping strategy. However, in this second possibility, regulation can be not efficient enough, as available resources are limited.

Identification and reduction of isolation

Isolation at work can lead to genuine mental overload.

Isolated work has turned out to be an at-risk situation, although, when it is characterised from a topological and organisational point of view, employees can be kept under reasonable control by enterprises [191]. 'Isolation', on the other hand, is a more complex phenomenon that is not directly linked to the presence or absence of others (colleagues, supervisors, co-workers). New technologies and economic choices have contributed to the disintegration of groups, the spreading of working hours over longer periods, and the redistribution of space (e.g. a great deal of stock is on the road). These mechanisms result in even more isolation of individuals, for occasional or prolonged periods of time, depending on their activities. Thus, crucial decisions are sometimes taken in a hurry and, more importantly, without having been presented to expert peers. The link between intensity and the isolation phenomenon is easy to

suggest. Working alone (isolation) requires a great deal more attention, and calls for the repeated review of a diagnosis before making a decision. If we add the stakes of presumed responsibility in the case of failure, isolation can lead to genuine mental overload.

As stated earlier, isolation at work is not always visible. Analysing work activity and listening to employees (e.g. by talking with occupational physicians or making surveys) can help to identify these situations. The answers needed to take action will essentially be found in work organisation, which should enable workers to exchange opinions, debate, problem-solving assistance and cooperation when necessary. Organisational conditions determine the running of work teams, the presence of hierarchy, and customer relations. Technical means (e.g. new information technology) can also be employed to reduce workers' isolation at work.

Adjusting the dependency on organisation

According to French surveys on working conditions, the rhythm of work increasingly depends on external factors instead of on the employees themselves (standards, deadlines, smooth operation of machinery, transportation of products, and customer or public demand). According to this phenomenon, it is no longer those at the workplace who determine the speed and rhythm of their activity or their rest periods. They must respond to an imposed rhythm. This issue is the source of debates and misunderstandings. Companies often try to improve their standards in terms of execution, but forget to integrate it with other dimensions. Freedom of execution is therefore reduced for a growing number of employees, even though, for some, work productivity remains the same. This phenomenon of 'dependency' has been imposed in virtually all production systems (automotive, food, care and beauty industry, etc.). It is closely linked to the extreme mechanisation of processing operations and product transportation. In this context, employees no longer have the possibility to interrupt the flow: 'it is taken out of their hands'. Dependency on organisation also becomes apparent in the loss of 'time buffers'. Employees no longer have any time to consider the future or cope with it [192].

The rhythm of work increasingly depends on external factors, not on the employees.

The dependency on organisation can be reduced by proper organisation of work. Taking the example of a call centre, it is the organisational sphere that permits (or does not permit) the workers to take a break and extract themselves from the workflow when they feel the need to do so. It is also through work organisation that the necessary transitional time, or time buffers, can be found to allow the work to be executed in reasonably comfortable conditions. These times, situated between self and production requirements, make it possible to look ahead and to get prepared. Solutions can also come from production organisation. In a large department store or supermarket, the number of cash desks can be flexible and adjusted to the current situation. In an order preparation centre, the information mode can impede employees to follow step-by-step instructions or, on the contrary, allow them to get ahead or anticipate forthcoming orders. Finally, the strategic organisation of a company is also a dimension that should be examined. For example, working under time pressure (which keeps employees permanently in a state of tension) can turn out to be less efficient than well-managed schedules.

Ensuring room for manoeuvre

Each worker attempts to deal with the adversities and difficulties that arise during task execution in their own way. Work intensification can reduce or hamper the implementation of these strategies [188][193] as, in order to develop appropriate

strategies, workers need some decisional latitude; in other words 'room for manoeuvre'. Many authors have proposed definitions of this term [189][194]. Marquié [195], for example, defines room for manoeuvre as 'space left untouched by work constraints'. The question of room for manoeuvre is not restricted to employees working under heavy time constraints. Other categories are affected as well, but it is very likely that the stakes, in terms of health, are much higher in situations where space and time have been compressed.

Room for manoeuvre allows workers to resort to their own strategies while meeting demands.

As it was just pointed out, for many workers, room for manoeuvre falls within the scope of the 'space–time' equation. The automotive sector has provided numerous illustrations of this. Hatzfeld [168] describes how workers under time constraints 'play' with the space at their disposal on the assembly line, personalising their work rhythm by accelerating or reducing their speed in order to remain on top of the situation. Ensuring room for manoeuvre therefore means allowing those executing the task to resort to their own strategies to the greatest possible extent while meeting demands. This condition is often contrary to the efforts of companies to rationalise and standardise operations and methods that, if pushed to the limit, constitute sources favourable to the emergence of MSD, stress, etc. Ensuring room for manoeuvre thus involves finding responses to the way a task is designed and then how this concept works out wherever it is implemented. However, as already pointed out, it must be kept in mind that design and production activities are, as a general rule, no longer located in the same place. Room for manoeuvre is also present in the resources possessed by the workforce as a whole. The employees should not constitute merely a collection of individuals working nearby one another, but a homogenous group where solidarity has evolved and where feelings of trust connect the individuals. Over the course of time, this leads to group-specific structures of mutual help and cooperation according to internally constructed rules.

Reducing counterproductive arbitration at work

Employees acquire their own coping strategies to mitigate unacceptable constraints.

Employees are never passive. Over time, they acquire coping strategies to mitigate constraints when they have become, for them, unacceptable. They invent their own pressure relief valves and exit strategies. This reaction, appropriate to various forms of intensity, could therefore give the impression that the problem is not that bad. To resolve this question, it is necessary to enter into the hidden area of arbitration and decision, into which workers retreat when they feel cornered. In this respect, a great deal of research work has emphasised 'cheating' [196], which allows the employee a way out when the situation does not go according to plan. Other cases reveal forms of 'deadlock' which manifest as actions not carried out that nobody will learn about. These 'renunciations' are often the result of a 'restricted choice' between antagonistic instructions at any given time. In this context, safety is often the most mistreated instruction. The accumulation of constraints can lead to the need for arbitration between heterogeneous and, at times, contradictory requirements (safety, quantity, quality, etc.) which are often pointed out by employees as a source of internal tension [162]. These arbitration processes are not unique to specific categories of employees. Directors and managers also experience these forms of deadlock, which they apply to their work schedules, meetings, training, etc. The service sector is not spared from this phenomenon either. According to du Tertre [197], an employee in face-to-face situations is constantly forced to arbitrate between the orientations and goals set by hierarchy and the specific requirements of the beneficiary.

Light should be brought to cases of counterproductive arbitration, i.e. arbitration that results in incompleteness concerning the achievement of certain objectives (safety, quality, etc.). However, identifying an occurrence of such situations demands a

number of prerequisites. First of all, the workers have to trust the management, as they may fear the consequences of this disclosure. Another condition concerns work organisation, which either allows or does not allow the employees to express, on a regular basis, any difficulties they encounter in meetings intended for this purpose. The third falls within the sphere of 'corporate culture' and concerns the positions adopted regarding how work is carried out. Hence, talking about arbitration is easier in a company which readily admits that there can be a gap between the reality of work and the way it had been conceived, and which determines beforehand how these discrepancies can be addressed.

4.4.7. Conclusion and future challenges

There are no ready-made recipes and solutions to reduce the harmful effects of work intensification. Instead, exploratory steps have to be taken that do not presuppose the conclusions to be drawn, as most of the time this will mean defining unobservable, often complex, structures and involving many actors located in structures with a different logic of action. Furthermore, part of the data collected is based on the subjectivity of those involved. Descriptive and explanatory studies on the work intensification carried out during the past two decades have revealed new questions related to the dynamic and unstable nature of this phenomenon.

The process manifests itself in very diverse ways, depending on the sector of activity and country. It is true that statistical studies describe this phenomenon and its evolution in terms of multiple constraints and their fluctuations over time. The reality on the ground cannot, however, be reduced to examining constraints and measuring their respective impacts. Many authors, more concerned with the issue of prevention action, have opted to favour the concept of work intensity (or density) and its consequences on the health of employees. Another difficulty lies in highlighting work intensity in the field, as it is an ambiguous and contradictory phenomenon [148][198]. It can be the result of processes that are difficult to understand and characterise, such as isolation, arbitration and workload. Finally, actions aimed at reducing work intensity tackle different issues depending on the characteristics of the situations concerned. In this respect, a 'confined' work environment [188] allows more control over artefacts, and thus opportunities for transformation and design, than 'unconfined' situations (see Section 4.4.6). More generally, designing sustainable work systems could constitute an alternative to the current design of intensive work systems [198].

Reducing intensity also entails questioning the various forms of organisation that prevail in a company, something which is not common practice. That is because, contrary to technological and material elements, organisation is often neglected by designers and is considered a hollow element, a variable that can be adjusted. However, as has been pointed out here, if work intensity is a result of organisation, it is indeed there that the reduction solutions must be sought.

All of these factors suggest that interventions and research should be developed in parallel to pursuing descriptive surveys of the changes taking place. This, in conjunction with fieldwork in companies, will result in the development of diagnoses involving all the actors, including the employees concerned. Involving the latter means that the employees participate directly in the analysis of their work, in the construction of hypotheses intended to better understand the difficulties experienced and, finally, in the search for and implementation of solutions. Lastly, the conditions necessary to achieve sustainable prevention, as well as interventions that enable new forms of cooperation and co-production in the workplace, should be considered and developed.

4.5. Ageing workers

4.5.1. Ageing workers — description of the phenomenon

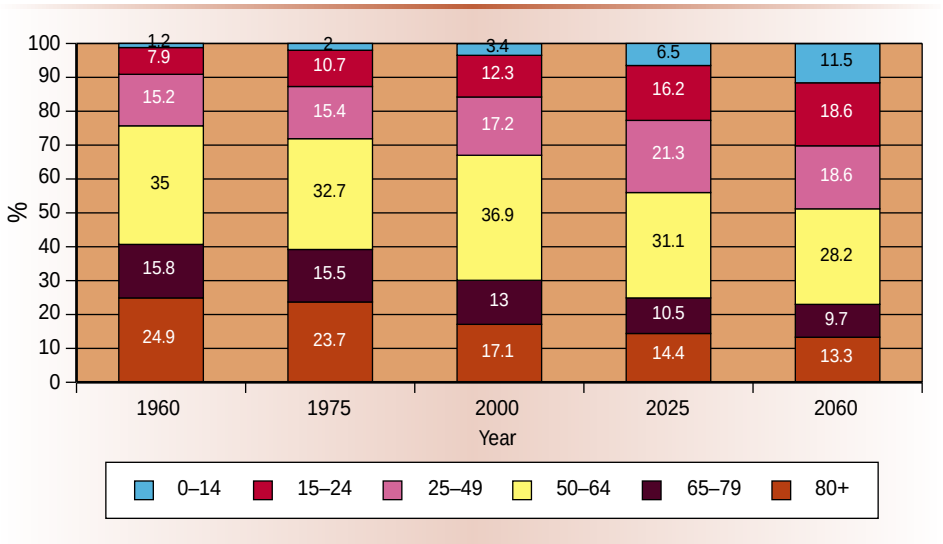
Researchers do not generally agree upon a precise age limit to define ageing workers [199]. According to the Organisation for Economic Cooperation and Development (OECD) definition (cited by the New Quality of Work Initiative (INQA) [199]), workers are ageing workers if they are in the second half of their working lives but have not yet reached retirement age. The Institute for Employment Research at the German Federal Employment Services defines workers between 45 and 55 as ageing, so that the boundary of the definition is blurring.

Constant increasing of the proportion of older workers is anticipated in European countries.

Ageing is not a one-dimensional topic. As life expectancy has risen constantly over recent decades, and not only in industrialised countries [200], many societies are affected by changes due to an ageing population [201]. In France, for instance, life expectancy rose from 63.6 years in 1950 to 75.6 years in 2002 [200]. Furthermore, the proportion of young and old people changes with a decreasing proportion of young and an increasing proportion of old people (changes in the age structure of the total population, example see Figure 8) [200][202]. Low birth rates intensify this change [200][203]. From 1995 to 2002, the number of people in work increased by 0.36 million (2 %) for those aged 15 to 24, while it increased by 2.38 million (16 %) amongst those 55 to 64 years old [9].

From the economic standpoint, this global development (longer life expectancy and changes in the age structure), together with a steady pension age, leads to a substantial increase in pension costs, because the number of years anticipated in retirement increases [200][204]. From the occupational safety and health point of view, questions about the work performance of older workers arise. Do older workers

Figure 8: Age distribution in Europe from 1960 to 2060 [202]



have more accidents at work? Are there any differences in health between young and older workers? Are older workers able to carry out certain occupations?

4.5.2. Changes in the course of life

Some functions decline and some other skills develop during the process of ageing.

Ageing can be understood as a dynamic and differentiated process of change in which functions decline at the same time as other skills develop (see Table 3). This process differs in the case of each individual (and in relation to gender) [201][205]. Experts speak of 'differential ageing' and of an 'inter-individual spread' of skills and characteristics which change, decline or emerge with age. By this they mean that the various abilities and facets of personality of individuals can develop to different degrees, in different directions, and in different timescales during the ageing process [206][207][208][209][210]. In relation to occupational safety and health, these changes in the abilities of ageing workers must be taken into account.

Table 3: Increase and decrease in abilities due to ageing [211]

Increase in abilities	Decrease in abilities
Experience	Muscle strength
Independence	Sight, hearing, sense of touch
Competence to judge	Short-term memory
Steadiness	Speed of perception
Sense of responsibility	Responsiveness

Referring to the literature [211][212][213][214][215], older employees are usually characterised by the following abilities and qualities.

- They are well able to handle both complex organisational models and wide-ranging objectives.
- They show greater autonomy in taking decisions and in acting, and they therefore attain goals with less effort than younger employees.
- Their quality perception is highly developed and, in general, they have a greater sense of responsibility and duty.
- They are better able to estimate their own abilities and limitations, and their judgement is more reliable.
- Their social expertise is more highly developed, and they fulfil advisory functions more effectively.

A range of abilities is subject to what the experts call the 'natural ageing process'. In particular, primarily physical and sensory abilities decline — albeit frequently not to the extent which many people used to assume.

The most important aspect — because it applies to both physical and mental abilities — is the reduction in speed in physical and mental processes as people grow older. Other declining abilities include senses such as powers of hearing and sight. The ability to hear starts to decline between the ages of 20 and 40, and deteriorates further thereafter. The situation in terms of visual ability is similar: the power and precision of sight gradually deteriorate with years [214]. However, ageing does not always cause these losses. One example is hearing loss that occurs in early adulthood as a result of noise exposure both in leisure time and at work. Such possible influences have to be considered, too. Physical strength and, to a certain degree, physical stamina and resilience also decline when people are in their twenties, and particularly in their

forties [211]. However, physical strength is often not vital in many of today's jobs, or designing the work appropriately can offset its loss. Declining sight and hearing can also be corrected.

A series of studies have demonstrated that those occupational groups of which certain intellectual functions have been least demanded had the greatest tendency to display decline within these areas. Losing the ability to learn is not exclusively related to age, but is normally the result of a working biography with a lack of continuous learning demands and, in particular, opportunities to learn [203].

Nevertheless, some abilities increase or first emerge with increasing age. Often, these are abilities and skills related to experience gained by employees in their professional and private lives. Examples include abilities to resolve complex tasks, to be open to alternative solutions or to show greater tolerance both to divergent opinions and to other people. Older people are often more flexible about time (once their children have grown up). They can feed-in experience specific to the job, thereby helping to optimise work and decision-making processes, and they are better positioned to assess their own capabilities and limitations (and those of their team). Also, older people often — at least in terms of their work — are more able to express themselves well.

Finally, there is a whole range of skills that remain constant over the years — as long as they are not subjected to extreme pressures and thus worn out before their time. These include all the skills needed to adapt to normal physical and mental requirements and to produce the performance needed during a day at work (concentration, application of acquired knowledge, verbal skills, etc.) [216].

In addition to innate factors and personal lifestyle, a major role in the respective development of these characteristics is played by work-related influences during the individual's past working life. This implies that generalised statements about 'older people' or 'younger people' cannot be made [200].

Many studies have explored the relationship between age and the number of occupational accidents. The results are inconsistent. In some studies the number of accidents increases with age, whereas in other studies the number of accidents decreases [214][217][218]. The results for lost working days are inconsistent as well. In some cases the number of lost working days increases with age, whereas in other cases the number for older workers is as high as for younger workers [219][220]. Therefore, a general conclusion that 'ageing = higher risk of accidents' cannot be made. Nevertheless, in relation to the types of injury, the age groups could be distinguished from each other, for example [220]:

Older workers are especially at risk of injuries related to fast movements, overload, slips and falls.

- younger workers: cuts (legs and arms), falls, bumps against objects (cars, refuse bins), contact with dangerous substances;
- older workers: injuries of the back and neck (due to fast movements or extreme overload), injuries of the knees and the legs (due to slips and falls).

4.5.3. Groups of older workers most at risk

The age structure of sectors indicates how many elderly people are working in a sector and how many have left prematurely (e.g. for health reasons). The differences between the Member States of the European Union are strong. Numerous reports by the EC and OECD have this documented [200][215][221][222][223][224][225].

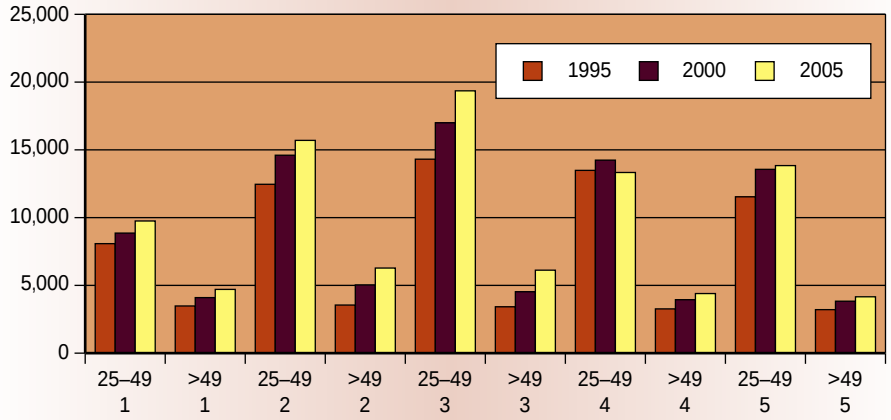
Figures 9 and 10 list different occupations (based on the International Standard Classification of Occupations (ISCO)) for different age groups (25 to 49 years and

more than 49 years) in the years 1995, 2000 and 2005 (EU-15) [200][202]. In general, the number of employees increases from 1995 to 2005 for both age groups. One exception is the decrease in skilled agricultural and fishery workers (both age groups). From all workers aged between 25 and more than 49 years in all sectors (22.8 %) 34 % were older than 49 years (2005). Exceptions are occupations that fall in the categories 'armed forces' and 'agriculture and fishery'. In 2005, only 9.3 % of all workers in the category 'armed forces' were older than 49 years. In contrast, in 2005, 43.9 % of all skilled agricultural and fishery workers were older than 49 years. In order to avoid any misleading interpretations, this chart has to be seen as a general overview.

Bakery. Labour Inspection, Austria.

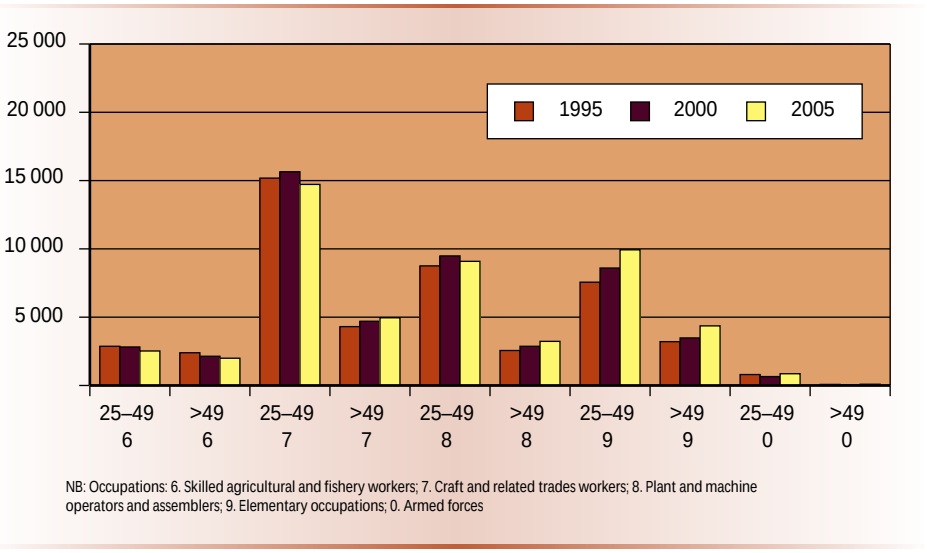
Each profession has its own work environment and working conditions. Physical and psychosocial factors, such as heavy physical work, hot and cold work, job demands and level of control, role conflicts, job satisfaction and opportunities to develop, influence work performance and work ability [226][227][228]. Thus, general conclusions about the performance of ageing workers cannot be drawn owing to the differences in their work environments and working conditions, and the individual differences concerning decreasing and increasing abilities due to the process of ageing.

Figure 9: Employment (1 000s) by age groups and occupations (EU-15) [202]



NB: Occupations: 1. Legislators, senior officials and managers; 2. Professionals; 3. Technicians and associate professionals; 4. Clerks; 5. Service workers and shop and market sales workers

Figure 10: Employment (1 000s) by age groups and occupations (EU-15) [202]



NB: Occupations: 6. Skilled agricultural and fishery workers; 7. Craft and related trades workers; 8. Plant and machine operators and assemblers; 9. Elementary occupations; 0. Armed forces

4.5.4. Age management

Age management in a company should be part of the general management.

OSH management and age management should be part of the general management. The prevention of harm to ageing workers is best achieved when health and safety policies and practices are applied holistically, particularly in the integration of occupational safety and health and human resources policies [9].

In many cases, ageing relates to OSH and could therefore be tackled in the same way, with the same information and the same structure as OSH. The primary objective must be to re-establish a situation in which the vast majority of older employees are enabled to remain at work until they reach the statutory retirement age. The effort that this involves must be undertaken in the world of work by companies [203][229][230][231][232].

Ageing worker

As a consequence, more attention should be paid to the circumstances in which people work (e.g. via risk assessment in relation to the European framework directive (89/391/EEC)), because they exercise a crucial influence on whether employees' productive job performance, and thus their ability to undertake a variety of tasks, is conserved well into old age. Work conditions also determine whether the qualifications of older workers are adapted in line with new requirements, whether they are fostered, and whether the development of compensatory mechanisms to balance out potential age-related changes is supported by such work arrangements.

The most important options generally available to companies regarding the management of ageing workforces include:

- age-appropriate job design and preventive occupational health measures which will enable workers to remain in their jobs right up to retirement age;
- ergonomic workplace design;
- fostering healthy work processes;
- job enrichment by changing types, contents and methods of work, and mixing tasks;
- reducing time pressure;
- introducing flexible working-time models.
- Ensure ongoing updating of the knowledge base by implementing lifelong learning in companies. Qualification processes at the workplace ensure the maintenance of older employees' performance. Nevertheless, older people are still under-represented in vocational training measures. This is not only due to companies' cost–benefit analyses of investments in training; older workers also have to be motivated to show willingness to continue training.
- Avoid lopsided specialisation and, in contrast, systematically promote the development of a range of competences and flexibility by ensuring that people carry out a variety of tasks and are subject to changing work demands throughout their company careers.
- Support the intergenerational transfer of know-how in companies and systematically use the complementary, age-specific skills of younger and older workers by setting up mixed-age teams.

Working conditions should enable employees to remain at work until they achieve retirement age.

Although quite general, these remarks give a first overview on basic approaches in relation to age management. Detailed recommendations depend on the circumstances in the enterprise. Risk assessment should be the first step in developing age-appropriate OSH management.

Risk assessment should be the first step in developing age-appropriate OSH management.

On an individual level, regular exercise could be introduced to improve ageing workers' physical abilities [220]. In order to maintain productivity, four mechanisms on a personal level exist to cope with changes due to ageing [220]:

- compensation (compensate for losses in other tasks),
- accommodation (reduce deficiencies if the nature of work changes),
- elimination (reduce certain working styles while other skills develop),
- compilation (cope with skills in order to stabilise productivity).

These individual and organisational development measures are also essential in order to secure the innovative ability of companies operating with ageing workforces. Innovative ability is not age-determined but is an expression of the work settings encountered during employees' working lives. There are numerous examples which demonstrate that companies operating in markets characterised by a dynamic knowledge base and rapid pace of innovative change can also be highly successful even if they mainly employ older workers. Several of Germany's traditional branches of industry, such as the machine tools sector, owe a large part of their international success to their experience-based 'innovative milieu', which is based on cooperation and exchanges between older experienced developers and new recruits [209][215][216][233].

An increasingly older population of working age threatens to collide with a world of work which demands patterns of behaviour tailored to younger age groups. For this reason, the employment problems confronting older workers are likely to intensify unless counteractive measures are taken in good time and efforts made to implement age-appropriate human resources and work-related policies.

4.5.5. Examples of good practice

In different countries, laws, regulations and standards for many occupations exist at a national level. The following example outlines factors for age-appropriate workplace design in relation to office work [234]. Although a generic guide is a useful tool, workers are experts in their work environment and should therefore take part in the workplace design.

Generally, in offices the factors that play a major role in relation to OSH are ergonomics, indoor climate, lighting and psychosocial aspects. In some cases (e.g. offices in old buildings), factors such as electrical and biological hazards and dangerous substances also have to be considered. Additionally, high autonomy in work organisation, working time, breaks and working speed increases the satisfaction and motivation of the employee.

Ageing management should include short, medium and long-term planning horizons.

Concerning some of these factors, the following recommendations in relation to ageing are given:

- *indoor climate:* temperature 24°C rather than 20°C, humidity 70 % rather than 30 %, air speed < 0.1 metre per second,
- *lighting:* 500 LUX at workstations, in open-plan offices 750 to 1 000 LUX, 50 % (40 to 55 years) up to 100 % (> 55 years) additional lighting in relation to age.

Regarding all occupations, there are a variety of options available to companies that enable them to respond in good time to demographic developments and OSH risks linked to ageing. These options can be broken down into short, medium and long-term planning horizons [225].

Furthermore, different actors such as employers, employees, people responsible for occupational safety and health (e.g. external services), labour inspectorates and accident insurance companies should cooperate [217]. Risk assessment is one possible method to evaluate the circumstances at the workplace [217][220].

Short-term action

- Analyse the age structure of workforces in enterprises and particular areas of work, with the aim of identifying any disequilibrium in age distribution and problems which this may engender.
- Initiate intergenerational collaboration and introduce tandem training, enabling companies to ensure that the experience and know-how of retiring employees are transferred to their successors in good time.
- Modify and extend recruitment and personnel development strategies to 'new' groups such as women or the older unemployed.

Medium-term action

- Counteract prejudices about the job performance of older employees and use the experience of older workers in innovative projects.
- Provide ageing employees with development perspectives (e.g. by developing age-appropriate, career management geared to each phase of working life and providing flexible routes into final retirement).
- Establish mixed-age teams which guarantee that knowledge and experience are transferred and the complementary strengths of younger and older workers are utilised.

Long-term action

- Boost the status of skill careers alongside hierarchical careers, fostering people's ability to adapt and learn by switching personnel between tasks and positions.
- Foster lifelong competence development, activating middle-aged and older employees by providing continuing training and opportunities for taking on new activities.
- Redesign or avoid activities which can only be performed for a limited period of time, avoid longer-term repetitive stresses and strains on employees, and introduce measures which reduce or provide a break from arduous tasks.
- Establish balanced personnel and age structures in specific areas of work and throughout the company, with the aim of avoiding waves of recruitment and retirement.

The potential of employees should be maintained and expanded throughout a whole working career.

Given that demographic change cannot be managed at the level of the individual enterprise alone, it is necessary for everyone involved in the work setting, the intermediary actors such as employers and trades union organisations as well as political institutions, to be sensitised to these developments and spurred into action. Companies must be monitored and supported as they implement the changes to their work and personnel policies outlined here. It will be possible to support the activities taken by companies only if the intermediary actors and political institutions referred to are able to reach a consensus on how to jointly promote the development of a broad, consistent course of action.

4.5.6. Conclusions

The prevention of OSH problems among older workers should follow a dual strategy. On the one hand, the employment and work conditions should be designed such that, as far as possible, no impairment of performance arises with age. On the other hand, the performance potential of employees should be maintained and expanded throughout a working career. To summarise, this would mean promoting the health as well as the qualifications and motivation of working individuals, from their appointment to their retirement from working life. This would also mean a complete turnaround of the corporate, age-related practice to date, where there is a reaction only when any performance problems of older employees become evident.

Two types of measure are needed to overcome the age-critical problems of work requirements:

- problem-preventive (active) measures
- problem-reducing (passive) measures.

Problem-preventive measures prevent the occurrence of problems or directly address the possible causes of the problem. Problem-reducing measures, on the other hand, can be resorted to as a reaction when the causes of age-critical working conditions (e.g. the introduction of new technology or for economic reasons) cannot be avoided. An indispensable prerequisite when using problem-preventive or avoidance measures is implementation at the right time and should, as a rule, be taken into consideration when decisions are made on investments and their implementation. Both measures are considered less costly than the phenomenon and ensuing problems occurring in the company through age instability (fluctuation, sickness rates and restrictions in achievement), which then require problem-reducing measures.

4.6. Violence and bullying

4.6.1. Introduction and definitions

The problem of workplace violence has created special social interest over the past few years.

The problem of workplace violence has created special interest over the past few years. This preoccupation has increased the study of these phenomena, which has resulted in many scientific publications related to this issue. Also, the social preoccupation has increased and different political and labour institutions, on a national and international level, have pronounced, through different documents, their concern on violence at workplaces (e.g. the European Parliament [235], the International Labour Organisation (ILO) [236], and the European Foundation for the Improvement of Living and Working Conditions [237]). Violence and bullying were also covered by the 2002 European Agency campaign on psychosocial issues [238].

The concept of violence at work is extensive and complex, which is why it has numerous definitions. The ILO [236] defines violence as 'any action, incident or behaviour that departs from reasonable conduct in which a person is assaulted, threatened, harmed, injured in the course of, or as a direct result of, his or her work'. The World Health Organisation (WHO) definition of workplace violence is: 'The intentional use of power, threatened or actual, against another person or against a group, in work-related circumstances, that either results in or has a high degree of likelihood of resulting in injury, death, psychological harm, bad development, or deprivation' [239]. The European Commission defines workplace violence as: 'Incidents where staff is abused, threatened or assaulted in circumstances related to their work, including commuting to and from work, involving an explicit or implicit challenge to their safety, well-being or health' [240].

4.6.2. Forms of violence at work

Violence can adopt diverse forms, all of them with detrimental effects to the health and well-being of the victim [241]. Violence can be internal workplace violence (takes place between workers, including managers and supervisors) and external workplace violence (take place between workers, managers or supervisors and any other person present at the workplace). In the 'Survey of workplace violence prevention' carried out in the USA [242], violence at work was classified as: 'criminal' when the perpetrator had no 'business' relationship with a given workplace or workers (e.g. robbery); 'customer or client' when the perpetrator was violent while being served by workers; 'co-worker' when the perpetrator was an employee (or past employee) of a given company; and 'domestic violence' when perpetrator had no 'business' relationship with a given workplace but had a personal relationship with the person employed there (e.g. family member).

Violent behaviour

Violence at work can also be distinguished as psychological violence as well as physical violence. As far as psychological violence is concerned, according to the country, cultural or geographical area, different terms such as 'mobbing', 'bullying' or 'harassment' are used to refer to the same problem. In the past, some researchers have made a distinction between those concepts but nowadays the original distinction is giving way to a conceptual assimilation of these terms [243]. This assimilation relates mainly to the notions 'bullying' and 'mobbing'. Accordingly, we will use the term 'bullying' when referring to this issue, unless the original term used by a given researcher was 'mobbing'. The notion 'harassment' is often used in the context of sex and sometimes gender and race as well. We can find different definitions and concepts of bullying proposed by researchers, but all of them point out that this phenomenon is related to repeated and prolonged conduct, usually against one person, but can also be, although not typical, against more than one person.

Leymann proposed [244] the first concept of mobbing: 'Psychological terror or mobbing in working life involves hostile and unethical communication which is directed in a systematic manner by one or more individuals, mainly toward one individual. Due to mobbing this individual is pushed into a helpless and defenceless position, and is held there by means of continuing mobbing activities. These actions occur on a frequent basis and over a long period of time'. The European Commission Advisory Committee on Safety, Hygiene and Health Protection at Work [245] states that 'Mobbing is a negative form of behaviour between colleagues or between hierarchical superiors and subordinate, whereby the person concerned is repeatedly humiliated and attacked directly or indirectly by one or more persons for the purpose and with the effect of alienating him or her'.

Another conceptualisation, of extensive outreach and impact, comes from Hirigoyen [246], who describes *le harcèlement moral* as 'an abusive conduct that is manifested through behaviour, words, actions, gestures or written words that can violate a person, their dignity or the psychic or physical integrity of a person, in order to put their job in danger or degrade the work environment'.

A person's dignity, professional capability, private life or physical and moral qualities can be subject to bullying.

Different aspects of a person can be the subject of bullying [247]: their dignity, professional capability, private life or physical and moral qualities. The types of behaviour that can be qualified as aggressive are so numerous that it is impossible to establish an exhaustive and closed list of them. Types of bullying behaviour include humiliation, verbal abuse, victimisation, exclusion, threats, insults, persistent negative attacks and deliberate sabotaging. It is worth mentioning that some authors consider bullying (mobbing) to be related to both psychological as well as physical violence, although they consider physical violence to be relatively rare [248]. Bullying is objectively damaging individual rights and is not desired by the offended person. Finally, such behaviours result in destruction, isolation of the victim, alienation and exclusion from the organisation.

Examples of harassment [243], when used in the context of sex, are deliberate, unsolicited and unnecessarily close physical contact, offensive phone calls, letters or e-mail messages, offensive language, and repeated sexually oriented comments or gestures, jokes or propositions.

Physical violence is related to the use or threat of the use of force against other persons.

Physical violence is characterised by the use or threat of the use of force against other persons. Examples of physical violence [249][250] are robbery, physical attacks, kicking, biting, rude gestures, aggressive posturing, hostile behaviour and shouting.

4.6.3. Workplaces and workers' groups most at risk

Bullying can appear in all types of occupation, but especially affects the service sector.

The figures presented by researchers on the magnitude of bullying and physical violence can be quite different, as they reflect issues of reporting and cultural differences.

In general, these problems affect all types of occupation and activity sector [70], although the prevalence is higher in the service sector [70][251]. The great variations in the figures is explained by, for example, different definitions of the concepts used, different methodologies, the level of awareness of the population of reference, and the information collection systems [70][252]. All of this means that, although the quantity of data and information on the phenomenon has increased considerably in the past few years, data are not always directly comparable. Nevertheless, there are some studies based on investigations with comparable methodologies [243].

Some occupations are especially at risk of physical violence.

Different sources [243][249][253] show a series of people in occupations that are especially affected by the risk of physical violence (mainly external physical violence), such as police officers, prison workers, security personnel, social workers, hotel and catering employees, healthcare workers (specifically nurses and clinic personnel), public transport drivers and taxi drivers, teachers and training workers, shop workers and assistants, especially in those in the retail sector.

As far as the prevalence of bullying is concerned, occupations and sectors are not such significant factors. However, service and sales workers are somewhat more vulnerable than workers from other occupations [254]. These differences are quite common among all countries where bullying has been studied [237].

The data on violence and bullying at European workplaces are periodically obtained from the European working conditions survey (carried out by the European Foundation for the Improvement of Living and Working Conditions). The *Third European survey on working conditions — 2000* [70] revealed that, generally (in the EU-15), incidence rates of physical violence and bullying have increased in the past few years. However, it is difficult to assess the actual level of this increase due to the simultaneous rise in the awareness of these issues. In particular, it has been stated that:

Young women are especially at risk of bullying and sexual harassment.

- women more than men suffered from all forms of violence (physical violence 7 % of the female and 5 % of the male workers; bullying 11 % of the female and 9 % of the male workers; and sexual harassment 4 % of the female and 1 % of the male workers);
- bullying was mostly found in services: it was reported by 14 % of workers from the education and health sector, public administration and defence sector, and hotels and restaurants sector, as well as by 12 % of workers from the transport and communications sector and 9 % of workers from the wholesale and retail trade sector;
- about 4 % of all workers were the subject of external physical violence (violence coming from outside the workplace) and 1.5 % of all workers were the subject of physical violence stemming from colleagues;
- physical violence was experienced most in the education and health sector (11 % of employees), followed by the public administration and defence sector (9 %) and hotels and restaurants sector (7 %).

For the acceding and candidate countries (now the 12 new Member States), the European working conditions survey (2001), stated that [255]:

- there were roughly similar proportions between the EU and the acceding and candidate countries for the prevalence of the various forms of violence at workplaces, although, unlike in the EU, violence and bullying affected slightly more men than women there;

- physical violence (external) particularly affected employees from the public administration and defence sector (9 %), the hotels and restaurants sector (8 %) and, to a lesser extent, from the real estate sector (5 %);
- bullying was experienced mostly by workers from hotels and restaurants (12 %), public administration and defence (11 %), transport (10 %) and mining (9 %).

Results of the *Fourth European working conditions survey* [13], which was carried out in 2005 and covers all EU-27 countries, are similar. Generally, about 5 to 6 % of all workers declared being subjected to some form of violence, bullying or harassment. In comparison with the period 1995–2005, the level of violence has increased slightly in the EU-15 (from 4 % to 6 %). In all European countries, women, especially young women, were more often than men the subject of bullying and harassment (except physical violence from other people, which was experienced slightly more often by men).

The level of physical violence and bullying has increased in the past few years.

Moreover, there are migrant workers who are also especially at risk of bullying [34]. A UK study (cited in the *Literature study on migrant workers* [34]) indicated that 10 % of nurses generally, and about 40 % of ethnic minority nurses, experienced racial harassment by work colleagues, and 20 % of nurses generally, and over 60 % of ethnic minority nurses, were subjected to racial abuse by patients.

Violence at work, or threats of violence, was more prevalent in north European countries as well as in the Netherlands and the United Kingdom (about 10 to 12 % of workers were threatened with physical violence). Similarly, bullying or harassment appeared most often in Finland (17 %) or the Netherlands (12 %) than, for example, in Italy or Bulgaria (2 %). These differences, as was mentioned earlier, can be related to the level of exposure to this kind of risk as well as to the level of awareness about these issues in different European countries.

4.6.4. Causes of risk

Workplace violence and bullying have very complex, multi-factorial causes, and it is therefore difficult to draw a simple picture of why they occur. However, the different studies show certain consensus when identifying a series of variables or risk factors.

As far as bullying is concerned, some studies have been focused on the identification of organisational factors that act as favourable conditions for this phenomenon, such as organisational culture which can maintain bullying behaviour. The studies indicated that bullying was also related to [243][244][248][256][257][258][259]:

Organisational and personal factors can contribute to the appearance of bullying.

- a negative work environment, for example highly competitive and stressful job, monotonous job, low level of control at work, role conflict or ambiguity, existence of multiple hierarchies, and excessive workload;
- poor or inadequate management of conflicts, for example conflict management policies are not actually used at the work floor, or denial of the existence of conflicts;
- laissez-faire leadership style (abdication of leadership) and the authoritarian leadership style;
- organisational changes, for example technological and structure changes or changes in organisation ownership.

Additionally, specialists indicated that bullying is also associated with individual factors of the perpetrators as well as their victims. The aggressors are often characterised by such personality traits as a high level of aggressiveness, impulsiveness, high or unstable self-esteem, competitiveness or lack of insight into their own behaviour. The psychological traits of the victims were related to low self-esteem, high anxiety level, neuroticism, submissiveness, conscientiousness and introversion [243].

Type of job, organisational aspects, and features of offender contribute to physical violence.

In relation to physical violence, the following risk factors have been identified [236][237][241][260][261]:

- type of job, for example jobs with regular exchange of money, jobs that are carried out in unsafe places and where the services are offered directly to the public, one-person jobs or jobs in small groups, monotonous and repetitive jobs, working at night, or working with people in distress (as is the case for social workers and probation officers);
- organisational aspects, for example situations of reorganisation and organisational restructuring (e.g. downsizing), lack of concern about workers' problems, chronic conflicts at the workplace, perception of injustice, inefficient internal procedures concerning workers' complaints or inadequate training;
- features of the offender, for example difficulties in coping with stress, psychological or emotional instability (e.g. proneness to rage), drug or alcohol abuse, frustration (e.g. dissatisfied clients), serious personality disorders, and easy access to weapons.

Some authors [258] distinguish three groups of factors related to the appearance of violence and bullying: (a) enabling structures or necessary antecedents (e.g. perceived power imbalances, dissatisfaction, and frustration); (b) motivating structures or incentives (e.g. internal competition and reward systems); and (c) precipitating processes or triggering circumstances (e.g. organisational changes, downsizing and restructuring).

4.6.5. Safety and health outcomes

Exposure to any form of violence or bullying at work has negative implications for individuals, organisations and society as a whole [262]. As individuals differ in their perception of events and their ability to cope with the situation, effects of violence and bullying vary between individuals [243].

Violence and bullying can result in somatic pathologies and serious problems with mental health.

Stress affects physical and mental health.
© A.S.B.L. Institut pour la prévention, la protection et le bien-être au travail (Prevent), Belgium

Violence and bullying are important sources of stress [243][251][263], and thus negatively affect physical and mental health. The somatic pathologies such as organic, functional and sleep disorders, alterations in the cortisol cycle [264][265], loss of appetite, hypertension, vomiting [266], chronic fatigue, back, muscular and joint pain and headaches can appear [247]. In the specific case of exposure to physical violence, some investigations show that over 40 % of assaults at work resulted in some type of actual injury to the victim, although for most the injury was relatively minor [249].

As far as mental health is concerned, post-traumatic stress disorder (PTSD) [267][262], deterioration of self-esteem [267], anxiety, depression, apathy, irritability, memory disorders [247], fear, and distrust can be observed. In the case of bullying, depending on length and magnitude, paranoia disorders and even suicide can appear [243][244]. Additionally, some

authors establish, in relation to the social and family area, that victims create relationships with their surroundings, based on susceptibility, hypersensibility to criticism, isolation conduct, hostility and social failure to adapt [262]. Deterioration of relationships, and obsessive behaviour are also observed [244]. At work, it generates strong dissatisfaction, lack of motivation and commitment as well as low efficiency [243][262].

Piñuel [247] investigated mobbing in a representative sample of public servants in Spain. The study has shown that 76 % of mobbing victims suffered from apathy and lack of initiative, 74 % from depression, 73 % from back pain, and 72 % from problems with concentration. The most frequent symptoms referred to by mobbing victims are shown in Table 4. These figures were statistically significant when compared to people who had not been the victims of mobbing.

Table 4: Health problems referred to by mobbing victims [247]

Symptoms	Percentage of mobbing victims that referred to this symptom
Apathy, lack of initiative	76
Depression	74
Back pain	73
Problems with concentration	72
Muscular and joint pain	71
Irritability	70
Insecurity	68
Waking up early	65
Interrupted, light dreams	64
Difficulties in falling asleep	63
Problems with memory	55
Chronic fatigue	53.5
Migraine	51.5

Generally, the greater the frequency and the more serious the form of violence, the more severe the effect would be [243]. A UK study shows that the level of repeat victimisation for violence at work was higher than for violence not at work, and states that 28 % of victims at work experienced three or more incidents [249]. Some negative effects seem to extend to witnesses of the situations of violence as well, where a climate of fear produces similar negative effects as being personally assaulted or attacked [243][262]. Some studies report that observers of bullying have similar high stress levels to those being bullied [263].

Few studies have explored the effects of violence and bullying on the organisation, but it seems that they lead to reduced productivity, increased sickness, absenteeism and turnover rates, as well as replacement and additional retirement costs [243][262]. More studies in this field are needed.

4.6.6. Possible prevention measures

There is agreement that there are no simple solutions or unique and general principles to tackle violence and bullying in the workplace [243]. The recommendation is to develop written policies and procedures (with codes of conduct), implement preventive measures, ensure that workers participate in identifying risks [250][262],

and develop measures to ensure that workers' complaints related to violence and bullying are treated seriously [260].

An anti-bullying policy should be developed and spread in a company.

As far as bullying is concerned, the recommendation is to develop and spread a written policy which should strengthen the moral criteria of the organisation ('zero tolerance' for violence) and define unacceptable conduct in the organisation [236] [262]. The anti-bullying prevention measures also include [262]:

- avoiding deficiencies of the design of the job (e.g. adequacy of workers' workload, demands and control, elimination of ambiguity and role conflict);
- maintaining good quality leadership and management systems (e.g. recognition of conflicts and handling them adequately, managing information well, and implementing systems for motivation); and
- good management of discrepancies, complaints and conflicts (e.g. develop formal procedures for complaints and guarantee anonymity).

Such measures can be implemented in many different ways: by establishing new legislation, developing new procedures, formulating codes of conduct, 'collective agreements' or realisation of good practices [243][268][269][270].

With regard to physical violence, the specific methods, preventive as well as reactive, that can be adopted depend on the type of establishment or organisation, the type of product or service offered, and the type and intensity of violence that is most likely to occur. This requires an adequate evaluation and description of the risk of violence [268].

Preventive measures should be aimed at decreasing the level of risk — eliminating the situations that can lead to violence and reducing the possibility of damage or injury. Within these can be adopted measures that refer to [250][252][260][261][268][269][271]:

- the work environment and design of workspaces (e.g. installation of special barriers and counters or entry controls and screens for monitoring the workplace);
- work procedures (e.g. safety procedures, modification of work routes, avoiding working alone, adequacy of staff, or limiting public access); and
- safety systems (e.g. equipment specially designed to prevent or detain violence, such as alarms and video surveillance systems or emergency communications systems).

Reactive measures refer to those designated to managing violent incidents once they have occurred. The literature suggests that [241][261][272] the following measures should be taken.

- In the first place, the level of risk for the persons and surroundings has to be reduced (e.g. establish crisis management teams and contact with the police and emergency services).
- In the second place, the physical and psychological well-being of those involved should be stabilised by giving a short-term, initial response. For this, offering professional support and legal advice to workers and their families is recommended. Longer-term support may also be necessary.
- In the third place, investigation of the given fact should be conducted to avoid repetition of such an incident in the future.

Workers should know how to anticipate and handle violence during and after violent events.

Proper training of workers is also one of the most important elements for preventing and tackling violence in the workplace. All workers should know the ways of anticipating and handling violence during and after violent events.

4.6.7. Perspectives and future challenges

Specialists indicate that future research on violence and bullying should be focused on the following issues [260][261][262][272][273].

- The term 'violence' is used to describe different, specific forms of violence. To improve the comprehension of this phenomenon, clear differentiation between different types of violence and anti-social conduct should be made.
- There is a lack of reliable tools for the assessment of violence and bullying. Development of adequate assessment methods is necessary.
- Generally, there is a need for reliable epidemiological data, based on more rigorous studies that cover more activity sectors. Research should employ better methodologies, with more respondents per study and representative samples.
- More studies should be focused on the contextual antecedents of violence and bullying. It is necessary to develop global models that consider the role of the different organisational factors associated with violence and bullying. These models should be tested in the particular work environment.
- More descriptive information on the phenomenon must be provided. Longitudinal studies are necessary in order to correctly identify antecedents, long-term effects and the efficiency of interventions.
- The influence of violence and bullying on the private life and financial situation of the victims should be investigated.
- More studies are needed in the field of prevention, management and coping with violence and bullying.
- More research is needed on the medical and physiological consequences of bullying.
- More information is needed regarding possible intervention and rehabilitation programmes and the benefits and costs associated with different strategies.

5.

FURTHER RISKS MENTIONED IN THE EXPERT FORECAST

This chapter of the report sets out to present all the items identified in the survey in addition to the main risks presented in Chapter 3 — i.e. the risks agreed to be emerging ($3.25 < MV \leq 4$), the items upon which the respondents were undecided ($2.75 \leq MV \leq 3.25$), and the items not agreed as emerging risks ($2 \leq MV < 2.75$) — in the light of the comments provided by the experts. All mean values and standard deviations are available in Annex 1.

Risks agreed to be emerging ($3.25 < MV \leq 4$)

The items older workers (MV = 3.94), violence and bullying (MV = 3.44) and problems reconciling family and working life (MV = 3.80) are dealt with in Chapter 3 as they are directly related to some of the 10 main emerging risks and are therefore not presented in this chapter.

Some experts indicate that high levels of unemployment (MV = 3.81) pose a risk to the active workforce in terms of health and safety. Indeed, workers fear to lose their jobs and to then have difficulties re-entering the labour market, which presents a risk of marginalisation. There is growing concern about the negative effects this may have on workers' health and well-being, such as stress. The experts also point out the risk that, in the context of high unemployment, people might be more likely to accept poor-quality, low-level jobs. According to the experts, one of the factors contributing to unemployment is companies' need to reduce their costs, which they increasingly tend to do by moving some workplaces to low-cost countries. The difficulty in re-integrating into the labour market, including the issue of employability, was also stressed in a separate item (MV = 3.63), with a special mention of disabled people: one expert commented that, in the context of high unemployment and costs reduction, disabled people are confronted with more problems of finding workplaces adapted to their specific conditions even in 'welfare states'.

In this context, the lack of proper future-oriented models or strategies for workers affected by downsizing (MV = 3.75) processes also contributes to the generation of stress for those who remain in the company and fear losing their job. This leads to subsequent negative effects on workers' health and safety. More particularly, one of the experts mentioned an increase in cardiovascular morbidity and mortality in workers as a result of stress related to downsizing.

The respondents point out that technological development, work intensification, changes in work organisation and in the structure of the workforce, as well as the reduction of the labour force result in changing contexts, new roles and skills (MV = 3.75). It is stressed that these changing contexts, and especially the emergence of virtual organisations (such as teleworking and mobile working), imply the need for workers' new skills as well as new styles of leadership. Some experts share the view that, in many cases, intensification of work is associated with poorer control by workers over their job and increased complexity of tasks. Moreover, the increase in temporary and flexible employment contracts may mean fewer training opportunities for workers, resulting in a higher mental and emotional demand linked to performing the job. Some experts think that this may particularly affect older workers, especially with regard to the introduction of new technologies. In a separate item, the respondents also emphasised that, in some cases, the increasing use of information and communication technology (ICT) at work and the new skills it requires may pose problems for workers with disabilities (MV = 3.31) — depending on the disability — who hence need special support to avoid being excluded from working life. Indeed, the poor matching of jobs to workers' skills leads to the feeling of being inadequate and to frustration, and hence affects workers' well-being and health.

According to the experts, intensification of work and high time pressure also have negative consequences on the social climate at the workplace, which was mentioned in relation with several items. According to some experts, a trend of general deterioration of psychosocial working conditions (MV = 3.63) has been observed in all sectors over the past 15 years. One of the causes identified is that intensification of work and high time pressure may lead to poor communication at work, and subsequently to a loss of ethical values and respect for colleagues. This, in turn, contributes to an increase in conflicts at work and to a negative psychosocial work environment, with subsequent negative impact on workers' health and well-being. One expert states that this specifically affects workers in outsourced companies.

Regarding the item deteriorating industrial relations and social dialogue (MV = 3.44), which was addressed in the survey at an organisational level, the experts commented that changes in work organisation, together with inappropriate leadership styles, lead to a loss of trust-based relationships amongst workers and to an increase in conflicts at work. This affects workers' well-being and health negatively. A separate, but almost identical item was industrial relations and dialogue (MV = 3.25). However, the respondents rated this item as 'undecided' and seemed to understand it in different ways. Some experts mentioned a possible lack of dialogue, which would impede companies' prosperity. Others associate this issue to the need for discussion on mental health problems caused by poor working conditions and stress at work. More generally, this is seen as a macro-factor strongly contributing to workers' vulnerability, generating inequalities towards OSH and bringing difficulties for trades unions.

Artist: Mariusz Napierała
Courtesy of the Occupational Safety Poster Competition organised by the Central Institute for Labour Protection – National Research Institute, Poland

Further related items are the increasing individuality in the workplace (MV = 3.31) and interpersonal conflicts and problems (MV = 3.31). The respondents see these items as a consequence of stronger competitiveness between workers — in the context of increasing job insecurity — which generates stress and leads to difficult interpersonal relationships. One further reason identified by the experts is the increase in video display unit (VDU) jobs and in telework, which means less work requiring direct contact with colleagues and therefore fewer social relationships at work. Consequences mentioned are feelings of isolation, lack of social support and, more generally, a poor psychosocial working environment. This, the experts say, may increase workers' vulnerability. According to the respondents, the ethical conflict at work (MV = 3.31) problem seems more particularly acute in the healthcare sector, where there is a lack of staff, as well as among supervisors and managers. Potential causes mentioned for ethical conflicts at work are inadequate criteria for career development, resulting in workers' strong dissatisfaction with the job and increased mental and emotional demand.

The lack of effectiveness of OSH management (MV = 3.56) is seen as a consequence of the pressure on the budget available for OSH and of the poor interest that companies' management often have in OSH issues. This is considered to result in less safe and healthy jobs and in emerging risks to workers.

The phenomenon of the increasing demand for mobility in the labour market (MV = 3.56) is also seen to contribute to the deterioration of the psychosocial work environment. In the context of globalisation, there is a growing number of migrant workers who may be confronted with the difficulty of acclimatising to a new working and cultural environment. At the same time, these workers also often lack social support. A feeling of isolation makes them more vulnerable to poor working conditions and also contributes to a poor psychosocial working environment. The issue of the difficult integration of workers from other cultural backgrounds was mentioned in two further items in the survey (integration of workers from other cultural backgrounds and workers from other cultures), with equal mean values (MV = 3.44). According to experts, their difficult integration is the result of local workers' poor knowledge of different cultures, resulting in prejudice also at the workplace. Some respondents add that migration has become an important dimension of the labour market and entails specific OSH risks for a group that faces particularly poor working conditions. With regard to prevention, other respondents state that better employment conditions and training opportunities for migrant workers, including language courses, are needed for their better integration. One expert advocates the need for an OSH monitoring system to register and study the specific working conditions and OSH outcomes of different groups of migrant workers.

Risks the experts were undecided upon ($2.75 \leq MV \leq 3.25$)

The introduction of new information and communication technologies (ICT) (MV = 3.20) in the workplace results in a continuous demand on workers to learn new skills. One expert emphasised that new technologies are not always adapted to workers or user-friendly. Closely related to this issue are the items risk of marginalisation due to inadequate education or training (MV = 3.13) and the poor matching of skills to the job (MV = 3.06). The constant, rapid changes in workplaces, together with an increasingly common role ambiguity, may create a fear in workers of being inapt to perform the work and to cope with demands. This may result in increased mental and emotional strains and in related health outcomes. Some respondents state that this issue may particularly affect older workers, as well as outsourced workers or temporary agency workers.

Low status of workers and low control of the job (MV = 3.19) were seen by some of the respondents as a risk resulting from increased subcontracting practices, as well as from more centralised leadership styles. It was added that low job control is often found to be related to various health impairments. Unfair decision-making or inappropriate leadership styles (MV = 3.19) is a similar issue that was also evaluated as 'undecided'.

Some experts reckoned that the trend towards inflexible working time arrangements (MV = 3.00) is increasing and related to the work intensification mentioned previously in the report. However, those respondents who rated this item as a non-emerging risk brought forward the fact that, on the contrary, working time arrangements have become more flexible as a consequence of increased types of work where workers are

expected to work in networks, which implies flexibility. Other respondents indicated that the approach concerning flexible or inflexible working time varies in the different sectors. In any case, inflexible working time arrangements create difficulties for workers in achieving a balance between working and non-working time and may engender work-related stress.

With regard to people with psychiatric complaints or backgrounds (MV = 3.19) and their integration (MV = 3.00) into the workplace, some experts commented that the number of workers with mental health disorders has increased and that their integration into the workplace is difficult. The reasons mentioned are a poor culture of integration of a diverse workforce, and a lack of proper integration models and projects, despite the (European) anti-discrimination legislation and OSH legislation that support the employment of people with disabilities. The poor cooperation between rehabilitation and occupational health services and employers was also mentioned. Some experts highlighted an increase in the number of early-retired workers due to depressive symptoms, which might be partly caused by work-related stress. A well-functioning OSH system should help to decrease the number of work-related psychiatric disorders.

The experts also expressed their concerns on the quality of OSH systems and services. The respondents who rated as emerging the items public or private occupational health systems controversy and competition (MV = 3.19), and OSH is one of the first issues to be cut in a recession or when firms try to gain competitiveness (MV = 2.87), put forward that this may result in companies outsourcing OSH to private organisations, which may offer OSH services at a low price but of low quality, below the legal requirements. Moreover, they warned against the reduced possibility of authorities to control the quality of these private OSH services. Additionally, they pointed out the fact that the tendency of some governments towards a 'de-regulation' of OSH may result in less importance attributed to workers' safety and health and, consequently, in an increase in occupational accidents and incidents. However, some experts reckoned that these phenomena are not general but sector-specific, and concern more particularly the service sector where the OSH-tradition — according to the respondents — is quite recent. One respondent mentioned that the new hazards at work create new challenges for the OSH community that may not be taken into account sufficiently.

Concerning the item increasing alcohol consumption, smoking and other drug abuse (MV = 2.94), some experts highlighted the associated negative effects on workers' health and the possible risk of marginalisation. The resulting social costs were also mentioned.

With regard to the gender issues and gender segregation (MV = 2.93), the experts who rated the item as an emerging risk pointed out the still male-dominated culture in the workplace and the poor opportunities for career development given to women, their lower salaries, and the lack of support provided to them for balancing work, home and family demands. One respondent stated that research on work-related health effects should be evaluated more from a gender perspective, since findings show differences in exposure depending on gender. This is in line with the conclusions of the Agency's report *Gender issues in safety and health at work — A review* [274].

Last, but not least, the experts were undecided whether younger workers (MV = 2.75) is an emerging risk and perceive the future opportunities for young workers differently. Some think that they have increasing difficulties in accessing employment and finding stable jobs, which leads to a lack of perspective and a feeling of job insecurity, resulting in stress — hence young workers' need for help in integrating into

working life, according to one respondent. Another respondent argued that, on the contrary, the possibilities for young workers to integrate into working life will increase in the future as a consequence of the ageing workforce.

Risks not considered as emerging (2 ≤ MV < 2.75)

Although deterioration of (specific) physical working conditions (MV = 2.31) had been mentioned as a potential emerging risk by one respondent in the first survey round, the item was not rated as such in the following steps of the forecast. However, in a similar forecast also carried out by the Topic Centre on Research — Work and Health (TCWH) and the Agency, experts in physical risks identified a number of emerging OSH risks linked to the physical working environment [275]

6.

CONCLUSIONS

Over recent decades significant changes have taken place in the world of work which have resulted in new challenges with regard to workers' occupational safety and health. These changes have also led — besides physical, biological and chemical risks — to emerging psychosocial risks, which are related to the way work is designed, organised and managed, as well as to the economic and social context of work.

The report deals with the results of an expert forecast on these emerging psychosocial occupational safety and health risks. All in all, the experts proposed 42 psychosocial risks, and rated eight of these risks as strongly emerging, 19 as emerging, 14 items as undecided, and one item as a non-emerging risk. To enhance the experts' opinions, additional literature studies were conducted.

The expert survey as well as the literature studies revealed that emerging psychosocial OSH risks for employees are often related to technical and organisational as well as to some socioeconomic, demographic and political changes, including the phenomenon of globalisation. The 10 top emerging risks identified by experts involved in the forecast can be categorised in the following five main topics.

New forms of employment contracts and job insecurity

To remain competitive in a situation of global competition, companies are becoming more and more flexible. Outsourcing or new forms of flexible employment such as part-time work, temporary work, telework and on-call work have emerged. These non-standard forms of employment are often related to job insecurity, as they mostly offer only low levels of income, low social protection, temporary employment and general low control over work life. Job insecurity and increased work-related stress due to precarious work negatively affect workers' health and safety. Additionally, workers in these types of contract are more vulnerable than permanent workers, as they usually carry out the most hazardous jobs, work in poorer conditions, and are the subject of less OSH training, which increases the risk of occupational accidents.

OSH risks for the ageing workforce

Owing to higher life expectancy and lower birthrates, as well as the fact that some countries have raised the retirement age to reduce bottlenecks in their social systems, a constant rise in the number of ageing workers can be observed. Ageing workers are more vulnerable to poor working conditions than young workers. Additionally, the failure to provide ageing workers with lifelong learning opportunities has increased the mental and emotional demands upon them, which may affect their health and increase the probability of work-related accidents. Working conditions and OSH measures have to be adapted to the needs of older workers to allow healthy and safe work during a prolonged working life. Protecting them against negative health effects still presents a challenge to organisations and societies.

Work intensification

Since the 1990s, work intensification has occurred in many European and other developed countries. Work intensification is directly linked to densification of work and a higher pace of work; thus it increases physical and/or mental charge. The development of stress and musculoskeletal diseases as well as an increase in accidents and injuries at work become more likely.

High emotional demands at work

In the new world of work, workers have to deal with high emotional demands at work. Moreover, workers may try to hide their difficulties in coping with these

demands as a reaction to the fear of losing their job, which can be the source of additional stress. Although the issue is not new, it is a growing concern, especially in the healthcare and service sector, which is growing and where competition is increasing. Violence and bullying also contribute to this increased emotional demand.

Poor work–life balance

Changes in work organisation, such as an increasing number of precarious employment contracts, work intensification, and higher requirements for flexibility and mobility from workers, may lead to greater pressure on workers and to a spillover into private life. Additionally, phenomena such as more women at work, single parents and households with 'dual careers', with less family support and, in some cases, with more dependant older relatives, result in more workers for whom a good work–life balance is especially important. Failure to achieve a decent work–life balance may lead to stress and other health consequences for workers.

The identification of emerging risks by the European Risk Observatory is aimed at early anticipation in order to prevent any possible negative effects of these risks on workers' safety and health. This way, the targeting of resources as well as interventions and strategies to tackle future risks can be better and more timely planned and enhanced in effectiveness.

The results of the expert survey on emerging psychosocial risks, as well as the results of the forecasts on physical, chemical and biological risks carried out by the European Risk Observatory, are based on scientific expertise and should be seen as a basis for discussion among stakeholders to set priorities for further research and for action. The European Agency for Safety and Health at Work took the first step in this direction in organising the 'Promoting OSH research in the EU' seminar (Bilbao, 1 and 2 December 2005), where the results of the four forecasts as well as the Agency's report *Priorities for occupational safety and health research in the EU25* [276] were discussed by representatives from major European OSH research institutes and from UNICE, the ILO, the Research DG and the Employment, Social Affairs and Equal Opportunities DG.

During this seminar, the participants reached consensus on the top OSH research priorities [277]. As far as psychosocial issues are concerned, the following research topics were emphasised:

(i) creating a positive work environment to prevent the occurrence of psychosocial issues;

(ii) psychosocial risk associated with organisational changes, and the understanding of the underlying causes of health-related outcomes that may be related to them, such as cardiovascular disease;

(iii) interaction of psychosocial risk factors and musculoskeletal disorders.

These priorities strongly support the findings of the Delphi survey and the research needs highlighted by both the experts and the literature reviews presented in this report.

One aim of this list is to draw policymakers' attention to the priorities for OSH research and to promote these issues as possible subjects of the seventh research framework programme (FP7). The European Commission supported the identified priorities and launched a call for proposals, under FP6, on work-related stress together with physical and psychological violence soon after the seminar.

As a next step, the Agency will organise a further workshop specifically dedicated to psychosocial risks in the workplace and bring together high-level representatives from the OSH community — and possibly from further disciplines concerned with the issue — as well as policymakers and social partners. The aim of the workshop will be to consolidate the expert forecast and explore concrete ways to tackle the psychosocial emerging risks identified in this forecast, as well as to stimulate EU research networking activities related to the priorities identified.

As the world of work is constantly changing, a feasibility study for a future large-scale forecast is currently being undertaken, building on the experience gained through these four Delphi surveys. The forecast should enable the long-term follow-up of the constant technical and societal evolution and provide a continuously up-to-date forecast on emerging OSH risks.

All results from the European Risk Observatory are available on a dedicated website ([11]), accessible from the website of the European Agency for Safety and Health at Work ([12]).

([11]) http://riskobservatory.osha.europa.eu

([12]) http://osha.europa.eu/OSHA

2

ANNEXES

Annex 1 Quantitative results of the second and third rounds

1. Risks strongly agreed to be emerging (MV > 4)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Unstable labour market, precarious contracts, etc.	n = 20 Mean = 4.25 SD .72 Agree (n = 17, 85 %) Undecided (n = 3) Disagree (n = 0)	n = 16 Mean = 4.56 SD .51 Agree (n = 16, 100 %) Undecided (n = 0) Disagree (n = 0)
2. Globalisation	n = 20 Mean = 4.15 SD .99 Agree (n = 16, 80 %) Undecided (n = 2) Disagree (n = 2)	n = 16 Mean = 4.38 SD .72 Agree (n = 14, 88 %) Undecided (n = 2) Disagree (n = 0)
3. New forms of employment, contracting practices	n = 20 Mean = 4.25 SD .85 Agree (n = 15, 75 %) Undecided (n = 5) Disagree (n = 0)	n = 16 Mean = 4.25 SD .68 Agree (n = 14, 88 %) Undecided (n = 2) Disagree (n = 0)
4. Job insecurity	n = 19 Mean = 4.05 SD1 .08 Agree (n = 14, 70 %) Undecided (n = 4) Disagree (n = 1)	n = 16 Mean = 4.25 SD .77 Agree (n = 15, 94 %) Undecided (n = 0) Disagree (n = 1)
5. The ageing workforce	n = 20 Mean = 4.20 SD .89 Agree (n = 16, 80 %) Undecided (n = 3) Disagree (n = 1)	n = 16 Mean = 4.19 SD .54 Agree (n = 15, 94 %) Undecided (n = 1) Disagree (n = 0)
6. Long working hours	n = 20 Mean = 4.10 SD .79 Agree (n = 15, 75 %) Undecided (n = 5) Disagree (n = 0)	n = 16 Mean = 4.13 SD .62 Agree (n = 14, 88 %) Undecided (n = 2) Disagree (n = 0)
7. Intensification of work, high workload/work pressure	n = 20 Mean = 4.25 SD .79 Agree (n = 16, 80 %) Undecided (n = 4) Disagree (n = 0)	n = 15 Mean = 4.07 SD1 .03 Agree (n = 13, 87 %) Undecided (n = 1) Disagree (n = 1)
8. Lean production/outsourcing	n = 20 Mean = 4.20 SD .70 Agree (n = 17, 85 %) Undecided (n = 3) Disagree (n = 0)	n = 16 Mean = 4.06 SD .68 Agree (n = 13, 81 %) Undecided (n = 3) Disagree (n = 0)

2. Risks agreed to be emerging (3.25 < MV ≤ 4)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Emotional demands/hiding emotional demands	n = 20 Mean = 3.90 SD .72 Agree (n = 14, 70 %) Undecided (n = 6) Disagree (n = 0)	n = 16 Mean = 4.00 SD .52 Agree (n = 14, 88 %) Undecided (n = 2) Disagree (n = 0)
2. Poor work–life balance	n = 20 Mean = 4.05 SD .83 Agree (n = 16, 80 %) Undecided (n = 3) Disagree (n = 1)	n = 16 Mean = 4.00 SD .73 Agree (n = 12, 75 %) Undecided (n = 4) Disagree (n = 0)
3. Older workers	n = 20 Mean = 4.05 SD .69 Agree (n = 16, 80 %) Undecided (n = 4) Disagree (n = 0)	n = 16 Mean = 3.94 SD .68 Agree (n = 12, 75 %) Undecided (n = 4) Disagree (n = 0)
4. Unemployment	n = 20 Mean = 3.95 SD .76 Agree (n = 14, 70 %) Undecided (n = 6) Disagree (n = 0)	n = 16 Mean = 3.81 SD .66 Agree (n = 11, 69 %) Undecided (n = 5) Disagree (n = 0)
5. Problems reconciling family and working life	n = 20 Mean = 4.05 SD .76 Agree (n = 15, 75 %) Undecided (n = 5) Disagree (n = 0)	n = 15 Mean = 3.80 SD .56 Agree (n = 11, 73 %) Undecided (n = 4) Disagree (n = 0)
6. Changing contexts, new roles, skills, etc.	n = 18 Mean = 4.00 SD .69 Agree (n = 14, 78 %) Undecided (n = 4) Disagree (n = 0)	n = 16 Mean = 3.75 SD .68 Agree (n = 10, 63 %) Undecided (n = 6) Disagree (n = 0)
7. Downsizing	n = 20 Mean = 3.85 SD1 .09 Agree (n = 14, 70 %) Undecided (n = 4) Disagree (n = 2)	n = 16 Mean = 3.75 SD .68 Agree (n = 10, 63 %) Undecided (n = 6) Disagree (n = 0)
8. General deterioration of psychosocial working conditions	n = 20 Mean = 3.75 SD .79 Agree (n = 13, 65 %) Undecided (n = 6) Disagree (n = 1)	n = 16 Mean = 3.63 SD .62 Agree (n = 11, 69 %) Undecided (n = 4) Disagree (n = 1)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
9. Difficulty in reintegrating into the labour market/employability	n = 20 Mean = 3.75 SD .64 Agree (n = 15, 75 %) Undecided (n = 4) Disagree (n = 1)	n = 16 Mean = 3.63 SD .96 Agree (n = 10, 63 %) Undecided (n = 5) Disagree (n = 1)
10. Increasing demand for mobility in the labour market	n = 20 Mean = 3.85 SD .75 Agree (n = 13, 65 %) Undecided (n = 7) Disagree (n = 0)	n = 16 Mean = 3.56 SD .73 Agree (n = 11, 69 %) Undecided (n = 3) Disagree (n = 2)
11. OSH management lacks effectiveness	n = 19 Mean = 3.53 SD1 .07 Agree (n = 10, 53 %) Undecided (n = 5) Disagree (n = 4)	n = 16 Mean = 3.56 SD .73 Agree (n = 9, 56 %) Undecided (n = 6) Disagree (n = 1)
12. Violence and bullying	n = 19 Mean = 3.89 SD .57 Agree (n = 15, 75 %) Undecided (n = 4) Disagree (n = 0)	n = 16 Mean = 3.44 SD .73 Agree (n = 9, 56 %) Undecided (n = 5) Disagree (n = 2)
13. Deteriorating industrial relations and social dialogue	n = 19 Mean = 3.79 SD .63 Agree (n = 13, 68 %) Undecided (n = 6) Disagree (n = 0)	n = 16 Mean = 3.44 SD .73 Agree (n = 7, 44 %) Undecided (n = 8,) Disagree (n = 1)
14. Workers from other cultures	n = 20 Mean = 3.85 SD .49 Agree (n = 16, 80 %) Undecided (n = 4) Disagree (n = 0)	n = 16 Mean = 3.44 SD .96 Agree (n = 8, 50 %) Undecided (n = 5) Disagree (n = 3)
15. Integration of people from other cultural backgrounds	n = 20 Mean = 3.65 SD .67 Agree (n = 13, 65 %) Undecided (n = 6) Disagree (n = 1)	n = 16 Mean = 3.44 SD .96 Agree (n = 8, 50 %) Undecided (n = 5) Disagree (n = 3)
16. Workers with disabilities	n = 20 Mean = 3.80 SD .52 Agree (n = 15, 75 %) Undecided (n = 5) Disagree (n = 0)	n = 16 Mean = 3.31 SD .79 Agree (n = 6, 38 %) Undecided (n = 8) Disagree (n = 2)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
17. More individuality in the workplace	n = 19 Mean = 3.58 SD .96 Agree (n = 11, 58 %) Undecided (n = 5) Disagree (n = 3)	n = 16 Mean = 3.31 SD .79 Agree (n = 6, 38 %) Undecided (n = 8) Disagree (n = 2)
18. Ethical conflict at work	n = 20 Mean = 3.55 SD1 .10 Agree (n = 11, 55 %) Undecided (n = 6) Disagree (n = 3)	n = 16 Mean = 3.31 SD .79 Agree (n = 8, 50 %) Undecided (n = 5) Disagree (n = 3)
19. Interpersonal conflicts and problems	n = 20 Mean = 3.30 SD .73 Agree (n = 9, 45 %) Undecided (n = 8) Disagree (n = 3)	n = 16 Mean = 3.31 SD .87 Agree (n = 6, 38 %) Undecided (n = 9) Disagree (n = 1)

3. Risks the experts are undecided upon (2.75 ≤ MV ≤ 3.25)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Industrial relations and dialogue	n = 19 Mean = 3.26 SD .99 Agree (n = 8, 42 %) Undecided (n = 9) Disagree (n = 2)	n = 16 Mean = 3.25 SD .78 Agree (n = 5, 31 %) Undecided (n = 9) Disagree (n = 2)
2. ICT issues/developments	n = 17 Mean = 3.53 SD .62 Agree (n = 8, 47 %) Undecided (n = 9) Disagree (n = 0)	n = 15 Mean = 3.20 SD .56 Agree (n = 4, 27 %) Undecided (n = 10) Disagree (n = 1)
3. Unfair decision-making/inappropriate leadership styles	n = 20 Mean = 3.15 SD .99 Agree (n = 8, 40 %) Undecided (n = 7) Disagree (n = 5)	n = 16 Mean = 3.19 SD .98 Agree (n = 5, 31 %) Undecided (n = 7) Disagree (n = 4)
4. Public-private occupational health systems controversy/competition	n = 19 Mean = 3.53 SD1 .12 Agree (n = 11, 58 %) Undecided (n = 6) Disagree (n = 2)	n = 16 Mean = 3.19 SD1 .05 Agree (n = 8, 50 %) Undecided (n = 5) Disagree (n = 3)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
5. People with psychiatric complaints/backgrounds	n = 19 Mean = 3.37 SD .90 Agree (n = 9, 45 %) Undecided (n = 8) Disagree (n = 2)	n = 16 Mean = 3.19 SD1 .05 Agree (n = 5, 31 %) Undecided (n = 8) Disagree (n = 3)
6. Low status and low control	n = 20 Mean = 3.37 SD1 .12 Agree (n = 10, 50 %) Undecided (n = 6) Disagree (n = 3)	n = 16 Mean = 3.19 SD1 .11 Agree (n = 6, 38 %) Undecided (n = 6) Disagree (n = 4)
7. Risk of marginalisation due to inadequate education and/or training	n = 20 Mean = 3.30 SD .66 Agree (n = 8, 40 %) Undecided (n = 10) Disagree (n = 2)	n = 16 Mean = 3.13 SD .72 Agree (n = 3, 19 %) Undecided (n = 11) Disagree (n = 2)
8. Poor matching of skills to job	n = 20 Mean = 3.25 SD .72 Agree (n = 8, 40 %) Undecided (n = 9) Disagree (n = 3)	n = 16 Mean = 3.06 SD .77 Agree (n = 5, 31 %) Undecided (n = 7) Disagree (n = 4 %)
9. Integration of people with psychiatric complaints/backgrounds	n = 20 Mean = 3.65 SD .88 Agree (n = 14, 70 %) Undecided (n = 3) Disagree (n = 3)	n = 16 Mean = 3.00 SD .89 Agree (n = 5, 31 %) Undecided (n = 7) Disagree (n = 4)
10. Inflexible working-time arrangements	n = 20 Mean = 2.75 SD1 .21 Agree (n = 6, 30 %) Undecided (n = 6) Disagree (n = 8)	n = 16 Mean = 3.00 SD .97 Agree (n = 5, 31 %) Undecided (n = 5) Disagree (n = 6)
11. Lifestyle: increasing alcohol consumption, smoking and other drug abuse	n = 20 Mean = 3.25 SD .91 Agree (n = 7, 35 %) Undecided (n = 9) Disagree (n = 4)	n = 16 Mean = 2.94 SD .77 Agree (n = 4, 25 %) Undecided (n = 7) Disagree (n = 5)
12. Gender issues, gender segregation	n = 20 Mean = 3.30 SD1 .03 Agree (n = 9, 45 %) Undecided (n = 7) Disagree (n = 4)	n = 15 Mean = 2.93 SD1 .03 Agree (n = 4, 27 %) Undecided (n = 6) Disagree (n = 5)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
13. OSH is one of the first issues to be cut in a recession or when firms try to gain competitiveness	n = 20 Mean = 3.80 SD .89 Agree (n = 14, 70 %) Undecided (n = 4) Disagree (n = 2)	n = 16 Mean = 2.87 SD .96 Agree (n = 4, 25 %) Undecided (n = 8) Disagree (n = 4)
14. Younger workers	n = 20 Mean = 2.65 SD .93 Agree (n = 4, 20 %) Undecided (n = 7) Disagree (n = 9)	n = 16 Mean = 2.75 SD1 .07 Agree (n = 5, 31 %) Undecided (n = 4) Disagree (n = 7)

4. Risk not considered as emerging (2 ≤ MV < 2.75)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Deterioration of (specific) physical working conditions	n = 20 Mean = 2.50 SD.83 Agree (n = 3, 15 %) Undecided (n = 5) Disagree (n = 12)	n = 16 Mean = 2.31 SD.87 Agree (n = 2, 13 %) Undecided (n = 3) Disagree (n = 11)

Annex 2: Results from the 14 respondents to both second and third rounds

1. Risks strongly agreed as emerging (MV > 4)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Unstable labour market, precarious contracts, etc.	n = 14 Mean = 4.29 SD .83 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)	n = 14 Mean = 4.57 SD .51 Agree (n = 14,100 %) Undecided (n = 0) Disagree (n = 0)
2. Globalisation	n = 14 Mean = 4.07 SD .83 Agree (n = 10, 71 %) Undecided (n = 4) Disagree (n = 0)	n = 14 Mean = 4.50 SD .65 Agree (n = 13, 93 %) Undecided (n = 1) Disagree (n = 0)
3. New forms of employment, contracting practices	n = 14 Mean = 4.29 SD .73 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)	n = 14 Mean = 4.21 SD .70 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)
4. Job insecurity	n = 14 Mean = 3.93 SD .73 Agree (n = 10, 71 %) Undecided (n = 4) Disagree (n = 0)	n = 14 Mean = 4.21 SD .80 Agree (n = 13, 93 %) Undecided (n = 0) Disagree (n = 1)
5. The ageing workforce	n = 14 Mean = 4.29 SD .73 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)	n = 14 Mean = 4.14 SD .54 Agree (n = 13, 93 %) Undecided (n = 1) Disagree (n = 0)
6. Long working hours	n = 12 Mean = 3.92 SD .67 Agree (n = 9, 75 %) Undecided (n = 3) Disagree (n = 0)	n = 14 Mean = 4.07 SD .62 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)
7. Lean production/outsourcing	n = 14 Mean = 4.21 SD .70 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)	n = 14 Mean = 4.07 SD .73 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
8. Poor work–life balance	n = 13 Mean = 3.85 SD .80 Agree (n = 8, 62 %) Undecided (n = 5) Disagree (n = 0)	n = 14 Mean = 4.07 SD .73 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)

2. Risks agreed to be emerging (3.25 < MV ≤ 4)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Emotional demands/hiding emotional demands	n = 14 Mean = 3.29 SD .73 Agree (n = 6, 43 %) Undecided (n = 6) Disagree (n = 2)	n = 14 Mean = 4.00 SD .55 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)
2. Older workers	n = 14 Mean = 3.36 SD1 .01 Agree (n = 6, 43 %) Undecided (n = 5) Disagree (n = 3)	n = 14 Mean = 4.00 SD .68 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)
3. Intensification of work, high workload/work pressure	n = 14 Mean = 4.21 SD .80 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)	n = 13 Mean = 4.00 SD1 .08 Agree (n = 11, 85 %) Undecided (n = 1) Disagree (n = 1)
4. Problems reconciling family and working life	n = 14 Mean = 2.57 SD1 .02 Agree (n = 3, 21 %) Undecided (n = 4) Disagree (n = 7)	n = 13 Mean = 3.92 SD .49 Agree (n = 11, 85 %) Undecided (n = 2) Disagree (n = 0)
5. Changing contexts, new roles, skills, etc.	n = 14 Mean = 4.43 SD .85 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)	n = 14 Mean = 3.71 SD .61 Agree (n = 9, 64 %) Undecided (n = 5) Disagree (n = 0)
6. Unemployment	n = 14 Mean = 3.93 SD .92 Agree (n = 10, 71 %) Undecided (n = 3) Disagree (n = 1)	n = 14 Mean = 3.71 SD .61 Agree (n = 9, 64 %) Undecided (n = 5) Disagree (n = 0)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
7. Downsizing	n = 14 Mean = 3.79 SD .70 Agree (n = 9, 64 %) Undecided (n = 5) Disagree (n = 0)	n = 14 Mean = 3.71 SD .61 Agree (n = 9, 64 %) Undecided (n = 5) Disagree (n = 0)
8. General deterioration of psychosocial working conditions	n = 14 Mean = 3.57 SD1 .16 Agree (n = 8, 57 %) Undecided (n = 4) Disagree (n = 2)	n = 14 Mean = 3.64 SD .63 Agree (n = 10, 71 %) Undecided (n = 3) Disagree (n = 1)
9. Difficulty in reintegrating into the labour market/employability	n = 14 Mean = 3.50 SD .94 Agree (n = 9, 64 %) Undecided (n = 2) Disagree (n = 3)	n = 14 Mean = 3.64 SD1 .01 Agree (n = 9, 64 %) Undecided (n = 4) Disagree (n = 1)
10. OSH management lacks effectiveness	n = 13 Mean = 3.92 SD .95 Agree (n = 9, 69 %) Undecided (n = 3) Disagree (n = 1)	n = 14 Mean = 3.57 SD .76 Agree (n = 8, 57 %) Undecided (n = 5) Disagree (n = 1)
11. Increasing demand for mobility in the labour market	n = 14 Mean = 3.93 SD .48 Agree (n = 12, 86 %) Undecided (n = 2) Disagree (n = 0)	n = 14 Mean = 3.50 SD .76 Agree (n = 9, 64 %) Undecided (n = 3) Disagree (n = 2)
12. Deteriorating industrial relations and social dialogue	n = 14 Mean = 2.71 SD1 .20 Agree (n = 5, 36 %) Undecided (n = 3) Disagree (n = 6)	n = 14 Mean = 3.50 SD .76 Agree (n = 7, 50 %) Undecided (n = 6) Disagree (n = 1)
13. Workers from other cultures	n = 14 Mean = 3.93 SD .62 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)	n = 14 Mean = 3.50 SD .94 Agree (n = 7, 50 %) Undecided (n = 5) Disagree (n = 2)
14. Ethical conflict at work	n = 13 Mean = 3.46 SD1 .27 Agree (n = 8, 62 %) Undecided (n = 3) Disagree (n = 2)	n = 14 Mean = 3.43 SD .76 Agree (n = 8, 57 %) Undecided (n = 4) Disagree (n = 2)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
15. Violence and bullying	n = 14 Mean = 3.14 SD1 .03 Agree (n = 7, 50 %) Undecided (n = 3) Disagree (n = 4)	n = 14 Mean = 3.43 SD .76 Agree (n = 8, 57 %) Undecided (n = 4) Disagree (n = 2)
16. Integration of people from other cultural backgrounds	n = 14 Mean = 4.00 SD .96 Agree (n = 10, 71 %) Undecided (n = 3) Disagree (n = 1)	n = 14 Mean = 3.43 SD1 .02 Agree (n = 7, 50 %) Undecided (n = 4) Disagree (n = 3)
17. More individuality in the workplace	n = 14 Mean = 4.07 SD .92 Agree (n = 11, 79 %) Undecided (n = 2) Disagree (n = 1)	n = 14 Mean = 3.36 SD .84 Agree (n = 6, 43 %) Undecided (n = 6) Disagree (n = 2)
18. Workers with disabilities	n = 14 Mean = 3.79 SD .58 Agree (n = 10, 71 %) Undecided (n = 4) Disagree (n = 0)	n = 14 Mean = 3.36 SD .84 Agree (n = 6, 43 %) Undecided (n = 6) Disagree (n = 2)
19. Industrial relations and dialogue	n = 13 Mean = 3.38 SD .96 Agree (n = 6, 46 %) Undecided (n = 6) Disagree (n = 1)	n = 14 Mean = 3.29 SD .83 Agree (n = 5, 36 %) Undecided (n = 7) Disagree (n = 2)
20. Interpersonal conflicts and problems	n = 14 Mean = 3.93 SD .62 Agree (n = 11, 79 %) Undecided (n = 3) Disagree (n = 0)	n = 14 Mean = 3.29 SD .91 Agree (n = 5, 36 %) Undecided (n = 8) Disagree (n = 1)

3. Risks the experts are undecided upon (2.75 ≤ MV ≤ 3.25)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Unfair decision-making/inappropriate leadership styles	n = 14 Mean = 2.64 SD .93 Agree (n = 3, 21 %) Undecided (N =4) Disagree (N =7)	n = 14 Mean = 3.21 SD .97 Agree (n = 4, 29 %) Undecided (N =7) Disagree (N =3)
2. People with psychiatric complaints/backgrounds	n = 14 Mean = 3.71 SD .47 Agree (n = 10, 71 %) Undecided (n = 4) Disagree (n = 0)	n = 14 Mean = 3.21 SD1 .12 Agree (N =5, 36 %) Undecided (n = 6) Disagree (n = 3)
3. Low status and low control	n = 13 Mean = 3.92 SD1 .19 Agree (n = 9, 69 %) Undecided (n = 3) Disagree (n = 1)	n = 14 Mean = 3.21 SD1 .19 Agree (n = 6, 43 %) Undecided (n = 4) Disagree (n = 4)
4. ICT issues/developments	n = 14 Mean = 3.36 SD .75 Agree (n = 7, 50 %) Undecided (n = 5) Disagree (n = 2)	n = 13 Mean = 3.15 SD .56 Agree (n = 3, 23 %) Undecided (n = 9) Disagree (n = 1)
5. Risk of marginalisation due to inadequate education and/or training	n = 14 Mean = 3.36 SD1 .01 Agree (n = 6, 43 %) Undecided (n = 5) Disagree (n = 3)	n = 14 Mean = 3.14 SD .77 Agree (n = 3, 21 %) Undecided (n = 9) Disagree (n = 2)
6. Public–private occupational health systems controversy/competition	n = 14 Mean = 3.86 SD .86 Agree (n = 10, 71 %) Undecided (n = 3) Disagree (n = 1)	n = 14 Mean = 3.14 SD1 .10 Agree (n = 7, 50 %) Undecided (n = 4) Disagree (n = 3)
7. Poor matching of skills to job	n = 11 Mean = 3.45 SD .52 Agree (n = 5, 45 %) Undecided (n = 6) Disagree (n = 0)	n = 14 Mean = 3.07 SD .73 Agree (n = 4, 29 %) Undecided (n = 7) Disagree (n = 3)
8. Inflexible working-time arrangements	n = 13 Mean = 3.92 SD .64 Agree (n = 10, 77 %) Undecided (n = 3) Disagree (n = 0)	n = 14 Mean = 3.07 SD1 .00 Agree (n = 5, 36 %) Undecided (n = 4) Disagree (n = 5)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
9. Life style: increasing alcohol consumption, smoking and other drug abuse	n = 14 Mean = 3.36 SD .63 Agree (n = 6, 43 %) Undecided (n = 7) Disagree (n = 1)	n = 14 Mean = 3.00 SD .78 Agree (n = 4, 29 %) Undecided (n = 6) Disagree (n = 4)
10. Integration of people with psychiatric complaints/backgrounds	n = 14 Mean = 3.43 SD .65 Agree (n = 7, 50 %) Undecided (n = 6) Disagree (n = 1)	n = 14 Mean = 3.00 SD .9 Agree (n = 5, 36 %) Undecided (n = 5) Disagree (n = 4)
11. Gender issues, gender segregation	n = 13 Mean = 3.46 SD .78 Agree (n = 6, 46 %) Undecided (n = 6) Disagree (n = 1)	n = 13 Mean = 2.92 SD1 .04 Agree (n = 3, 23 %) Undecided (n = 6) Disagree (n = 4)
12. OSH is one of the first issues to be cut in a recession or when firms try to gain competitiveness	n = 13 Mean = 3.69 SD1 .11 Agree (n = 8, 62 %) Undecided (n = 4) Disagree (n = 1)	n = 14 Mean = 2.86 SD1 .03 Agree (n = 4, 29 %) Undecided (n = 6) Disagree (n = 4)
13. Younger workers	n = 14 Mean = 4.07 SD .92 Agree (n = 9, 64 %) Undecided (n = 5) Disagree (n = 0)	n = 14 Mean = 2.79 SD1 .12 Agree (n = 5, 36 %) Undecided (n = 3) Disagree (n = 6)

4. Risk not considered as emerging (2 ≤ MV < 2.75)

Emerging risks: prioritised according to mean value of the ratings in the third round	Results Second round	Results Third round
1. Deterioration of (specific) physical working conditions	n = 14 Mean = 4.07 SD .62 Agree (n = 12, 86%) Undecided (n = 2) Disagree (n = 0)	n = 14 Mean = 2.43 SD .85 Agree (n = 2, 14%) Undecided (n = 3) Disagree (n = 9)

Annex 3: References

[1] European Agency for Safety and Health at Work, 'The changing world of work', Conference hosted jointly by the Austrian Presidency of the European Union and the European Agency for Safety and Health at Work, Bilbao, 19–21 October 1998. http://osha.europa.eu/publications/conference/19981019/index.htm#2

[2] European Foundation for the Improvement of Living and Working Conditions, *Quality of work and employment in Europe — Issues and challenges*, Office for Official Publications of the European Communities, Luxembourg, 2002. http://www.eurofound.eu.int/pubdocs/2002/12/en/1/ef0212en.pdf

[3] National Institute for Occupational Safety and Health, *The changing organisation of work and the safety and health of working people — Knowledge gaps and research directions*, National Institute for Occupational Safety and Health, Cincinnati, 2002. http://www.cdc.gov/niosh/02-116pd.html

[4] European Foundation for the Improvement of Living and Working Conditions, *Temporary agency work in the European Union*, Office for Official Publications of the European Communities, Luxembourg, 2005. http://www.eurofound.eu.int/ewco/reports/DK0408TR01/DK0408TR01.pdf

[5] P. Boisard, D. C. Cartron, M. Gollac and A. Valeyre, European Foundation for the Improvement of Living and Working Conditions, *Time and work: duration of work*, Office for Official Publications of the European Communities, Luxembourg, 2003. http://www.eurofound.eu.int/publications/htmlfiles/ef0211.htm

[6] M. Sverke, J. Hellgren and K. Näswall, *Job insecurity — A literature review*, Saltsa Joint Programme for Working Life Research in Europe, Stockholm, The National Institute for Working Life and The Swedish Trade Unions in Cooperation, 2006.

[7] Commission of the European Communities, 'Adapting to change in work and society: a new community strategy on health and safety at work 2002–2006', Commission of the European Communities, Brussels, 2002. http://ec.europa.eu/employment_social/news/2002/mar/new_strategy_en.html

[8] European Foundation for the Improvement of Living and Working Conditions, *Ageing and work in Europe*, Office for Official Publications of the European Communities, Luxembourg, 2005. http://www.eurofound.eu.int/ewco/reports/FR0407TR01/FR0407TR01.htm

[9] European Agency for Safety and Health at Work, *Ageing workers and occupational safety and health — Prevention report*, Office for Official Publications of the European Communities, Luxembourg (in preparation).

[10] M. Quinlan, C. Mayhew and P. Bohle, 'The global expansion of precarious employment, work disorganization, and consequences for occupational health: placing the debate in a comparative historical context', *International Journal of Health Services*, No 31(3), 2001, pp. 507–536.

[11] European Foundation for the Improvement of Living and Working Conditions, *Working conditions in atypical work*, Office for Official Publications of the European Communities, Luxembourg, 2006. http://www.eurofound.europa.eu/pubdocs/2001/59/en/1/ef0159en.pdf

[12] Commission of the European Communities, *Guidance on work-related stress — Spice of life or kiss of death?*, Office for Official Publications of the European Communities, Luxembourg, 2002.
http://ec.europa.eu/employment_social/publications/2002/ke4502361_en.pdf

[13] European Foundation for the Improvement of Living and Working Conditions, *Fourth European working conditions survey*, Office for Official Publications of the European Communities, Luxembourg, 2006.
http://www.eurofound.eu.int/ewco/surveys/EWCS2005/index.htm

[14] M. Aptel, A. Aublet-Cuvelier and J. C. Cnockaert, 'Work-related musculoskeletal disorders of the upper limb', *Joint Bone Spine*, No 69(6), 2002, pp. 546–555.

[15] European Foundation for the Improvement of Living and Working Conditions, *Work-related stress*, Office for Official Publications of the European Communities, Luxembourg, 2006.
http://www.eurofound.eu.int/ewco/reports/TN0502TR01/TN0502TR01.htm

[16] Commission of the European Communities, 'Proposal for a decision of the European Parliament and of the Council concerning the multiannual framework programme 2002–2006 of the European Community for research, technological development and demonstration activities aimed at contributing towards the creation of the European research area', Commission of the European Communities, Brussels, 2001. http://europe.eu.int/comm/research/pdf/com-2001-94-en.pdf

[17] T. Cox and E. Rial-Gonzalez, 'Work-related stress: the European picture', *European Agency for Safety and Health at Work Magazine*, No 5, 2002, pp. 4–6.
http://osha.europa.eu/publications/magazine/5

[18] K. Cuhls: 'Technikvorausschau in Japan — Ein Rückblick auf 30 Jahre Delphi-Expertenbefragungen', *Technik, Wirtschaft und Politik*, Vol. 29, Schriftenreihe des Fraunhofer-Instituts für Systemtechnik und Innovationsforschung (ISI), Physica, Heidelberg, 1998.

[19] Delphi 98 — Studie — Befragung zur globalen Entwicklung von Wissenschaft und Technik — Zusammenfassung der Ergebnisse, Fraunhofer-Institut für Systemtechnik und Innovationsforschung (ISI), Heidelberg.
http://www.isi.fraunhofer.de/p/Downloads/Delphi98-Methoden.pdf

[20] Commission of the European Communities, *Collection and use of expertise by the Commission — Principles and guidelines*, Office for Official Publications of the European Communities, Luxembourg, 2004 (ISBN 9289458216).
http://europa.eu.int/comm/research/science-society/pdf/guidlines_ss_en.pdf

[21] J. Benach, M. Amable, C. Muntaner and F. G. Benavides, 'Working conditions — The consequences of flexible work for health: Are we looking at the right place?', *Journal of Epidemiology and Community Health*, No 56, 2002, pp. 405–406.

[22] W. Nienhueser, 'Flexible work = atypical work = precarious work? Introduction to the special issue', *Management Revue*, No 16(3), 2005, pp. 299–303.

[23] W. Lewchuk, A. de Wolff, A. King and M. Polanyi, 'From job strain to employment strain: Health effects of precarious employment', *Just Labour*, No 3, 2003, pp. 23–35.

[24] G. Rodgers and J. Rodgers, *Precarious jobs in labour market regulation: the growth of atypical employment in western Europe*, International Institute for Labour Studies, Free University of Brussels, Brussels, 1989.

[25] D. Tucker, '"Precarious" non-standard employment — A review of the literature', Department of Labour, New Zealand, 2002.
http://www.psa.org.nz/library/other/dol%20-%20department%20of%20labour/precarious%20non-standard%20employment%20-%20a%20review%20of%20the%20literature%20-%202002.pdf

[26] C. L. Cooper, 'The changing psychological contract at work', *Occupational and Environmental Medicine*, No 59, 2002, p. 355.

[27] Institute of Medicine, Committee to Assess Training Needs for Occupational Safety and Health Personnel in the United States, *Safe work in the 21st century: education and training needs for the next decade's occupational safety and health personnel*, National Academy Press, Washington, 2000.

[28] M. Zijl, G. J. van den Berg and A. Heyma, 'Stepping stones for the unemployed: the effects of temporary jobs on the duration until regular work', Institute for the Study of Labor Discussion paper No 1241, Bonn, 2004.
http://ftp.iza.org/dp1241.pdf

[29] A. L. Booth, M. Francesconi and J. Frank, 'Temporary jobs: stepping stones or dead ends?', Working Papers Series No 8, Centre for Employment Studies, Laboratorio R. Revelli, Turin, 2000.
http://www.labor-torino.it/pdf_doc/n8.pdf

[30] R. Blum and K. Balke, IMF Special Report, 'Confronting the inequalities of precarious work', *Metal World*, No 2, 2006.
http://www.imfmetal.org/main/files/06060216314379/Precarious_work_2-2006_web.pdf

[31] S. Pochic, S. Paugam and M. Selz, 'Job security and precarity in Europe — Workshop 1, "State of the art" on Economic change, unequal life chances and the quality of life (Changequal)', Mannheim, 10–12 April 2003.

[32] Statistical Office of the European Communities, *Employment rate in the EU25 was 63.8 % in 2005*, News Release 118/2006, 11 September 2006.
http://epp.eurostat.cec.eu.int/pls/portal/docs/PAGE/PGP_PRD_CAT_PREREL/PGE_CAT_PREREL_YEAR_2006/PGE_CAT_PREREL_YEAR_2006_MONTH_09/3-11092006-EN-AP.PDF

[33] M. Ambrosini and C. Barone, *Employment and working conditions of migrant workers*, European Foundation for the Improvement of Living and Working Conditions, 2007 (report available in electronic format only).
http://www.eurofound.europa.eu/ewco/studies/tn0701038s/tn0701038s.htm

[34] European Agency for Safety and Health at Work, *Literature study on migrant workers*, Office for Official Publications of the European Communities, Luxembourg (in preparation).

[35] European Agency for Safety and Health at Work, *Young workers*, Thematic report, Office for Official Publications of the European Communities, Luxembourg (in preparation).

[36] C. Mayhew and M. Quinlan, 'The effects of outsourcing on occupational health and safety: a comparative study of factory-based workers and outworkers in the Australian clothing industry', *International Journal of Health Services*, No 29(1), 1999, pp. 83–107.

[37] J. Benach, F. G. Benavides, S. Platt, A. Diez-Roux and C. Muntaner, 'The health damaging potential of new types of flexible employment: A challenge for public health researchers', *American Journal of Public Health*, No 90(8), 2000, pp. 1316–1317.

[38] European Foundation for the Improvement of Living and Working Conditions, *Working conditions in atypical work: Resumée*, Office for Official Publications of the European Communities, Luxembourg, 2001.
http://eurofound.europa.eu/publications/htmlfiles/ef0159.htm

[39] European Foundation for the Improvement of Living and Working Conditions, *The impact of new forms of work organisation on working conditions and health*, Background paper to the European Union Presidency Conference 'For a better quality of work', Office for Official Publications of the European Communities, Luxembourg, 2001.
http://www.eurofound.eu.int/publications/htmlfiles/ef0164.htm

[40] Organisation for Economic Cooperation and Development, 'Taking the measure of temporary employment', *OECD Employment Outlook*, Paris, OECD, 2002.
http://www.oecd.org/dataoecd/36/8/17652675.pdf

[41] E. McLaren, P. Firkin, P. Spoonley, A. Dupuis, A. de Bruin and K. Inkson, 'At the margins: Contingency, precariousness and non-standard work', *Research Report Series*, 2004/1, Labour Markets Dynamics Research Programme, Massey University, Auckland, 2004.
http://lmd.massey.ac.nz/publications/At%20the%20Margins.pdf

[42] Battaglini E. (ed.), *Percezione dei rischi nell'Impresa post-fordista*, IRES Istituto di Ricerche Economiche e Sociali, Rome (forthcoming).

[43] F. Haigh and O. Mekel, 'Policy health impact assessment for the European Union: pilot health impact assessment of the european employment strategy in Germany', European Commission, Brussels, 2004.
http://ec.europa.eu/comm/health/ph_projects/2001/monitoring/fp_monitoring_2001_a1_frep_11_en.pdf

[44] F. Jones and J. Bright, *Stress: myth, theory and research*, Pearson Education, Harlow, 2001.

[45] R. A. Karasek, 'Job demand, job decision latitude, and mental strain — Implications for job redesign', *Administrative Science Quarterly*, No 24, 1979, pp. 285–308.

[46] R. A. Karasek and T. Theorell, *Healthy work: stress, productivity, and the reconstruction of working life*, Basic Books, New York, 1990.

[47] L. Strazdins, R. M. D'Souza, L. L. Lim, D. H. Broom and B. Rodgers, 'Job strain, job insecurity and health — Rethinking the relationship', *Journal of Occupational Health Psychology*, No 9(4), 2004, pp. 296–305.

[48] J. Siegrist, 'Berufliche Gratifikationskrisen und Gesundheit — ein soziogenetisches Modell mit differentiellen Erklärungschancen', in J. Margraf, J. Siegrist and S. Neumer (eds), *Gesundheits — oder Krankheitstheorie? Saluto — versus pathogenetische Ansätze im Gesundheitswesen*, Springer, Berlin, 1998, pp. 225–235.

[49] P. B. Warr, Work, unemployment *and mental health*, Clarendon Press, Oxford, 1987.

[50] M. F. Dollard and A. H. Winefield, 'Mental health: overemployment, underemployment, unemployment and healthy jobs', *Australian E-Journal for the Advancement of Mental Health*, No 1(3), 2002.

[51] J. Benach, D. Gimeno and F. G. Benavides, European Foundation for the Improvement of Living and Working Conditions, *Types of employment and health in the European Union*, Office for Official Publications of the European Communities, Luxembourg, 2002. http://eurofound.europa.eu/publications/htmlfiles/ef0221.htm

[52] L. Nylén, M. Voss and B. Floderus, 'Mortality among women and men relative to unemployment, part time work, overtime work, and extra work: a study based on data from the Swedish twin registry', *Occupational and Environmental Medicine*, No 58, 2001, pp. 52–57.

[53] M. Kivimäki, J. Vahtera, M. Virtanen, M. Elovainio, J. Pentti and J. E. Ferrie, 'Temporary employment and risk of overall and cause-specific mortality', *American Journal of Epidemiology*, No 158(7), 2003, pp. 663–668.

[54] E. Bardasi and M. Francesconi, 'The Impact of atypical employment on individual well-being: evidence from a panel of british workers', Working Papers of the Institute for Social and Economic Research, Paper 2003-2, University of Essex, Colchester, 2003.

[55] C. A. Sprigg, P. R. Smith and P. R. Jackson, *Psychosocial risk factors in call centres: an evaluation of work design and well-being*, Research Report 169, Health and Safety Executive, London.
http://www.hse.gov.uk/research/rrpdf/rr169.pdf

[56] V. S. Santana and D. Lomis, 'Informal jobs and non-fatal occupational injuries', *Annals of Occupational Hygiene*, No 48(2), 2004, pp. 147–157.

[57] Health and Safety Executive, *Management of health and safety at work regulations*, Health and Safety Executive, London, 1999.
http://www.hse.gov.uk/LAU/lacs/55-3.htm

[58] California Department of Industrial Relations, *Injury and illness prevention model program for employers of intermittent employees*, California Department of Industrial Relations. http://www.dir.ca.gov/dosh/dosh_publications/iipintermit.html

[59] K. Frick and D. Walters, 'Worker representation on health and safety in small enterprises — Lessons for a Swedish approach', *International Labour Review*, No 137(3), 1998, pp. 367–389.

[60] W. Hacker, *Neue Arbeitsformen — Gesundheitsförderung durch Arbeitsgestaltung*, Projektberichte, Heft 1, Dresden, Technische Universität, 1999.

[61] A. Riedmann, H. Bielenski, T. Szczurowska and A. Wagner, European Foundation for the Improvement of Living and Working Conditions, *Working time and work–life balance in European companies —Establishment survey on working time 2004–05*, Office for Official Publications of the European Communities, Luxembourg, 2006. http://www.eurofound.eu.int/publications/htmlfiles/ef0627.htm

[62] A. Goudswaard and M. de Nanteuil, European Foundation for the Improvement of Living and Working Conditions, *Flexibility and working conditions: a qualitative and comparative study in seven EU Member States —A summary*, Office for Official Publications of the European Communities, Luxembourg, 2000.
http://www.eurofound.eu.int/pubdocs/2000/71/en/1/ef0071en.pdf

[63] European Foundation for the Improvement of Living and Working Conditions, *European industrial relations* dictionary, Office for Official Publications of the European Communities, Luxembourg (updated 26 March 2007).
http://www.eurofound.eu.int/areas/industrialrelations/dictionary/

[64] D. Janssen and F. Nachreiner, 'Health and psychosocial effects of flexible working hours', *Revista Saúde Pública*, No 38 (Suppl.), 2004, pp. 11–18.
http://www.scielo.br/scielo.php?pid = S0034-
89102004000700003andscript = sci_arttext

[65] G. Costa, T. Akerstedt, F. Nachreiner, F. Baltieri, J. Carvalhais, S. Folkard, M. Frings-Dresen, C. Gadbois, J. Gartner, H. Grzech Šukalo, M. Härmä, I. Kandolin, S. Sartori and J. Silvério, 'As time goes by — flexible work hours, health and well-being', Final report for Saltsa CD-ROM (*Working Life Research in Europe*, Vol. 8), National Institute for Working Life, Stockholm, 2003.

[66] J. M. Harrington, 'Health effects of shift work and extended hours of work', *Occupational and Environmental Medicine*, No 58, 2001, pp. 68–72.

[67] A. Spurgeon, *Working time — Its impact on safety and health*, Geneva, International Labour Organisation, 2003.
http://www.ilo.org/public/english/protection/condtrav/publ/wtwo-as-03.htm

[68] Y. Kamakura, *Best practices in work-flexibility schemes and their impact on the quality of working life in the chemical industries*, Report for discussion at the tripartite meeting on best practices in work–flexibility schemes and their impact on the quality of working life in the chemical industries, Sectoral Activities Programme, International Labour Organisation, Geneva, 2003.
http://www.ilo.org/public/english/dialogue/sector/techmeet/tmwfci03/tmwfci-r.pdf

[69] Flexibility Ltd, *Is time on your side? An overview of flexible time work options*, Flexibility Ltd, Cambridge.
http://www.flexibility.co.uk/flexwork/time/time-options.htm

[70] P. Paoli and D. Merllié, European Foundation for the Improvement of Living and Working Conditions, *Third European survey on working conditions — 2000*, Office for Official Publications of the European Communities, Luxembourg, 2001.
http://eurofound.europa.eu/publications/htmlfiles/ef0121.htm

[71] T. Akerstedt, 'Health and long/irregular/flexible workhours', unpublished seminar on long and irregular working hours, National Institute of Occupational Health (Arbejdsmiljøinstituttet), Copenhagen, 2 June 2005.
http://www.arbejdsmiljoforskning.dk/Aktuel%20forskning/Arbejdstid/
Seminar%20on%20long%20and%20irregular%20working%20hours/
Summary%20from%20seminar%20on%20long%20and%20irregular%20working%20
hours.aspx

[72] P. Smulders, European Foundation for the Improvement of Living and Working Conditions, European Working Conditions Observatory, *Trends in quality of work in the Netherlands: Survey data reports from the Observatory network of national correspondents*, Office for Official Publications of the European Communities, Luxembourg, 2006.
http://www.eurofound.eu.int/ewco/surveys/NL0601SR01/NL0601SR01.pdf

[73] K. van Rijswijk, *It's about time — Part-time, flextime, and a healthy work–home balance*, Datawyse, Maastricht, 2005.

[74] P. Bohle, M. Quinlan, D. Kennedy and A. Williamson, 'Working hours, work–life conflict and health in precarious and 'permanent' employment', *Revista Saúde Pública*, No 38 (Suppl,), 2004, pp. 19–25.

[75] J. Hobson, 'Shift work and doctors' health', *BMJ Career Focus*, No 329, London, 2004, pp. 149–150.
http://careerfocus.bmj.com/cgi/content/full/329/7470/149

[76] E. Eysackers, 'Informatiedossier Volcontinue ploegenarbeid in België: analyse van de bedrijfseconomische, medische en sociale impact', *Innovatie en arbeid*, SERV-STV, Brussels, 2003.

[77] O. Lillqvist , M. Härmä and J. Gärtner, 'Improving five-crew shift', *Työterveiset Special Issue Ergonomics*, No 2 (1997), Finnish Institute for Occupational Safety and Health, 1997.

[78] E. Leduc, 'Physician on call frequency: Society of Rural Physicians of Canada discussion paper', *Canadian Journal of Rural Medicine*, No 3(3), 1998, pp. 139–141. http://epe.lac-bac.gc.ca/100/201/300/cdn_medical_association/cjrm/vol-3/issue-3/0139.htm

[79] E. Imbernon, G. Warret, C. Roitg, J. Clastang and M. Goldberg, 'Effects on health and social well-being of on-call shifts: an epidemiologic study in the French national electricity and gas supply company', *Journal of Occupational Medicine*, No 35(11), 1993, pp. 1131–1137.

[80] A. Spurgeon and J. M. Harrington, 'Work performance and health of junior hospital doctors: A review of the literature', *Work and Stress*, No 3(2), 1989, pp. 117–128, quoted in A. Spurgeon, *Working time — Its impact on safety and health*, International Labour Organisation, Geneva, 2003.

[81] J. White and J. Beswick, *Working long hours*, Health and Safety Laboratory, Sheffield, 2003.
http://www.hse.gov.uk/research/hsl_pdf/2003/hsl03-02.pdf

[82] C. C. Caruso, E. M. Hitchcock, R. B. Dick, J. M. Russo and J. M. Schmit, *Overtime and extended work shifts — Recent findings on illnesses, injuries, and health behaviors*, Cincinnatti, US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, 2004. http://www.cdc.gov/niosh/docs/2004-143/pdfs/2004-143.pdf

[83] R. Bourdeaud'hui and S. Vanderhaeghe, 'Werkbaar werk en overwerk — Technische nota', *Sociaal Economische Raad Vlaanderen, STV Innovatie and Arbeid*, Brussels, 2006.
http://www.serv.be/uitgaven.aspx?prm1 = 1andprm2 = 950andprm3 = 0andprm4 = 1

[84] P. Askenazy, 'Shorter working time, flexibility and intensification', *Eastern Economic Journal*, No 30(4), 2004, pp. 603–614.

[85] European Foundation for the Improvement of Living and Working Conditions, 'Impacts de la réduction du temps de travail (RTT) sur les conditions de travail en France', Office for Official Publications of the European Communities, Luxembourg, 2003 (based on *Premières informations* et *première synthèses*, No 24(1), Publications Dares, 2003).
http://www.eurofound.ie/ewco/2003/10/FR0310NU33.htm

[86] M.-A. Estrade, D. Méda and R. Orain, 'Les effets de la réduction du temps de travail sur les modes de vie: qu'en pensent les salariés un an après?', *Premières synthèses*, No 21(1), DARES, May 2001.
http://www.cee-recherche.fr/fr/fiches_chercheurs/texte_pdf/meda/rttps.pdf

[87] C. Afsa and P. Biscourp, 'L'évolution des rythmes de travail entre 1995 et 2001: quel impact des 35 heures?' [Changes in work schedules from 1995 to 2001: what impact on the 35-hour week?], *Economie et statistique*, No 376–377, Paris, Institut national de la statistique et des études économiques, 2004, pp. 173–198.

[88] M.-A. Estrade and D. Meda, 'Principaux résultats de l'enquête RTT et modes de vie', Document d'études de la DARES, No 56, Mai, 2002.
http://www.cee-recherche.fr/fr/fiches_chercheurs/texte_pdf/meda/de56.pdf

[89] K. Sparks, C. Cooper, Y. Fried and A. Shirom, 'The effects of hours of work on health: A meta-analytic review', *Journal of Occupational and Organizational Psychology*, No 70, 1997, pp. 391–408, quoted in J. White and J. Beswick, *Working Long Hours*, Health and Safety Laboratory, Sheffield, 2003.
http://www.hse.gov.uk/research/hsl_pdf/2003/hsl03-02.pdf

[90] A. Spurgeon, J. M. Harrington and C. L. Cooper, 'Health and safety problems associated with long working hours: a review of the current position', *Occupational and Environmental Medicine*, No 54, 1997, pp. 367–375.

[91] K. Hänecke, S. Tiedemann, F. Nachreiner and H. Grzech-Šukalo, 'Accident risk as a function of hour at work and time of day as determined from accident data and exposure models for the German working population', *Scandinavian Journal of Work, Environment and Health*, No 24, Suppl. 3, 1998, pp. 43–48.

[92] Organisation for Economic Cooperation and Development, 'Is job security on the increase in OECD countries?', *OECD Employment Outlook*, OECD, Paris, 1997.

[93] R. D. Caplan, S. Cobb, J. R. P. French, R. Van Harrison and S. R. Pinneau, *Job demands and worker health*, National Institute for Occupational Safety and Health, Washington, 1975.

[94] J. R. Hackman and G. R. Oldham, 'Development of the job diagnostic survey', *Journal of Applied Psychology*, No 60, 1975, pp. 159–170.

[95] Sverke, M., Hellgren, J. and K. Näswall, 'No security: a meta-analysis and review of job insecurity and its consequences', *Journal of Occupational Health Psychology*, No 7, 2002, pp. 242–264.

[96] H. De Witte, 'Job insecurity and psychological well-being: review of the literature and exploration of some unresolved issues', *European Journal of Work and Organizational Psychology*, No 8, 1999, pp. 155–177.

[97] G. B. Mohr, 'The changing significance of different stressors after the announcement of bankruptcy: a longitudinal investigation with special emphasis on job insecurity', *Journal of Organizational Behavior*, No 21, 2000, pp. 337–359.

[98] C. D. Johnson, L. A. Messe and W. D. Crano, 'Predicting job performance of low income workers — The work opinion questionnaire', *Personnel Psychology*, No 37, 1984, pp. 291–299.

[99] J. Hellgren and M. Sverke, 'Does job insecurity lead to impaired well-being or vice versa? Estimation of cross-lagged effects using latent variable modeling', *Journal of Organizational Behavior*, No 24, 2003, pp. 215–236.

[100] L. Greenhalgh and Z. Rosenblat, 'Job insecurity: towards conceptual clarity', *Academy of Management Review*, No 9, 1984, pp. 438–448.

[101] S. Ashford, C. Lee and P. Bobko, 'Content, causes, and consequences of job insecurity: a theory-based measure and substantive test', *Academy of Management Journal*, No 32, 1989, pp. 803–829.

[102] U. Kinnunen, S. Mauno, J. Nätti and M. Happonen, 'Perceived job insecurity: a longitudinal study among Finnish employees', *European Journal of Work and Organizational Psychology*, No 8, 1999, pp. 243–260.

[103] S. Mauno and U. Kinnunen, 'Perceived job insecurity among dual-earner couples: Do its antecedents vary according to gender, economic sector and the measure used?', *Journal of Occupational and Organizational Psychology*, No 75, 2002, pp. 295–314.

[104] J. E. Ferrie, M. J. Shipley, K. Newman, S. Stansfeld and M. G. Marmot, 'Self-reported job insecurity and health in the Whitehall II study: potential explanations of the relationship', *Social Science and Medicine*, No 60, 2005, pp. 1593–1602.

[105] J. E. Ferrie, M. J. Shipley, S. Stansfeld, G. D. Smith and M. G. Marmot, 'Future uncertainty and socioeconomic inequalities in health: the Whitehall II study', *Social Science and Medicine*, No 57, 2003, pp. 637–646.

[106] J. E. Ferrie, M. J. Shipley, M. G. Marmot, P. Martikainen, S. Stansfeld and G. D. Smith, 'Job insecurity in white-collar workers: toward an explanation of associations with health', *Journal of Occupational Health Psychology*, No 6, 2001, pp. 26–42.

[107] J. E. Ferrie, M. J. Shipley, M. G. Marmot, S. Stansfeld and G. D. Smith, 'The health effects of major organizational change and job insecurity', *Social Science and Medicine*, No 46, 1998, pp. 243–254.

[108] S. Mauno and U. Kinnunen, 'Job insecurity and well-being: a longitudinal study among male and female employees in Finland', *Community, Work and Family*, No 2, 1999, pp. 147–171.

[109] U. Kinnunen, J. Nätti and M. Happonen, 'Organizational antecedents and outcomes of job insecurity: a longitudinal study in three organizations in Finland', *Journal of Organizational Behavior*, No 21, 2000, pp. 443–459.

[110] E. Roskies and C. Louis-Guerin, 'Job insecurity in managers: antecedents and consequences', *Journal of Organizational Behavior*, No 11, 1990, pp. 345–359.

[111] E. Roskies, C. Louis-Guerin and C. Fournier, 'Coping with job insecurity: How does personality make a difference?', *Journal of Organizational Behavior*, No 14, 1993, pp. 617–630.

[112] T. M. Probst, 'Wedded to the job: moderating effects of job involvement on the consequences of job insecurity', *Journal of Occupational Health Psychology*, No 5, 2000, pp. 63–73.

[113] R. S. Lazarus and S. Folkman, *Stress, appraisal, and coping*, Springer, New York, 1984.

[114] K. L. Belkic, P. Landsbergis, P. L. Schnall and D. Baker, 'Is job strain a major source of cardiovascular disease risk?', *Scandinavian Journal of Work, Environment and Health*, No 30(2), 2004, pp. 85–128.

[115] P. M. Bongers, C. R. de Winter, M. A. J. Kompier and M. D. Hildebrandt, 'Psychosocial factors at work and musculoskeletal disease', *Scandinavian Journal of Work, Environment and Health*, No 19, 1993, pp. 297–312.

[116] J. Siegrist and A. Rödel, 'Chronischer Distress im Erwerbsleben und depressive Störungen: epidemiologische und psychobiologische Erkenntnisse und ihre Bedeutung für die Prävention', *Arbeitsbedingtheit depressiver Störungen*, Tagungsband 138 der Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, BAuA, Dortmund, 2005.

[117] C. Tennant, 'Work-related stress and depressive disorders', *Journal of Psychosomatic Research*, No 51(5), 2001, pp. 697–704.

[118] D. Goldberg, *Manual of the general health questionnaire*, NFER Nelson, London, 1979.

[119] V. Lim, 'Job insecurity and its outcomes: moderating effects of work-based and nonwork-based social support', *Human Relations*, No 49, 1996, pp. 171–194.

[120] S. W. Dekker and W. B. Schaufeli, 'The effects of job insecurity on psychological health and withdrawal: a longitudinal study', *Australian Psychologist*, No 30, 1995, pp. 57–63.

[121] J. Hellgren, M. Sverke and K. Isaksson, 'A two-dimensional approach to job insecurity: Consequences for employee attitudes and well-being', European Journal of Work and Organizational Psychology, No 8, 1999, pp. 179–195.

[122] R. M. Steinman, Santé psychique — stress — Bases scientifiques pour une stratégie nationale en matière de prévention du stress et de promotion de la santé psychique en Suisse (condensed), Promotion Santé Suisse, Berne and Lausanne, 2006. http://www.gesundheitsfoerderung.ch/f/leistungen/psychische_gesundheit/psychische_gesundheit_stress/default.asp

[123] D. M. Rousseau, S. B. Sitkin, R. S. Burt and C. Camerer, 'Not so different after all: A cross-discipline view of trust (introduction to special topic forum)', *Academy of Management Review*, No 23, 1998, pp. 393–404.

[124] R. Kalimo, T. W. Taris and W. B. Schaufeli, 'The effects of past and anticipated future downsizing on survivor well-being: an equity perspective', *Journal of Occupational Health Psychology*, No 8, 2003, pp. 91–109.

[125] K. Näswall, M. Sverke and J. Hellgren, 'The moderating role of personality characteristics on the relationship between job insecurity and strain', *Work and Stress*, No 19, 2005, pp. 37–49.

[126] M. Westman, D. Etzion and E. Danon, 'Job insecurity and crossover of burnout in married couples', *Journal of Organizational Behavior*, No 22, 2001, pp. 467–481.

[127] T. M. Probst and T. L. Brubaker, 'The effects of job insecurity on employee safety outcomes: cross-sectional and longitudinal explorations', *Journal of Occupational Health Psychology*, No 6, 2001, pp. 139–159.

[128] J. B. Rotter, 'Generalized expectancies for internal versus external control of reinforcement', *Psychological Monographs*, No 80(1), 1966, pp. 1–28.

[129] P. J. Jordan, N. M. Ashkanasy and C. E. J. Hartel, 'Emotional intelligence as a moderator of emotional and behavioral reactions to job insecurity', *Academy of Management Review*, No 27, 2002, pp. 361–372.

[130] R. J. Burke and D. Nelson, 'Mergers and acquisitions, downsizing, and privatization: a North American perspective', in M. K. Gowing, J. D. Kraft and J. C. Quick (eds), *The new organizational reality: downsizing, restructuring, and revitalization,* American Psychological Asocciation, Washington, 1998, pp. 21–54.

[131] D. M. Schweiger and A. S. Denisi, 'Communication with employees following a merger: a longitudinal field experiment', *Academy of Management Journal*, No 34, 1991, pp. 110–135.

[132] A. L. Canaff and W. Wright, 'High anxiety: counseling the job-insecure client', *Journal of Employment Counseling*, No 41, 2004, pp. 2–10.

[133] S. Dhondt, European Foundation for the Improvement of Living and Working Conditions,*Time constraints and autonomy at work in the European Union*, Office for

Official Publications of the European Communities, Luxembourg, 1998. http://www.eurofound.eu.int/publications/htmlfiles/ef9743.htm

[134] D. Merllié and P. Paoli, European Foundation for the Improvement of Living and Working Conditions, *Ten years of working conditions in the European Union*, Office for Official Publications of the European Communities, Luxembourg, 2001. http://www.eurofound.eu.int/publications/htmlfiles/ef00128.htm

[135] P. Paoli, European Foundation for the Improvement of Living and Working Conditions, *Second European survey on working conditions*, Office for Official Publications of the European Communities, Luxembourg, 1997. http://www.eurofound.eu.int/publications/htmlfiles/ef9726.htm

[136] F. Green and S. McIntosh, 'The intensification of work in Europe', *Labour Economics*, No 8(2), 2001, pp. 291–308.

[137] C. Fagan and B. Burchell, 'L'intensification du travail et les différences hommes/femmes: conclusions des enquêtes européennes sur les conditions de travail', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 161–180.

[138] B. Burchell, 'Gender and the intensification of work: evidence from the European working conditions surveys', *Eastern Economic Journal*, No 30, 2004.

[139] H. David, S. Volkoff, E. Cloutier and F. Derriennic, 'Aging, Work Organization and Health', *Pistes*, No 3(1), 2001. http://www.pistes.uqam.ca/v3n1/pdf/v3n1a5a.pdf

[140] V. Letourneux, European Foundation for the Improvement of Living and Working Conditions, *Precarious employement and working conditions in Europe*, Office for Official Publications of the European Communities, Luxembourg, 1998. http://www.eurofound.eu.int/publications/htmlfiles/ef9815.htm

[141] D. Storrie, European Foundation for the Improvement of Living and Working Conditions, *Temporary agency work,* Office for Official Publications of the European Communities, Luxembourg, 2002. http://www.eurofound.eu.int/publications/htmlfiles/ef0202.htm

[142] V. Daubas-Letourneux and A. Thébaud-Mony,European Foundation for the Improvement of Living and Working Conditions, *Work organisation and health at work in the European Union*, Office for Official Publications of the European Communities, Luxembourg, 2002. http://www.eurofound.eu.int/publications/htmlfiles/ef0206.htm

[143] A. Valeyre, 'Forms of work intensification and economic performance in French manufacturing', *Eastern Economic Journal*, No 30, 2004, pp. 643–658.

[144] A. Valeyre and E. Lorenz, 'Les nouvelles formes d'organisation du travail en Europe', *Les 4 pages du Centre d'Etudes de l'Emploi*, No 13, 2005, pp. 1–4.

[145] A. Härenstam, A. Rydbeck, M. Karlkvist, K. Waldenström and P. Wiklund, *The significance of organisation for healthy work — Methods, study design, analysing strategies and empirical results from the MOA-study*, Arbetslivsinstitutet, Stockholm, 2004.

[146] A.-F. Molinié and S. Volkoff, 'Intensité du travail et santé dans un organisme administratif: une enquête statistique à l'Agence nationale pour l'Emploi', *Pistes*, No 2(1), 2000. http://www.pistes.uqam.ca/v2n1/sommaire.html

[147] M. Zamarian and B. Maggi, 'L'influence des choix organisationnels sur l'intensité du travail', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 137–143.

[148] M. Gollac, 'L'intensité du travail — Formes et effets', *Revue économique*, No 56(2), 2005, pp. 195–216.

[149] L. Théry, *Le travail intenable — Résister collectivement à l'intensification du travail*, La Découverte, Paris, 2006.

[150] V. Hélardot and M. Druhle, 'Intensité, densité et sens du travail: quelques configurations de l'expérience des salariés aux prises avec la précarisation', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 345–351.

[151] Y. Clot, *Re-créer le travail*, paper presented at the États généraux de la Culture, Aubervillers, 15 November 2004.
http://docsite.cgt.fr/1113231236.pdf

[152] P. Askenazy, 'Innovative workplace practices and occupational health and safety in the United States', *Industrial and Economic Democracy*, No 22(4), 2001, pp. 485–516.

[153] M. Gollac, N. Greenan and S. Hamon-Cholet, 'Changements organisationnels, changements techniques, changements dans le travail', Paper presented at the SELF Congress, Les transformations du travail, enjeux pour l'ergonomie, Montreal, 3–5 October 2001.
http://www.ergonomie-self.org/self2001/v2/V2-021-R162-HAMON-CH.pdf

[154] P. Askenazy, 'Sur les sources de l'intensification', *Revue économique*, No 56(3), 2005, pp. 217–236.

[155] B. Burchell, D. Lapido and F. Wilkinson, *Job insecurity and work intensification*, Routledge, London, 2001.

[156] F. Green, 'Why has work effort become more intense', *Industrial Relations*, No 43(4), 2004, pp. 709–741.

[157] D. Gallie, 'L'intensification du travail en Europe 1996–2001?', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 239–259.

[158] S. Volkoff, '*Evolutions technologiques, densité du travail, contraintes temporelles — La dictature du temps*', Editions Page deux, Lausanne, 1996.
http://www.alencontre.org/EdPage2/p2_trv_volkoff.html

[159] A. Kluge, J. Sauer, D. Burkolter and K. Schüler, 'Simulator training principles for control tasks skill acquisition', *Theoretical Issues in Ergonomics* (submitted).

[160] P. Hamelin, 'Chauffeurs routiers, les poids lourds du temps de travail', *Santé and Travail*, No 5, 1993, pp. 45–51.

[161] M. Gollac and S. Volkoff, 'Citius, altius, fortius. L'intensification du travail', *Actes de la recherche en Sciences Sociales*, No 114, 1996, pp. 54–67.

[162] T. Perilleux, 'Diffusion du contrôle et intensification du travail', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 367–375.

[163] P. Askenazy, *Les désordres du travail, enquête sur le nouveau productivisme*, Editions du Seuil, Paris, 2004.

[164] European Foundation for the Improvement of Living and Working Conditions, *A review of working conditions in France*, Office for Official Publications of the European Communities, Luxembourg, 2006.
http://eurofound.europa.eu/ewco/surveys/FR0603SR01/FR0603SR01.pdf

[165] F. Coutarel, *La prévention des troubles musculo-squelettiques en conception: quelles marges de manoeuvre pour le déploiement de l'activité*, Bordeaux 2, 2004 (unpublished).

[166] C. Gaudart, K. Chassaing and S. Volkoff, 'Intensité du travail et contradiction dans l'activité: quelques résultats d'études ergonomiques dans le montage automobile', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 261–267.

[167] D. Cartron, *Excès de vitesse — Les effets de l'intensification du travail sur les pénibilités et les risques*, Centre d'Études de l'Emploi (CEE), Noisy-le-Grand cedex, CEE0/22, 2002.
http://damiencartron.free.fr/textes/rpdi.pdf

[168] N. Hatzfeld, 'L'intensification du travail en débat: Ethnographie et histoire aux chaînes de Peugeot-Sochaux', *Sociologie du Travail*, No 46, 2004, pp. 291–307.

[169] Y. Clot, 'Une intensification du travail peut-elle en cacher une autre?', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du Travail*, Toulouse, Octares, 2006, pp. 313–326.

[170] P. Davezies, *Charge de travail et enjeux de santé*, Paper presented at the Colloque 'Négocier la charge de travail entre performance, organisation et conditions de travail', CNIT Paris La Défense, 19 September 2001.

[171] A. Laville, C. Teiger, J. Duraffourg and M. Raquillet, 'Charge de travail et vieillissement', Rapport du Laboratoire d'Ergonomie du CNAM, No 40, Paris, 1973.

[172] M. Berthet and A.-M. Gauthier, *L'exposition aux risques professionnels. Intégrer organisation du travail et prévention*, ANACT, Lyon, 2000.

[173] P. Askenazy and E. Caroli, 'Pratiques innovantes, accidents du travail et charge mentale — Résultats de l'enquête française "Conditions de travail" 1998', *Pistes*, No 5(1), 2003.
http://www.pistes.uqam.ca/v4n1/articles/v4n1a4.htm

[174] B. Burchell, 'Anglais, encore un effort! L'intensité du travail au Royaume-Uni', *Actes de la recherche en Sciences Sociales*, No 163, 2006, pp. 91–100.

[175] D. Chouanière, 'Stress et risques psychosociaux: concepts et prévention', *Documents pour le Médecin du Travail de l'INRS*, No 106, 2006, pp. 169–186.

[176] M. Kompier and L. Levy, European Foundation for the Improvement of Living and Working Conditions, *Stress at work: causes, effects and prevention — A guide for small and medium sized enterprises,* Office for Official Publications of the European Communities, Luxembourg, 1994.

[177] J. Siegrist, 'Adverse health effects of high effort/low reward conditions', *Journal of Occupational Health Psychology*, No 1(1), 1996, pp. 27–41.

[178] P. Schnall, K. Belkic, P. Landsbergis and D. Baker, 'The workplace and cardiovascular disease', *Occupational Medicine*, No 15(1), 2000, pp. 1–334.

[179] M. Ferrario, G. Veronesi, G. Corrao, R. Fornari, R. Sega, R. Borchini, F. Battaini and G. Cesna, 'Rischio di incidenza di eventi coronarici e cerebrovascolari maggiori tra classi socio-occupazionali — Follow-up a 11 anni delle coorti Monica Brianza e Pamela', *Giornale Italiano di Medicina del Lavoro ed Ergonomia*, No 27(3), 2005, pp. 275–278.

[180] S. Sauter and L. Murphy, *Stress... at work*, NIOSH publication No 99–101, National Institute for Occupational Safety and Health, Cincinatti, 1999.

[181] I. Niedhammer, J.-F. Chastain, S. David, L. Barouhiel and G. Barrandson, 'Job strain and effort–reward imbalance models in a context of major organizational changes', *International Journal of Environmental Health*, No 12, 2006, pp. 111–119.

[182] F. Derriennic and M. Vezina, 'Intensification du travail et répercussions sur la santé mentale: arguments épidémiologiques apportés par l'enquête ESTEV', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et Intensité du Travail*, Octares, Toulouse, 2006, pp. 327–333.

[183] W. E. Hoogendoorn, M. N. M. van Poppel, P. M. Bongers, B. W. Koes and L. M. Bouter, 'Systematic review on psychosocial factors at work and private life as risk factors for back pain', *Spine*, No 25(16), 2000, pp. 2114–2125.

[184] B. Arnaudo, S. Hamon-Cholet and D. Waltisperger, 'Contraintes posturales et articulaires au travail', *Premières synthèses*, No 11(2), DARES, March 2006.

[185] N. Vézina, S. Stock and Y. Saint-Jacques, 'L'intensification du travail de couturière: savoir-faire et prévention des douleurs articulaires', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et intensité du travail*, Octares, Toulouse, 2006, pp. 281–289.

[186] A. Aublet-Cuvelier, M. Aptel and H. Weber, 'The dynamic course of musculoskeletal disorders in an assembly line factory', *International Archives of Occupational and Environmental Health*, No 79 (7), 2006, pp. 578–584.

[187] A. Hatchuel, 'Sources of intensity in work organizations', in P. Docherty, J. Forslin and A. B. S. Shani (eds), *Creating sustainable work systems — Emerging perspectives and practice*, London, Routledge, 2002, pp. 40–51.

[188] F. Daniellou, 'Les mondes du travail', in L. Théry (ed.), *Le travail intenable— Résister collectivement à l'intensification du travail*, La Découverte, Paris, 2006, pp. 17–38.

[189] A. Masson, *Mettre en oeuvre la réduction du temps de travail — Un guide pour conduire les réorganisations après l'accord*, ANACT, Lyon, 2000.

[190] B. Poete and R. Thierry, *Agir sur la charge de travail: de l'évaluation à la négociation*, Liaisons sociales et ANACT, Lyon, 2003.

[191] D. Liévin and G. Krawsky, 'Travail isolé et sécurité: facteurs de risque et possibilités de prévention', *Cahiers de Notes Documentaires — Hygiène et Sécurité du Travail*, No 125, 1986, pp. 503–521.

[192] F. de Coninck, 'Avoir du temps devant soi — La construction d'un temps transactionnel entre temps du sujet et temps de la production', in P. Askenazy, D. Cartron, F. de Coninck and M. Gollac (eds), *Organisation et Intensité du Travail*, Octares, Toulouse, 2006, pp. 319–326.

[193] M. Gollac, 'L'intensité du travail et ses ambiguïtés', in ISERES, *L'Intensité du travail et santé — Quelles recherches, quelles actions?*, L'Harmattan, Paris, 2001, pp. 33–42.

[194] F. Bourgeois, C. Brun, J.-M. Faucheux, F. Hubault, C. Lemarchand, A. Polin, P. Douillet and E. Albert, *Troubles musculo-squelettiques et travail — Quand la santé interroge l'organisation*, ANACT, Lyon, 2006.

[195] J.-C. Marquié, 'Changements cognitifs, contraintes de travail et expérience: les marges de manoeuvre du travailleur vieillissant', in J.-C. Marquié, D. Paumès and S. Volkoff (eds), *Le travail au fil de l'âge*, Octares, Toulouse, 1995.

[196] C. Dejours, *Travail et usure mentale — De la psychopathologie à la psychodynamique du travail*, Bayard, Paris, 1993.

[197] C. du Tertre, 'Services immatériels et relationnels: intensité du travail et santé', *@ctivités*, No 2(37), 2005.
http://www.activites.org/v2n1/html/dutertre.html

[198] P. Docherty, J. Forslin and A. Shani, *Creating sustainable work systems — Emerging perspectives and practice*, London, Routledge, 2002.

[199] INQA (Initiative Neue Qualität der Arbeit — The new quality of work initiative), Federal Institute for Occupational Safety and Health, Dortmund.
http://www.inqa.de/Inqa/Navigation/english.html

[200] Organisation for Economic Cooperation and Development, *Live longer, work longer*, OECD, Paris, 2006.
http://www.oecd.org/document/42/0,2340,en_2649_37435_36104426_1_1_1_37435,00.html

[201] J. Ilmarinen, 'Ageing and work — coping with strengths and weaknesses', *Scandinavian Journal of Work, Environment and Health*, No 23(1), 1997, pp. 3–5.

[202] Statistical Office of the European Communities, *Europe in figures — Eurostat yearbook 2005*, Office for Official Publications of the European Communities, Luxembourg, 2005. http://epp.eurostat.ec.europa.eu

[203] H. Buck, E. Kistler and H. G. Mendius, *Demographic change in the world of work — Opportunities for an innovative approach to work — a German point of view*, Bundesministerium für Bildung und Forschung, Stuttgart, 2002.
http://www.demotrans.de/documents/BR_DE_BR13.pdf

[204] G. Reday-Mulvey, *Working beyond 60 — Key policies and practices in Europe*, Palgrave Macmillan, New York, 2005.

[205] M. Samson, I. Meeuwsen, A. Crowe, J. Dessens, S. Duursma and H. Verhaar, 'Relationship between physical performance measures, age, height and body weight in healthy adults', *Age and Ageing*, No 29, 2000, pp. 235–242.

[206] Council on the Ageing, *Mature age employment*, Council of the Ageing, Melbourne, 1999.
http://www.cota.org.au/employsub.htm

[207] G. E. McClearn and D. A. Heller, 'Genetics and aging', in S. Manuck, R. Jennings, B. S. Rabin and A. Baum (eds), *Behavior, health and aging*, Lawrence Erlbaum Association, Mahwah (NJ), 2000, pp. 1–14.

[208] Ministry of Social Affairs and Health, Finland, *the many faces of the national programme on ageing workers — The concluding report on the programme*, Edita Prima, Helsinki, 2002.
http://pre20031103.stm.fi/english/tao/publicat/manyfaces/themanyfaces.pdf

[209] E. Zeef, J. Snel and R. Cremer, 'Judgement of the position of an invisbly moving object in young and old adults', in J. Snel and R. Cremer (eds), *Work and Aging — A European perspective*, London, Taylor and Francis, 1995, pp. 127–138.

[210] E. Leventhal, 'Aging women, getting older, getting better?', in S. Manuck, R. Jennings, B. S. Rabin and A. Baum (eds), *Behavior, health and aging*, Lawrence Erlbaum Association, Mahwah (NJ), 2000, pp. 27–42.

[211] K. Landau, 'Alternseinfluss', in K. Landau and G. Pressel (eds), *Medizinisches Lexikon der beruflichen Belastungen und Gefährdungen*, Gentner, Stuttgart, 2004.

[212] A. Walker, European Foundation for the Improvement of Living and Working Conditions, *Investing in ageing workers — A framework for analysing good practice in Europe*, Office for Official Publications of the European Communities, Luxembourg, 1995.

[213] A. Walker and P. Taylor, European Foundation for the Improvement of Living and Working Conditions, *Combating age barriers in employment — A European portfolio of good practice*, Office for Official Publications of the European Communities, Luxembourg, 1997. http://eurofound.europa.eu/publications/htmlfiles/ef9719.htm

[214] U. Lehr, *Psychologie des Alterns*, Wiebelsheims, Quelle and Meyer, 2003.

[215] M. Patrickson, 'Reversing the trend toward early retirement in managing an ageing workforce', in M. Patrickson and L. Hartmann (eds), *Managing an ageing workforce*, Business and Professional Publications, Warriewood (NSW), 1998, pp. 106–120.

[216] K. Dychtwald, *Age power — How the 21st century will be ruled by the new old*, New York, Jeremy P. Tarcher, 1999.

[217] INQA (Initiative Neue Qualität der Arbeit — The new quality of work initiative), *Älter werdende Arbeitnehmer — Abschlussbericht des finnischen Ministeriums für Soziales und Gesundheit*, Wirtschaftsverlag, Bremerhaven, 2005.

[218] Health and Safety Laboratory, *Facts and misconceptions about age, health status and employability*, Health and Safety Laboratory, Buxton, 2005.
http://www.hse.gov.uk/research/hsl_pdf/2005/hsl0520.pdf

[219] R. Skiba, *Taschenbuch Arbeitssicherheit*, Erich Schmidt, Bielefeld, 2000.

[220] L. Laflamme and E. Menckel, 'Altern und Unfall — die Auseinandersetzung mit Anforderungen und Risiken am Arbeitsplatz', in G. Aronsson and A. Kilbom (eds), *Arbeit über 45 — Historische, psychologische und physiologische Perspektiven älterer Menschen im Berufsleben*, Wirtschaftsverlag, Bremerhaven, 2001.

[221] L. Delsen and G. Reday-Mulvey, *Gradual retirement in the OECD countries: macro and micro issues and policies*, London, Dartmouth Press, 1996.

[222] E. Drury, *Age discrimination against older workers in the European Community*, Eurolink Age, London, 1993.

[223] S. Jacobzone, E. Cambois, E. Chaplain and J. M. Robine, 'The health of older persons in OECD countries: is it improving fast enough to compensate for population ageing?', OECD Labour market and social policy, Occasional Paper No 37, Paris, DEELSA/WD No 98(8), 1998.
http://caliban.sourceoecd.org/vl=5834636/cl=19/nw=1/rpsv/cgi-bin/wppdf?file=5lgsjhvj7s7d.pdf

[224] D. Turner, C. Giorno, A. de Serres, A. Vourc'h and P. Richardson, 'The macroeconomic implications of ageing in a global context', OECD Working Paper No 193, OECD, Paris, 1998.
http://oberon.sourceoecd.org/vl=1720618/cl=23/nw=1/rpsv/cgi-bin/wppdf?file=5lgsjhvj84q7.pdf

[225] J. Griffiths, *Business and social exclusion — A guide to good practice*, British Telecom, London, 1996.

[226] A. Aittomäki, E. Lahelma, E. Roos, P. Leino-Arjas and P. Martikainen, 'Gender differences in the association of age with physical workload and functioning', *Occupational and Environmental Medicine*, No 62, 2005, pp. 95–100.

[227] S. Letvak, 'Health and safety of older nurses', *Nursing Outlook*, No 53, 2005, pp. 66–72.

[228] K. Tuomi, T. Luostarinen, J. Ilmarinen and M. Klockars, 'Work load and individual factors affecting work disability among aging municipal employees', *Scandinavian Journal of Work, Environment and Health*, No 17, 1991, pp. 94–98.

[229] L. Brooke and P. Taylor, 'Older workers and employment: managing age relations', *Ageing and Society*, No 25(3), 2005, pp. 415–429.

[230] R. Clark and O. S. Mitchell, 'The changing retirement paradigm', in R. L. Clark and O. S. Mitchell (eds), *Reinventing the retirement paradigm*, Oxford University Press, Oxford, 2005, pp. 7–23.

[231] K. Henkens, 'Stereotyping older workers and retirement: the managers' point of view', *Canadian Journal on Aging*, No 24(4), 2005, pp. 353–366.

[232] Ministry of Labour, Finland, 'Preparing for the changes in labour market caused by the baby boom generation', Ministry of Labour, Helsinki, 2001.
http://www.mol.fi/english/reports/babyboomgeneration.pdf

[233] W. A. Sadler, *The third age — Six principles of growth and renewal after 40*, Perseus Books, Cambridge (MA), 2000.

[234] Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, *Alles grau in grau? Ältere Arbeitnehmer und Büroarbeit*, Lausitzer Druck und Verlagshaus, Bautzen, 2006.

[235] European Parliament, Resolution on harassment at the workplace (2001/2339 (INI)), *Official Journal of the European Communities*, C/77E, 28.3.2002, p.138, 2001.
http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/ce077/ce07720020328en01380141.pdf

[236] International Labour Organisation, *Code of practice on workplace violence in services sectors and measures to combat this phenomenon*, Mevsws/2003/11, International Labour Organisation, Geneva, 2003.
http://www.ilo.org/public/english/dialogue/sector/techmeet/mevsws03/mevsws-cp.pdf

[237] European Foundation for the Improvement of Living and Working Conditions, 'Violence, bullying and harassment in the workplace', Office for Official Publications of the European Communities, Luxembourg, 2006.
http://www.eurofound.eu.int/ewco/reports/TN0406TR01/TN0406TR01.pdf

[238] European Agency for Safety and Health at Work, *European Week 2002: Preventing psychosocial risks at work*, Office for Official Publications of the European Communities, Luxembourg, 2002.
http://ew2002.osha.europa.eu

[239] E. Krug, L. Dahlberg, J. Mercy, A. Zwi and R. Lozano (eds), *World report on violence and health*, World Health Organisation, Geneva, 2002.
http://www.who.int/violence_injury_prevention/violence/world_report/en/full_en.pdf

[240] R. N. Wynne, N. Clarkin, T. Cox and A. Griffiths (European Commission, DG V), *Guidance on the prevention of violence at work*, Office for Official Publications of the European Communities, Luxembourg, 1997.

[241] K. Rogers and D. Chappell, 'Preventing and responding to violence at work', International Labour Organisation, Geneva, 2003.

[242] US Department of Labor, Bureau of Labor Statistics, 'Survey of workplace violence prevention', Washington, DC, 2005.
http://www.bls.gov/iif/osh_wpvs.htm

[243] V. Di Martino, H. Hoel and C. Cooper, European Foundation for the Improvement of Living and Working Conditions, *Preventing violence and harassment in the workplace*, Office for Official Publications of the European Communities, Luxembourg, 2003.
http://www.eurofound.eu.int/publications/htmlfiles/ef02109.htm

[244] H. Leymann, 'The content and development of mobbing at work', *European Journal of Work and Organizational Psychology*, No 5, 1996.

[245] Committee on Safety, Hygiene and Health Protection at Work (Commission of the European Communities), Opinion on violence at the workplace — Opinion adopted on 29 November 2001, Commission of the European Communities, Brussels, 2001.

[246] M. F. Hirigoyen, *Le harcèlement moral, la violence perverse au quotidien*, Editions La Découverte, Paris, 1998.

[247] I. Piñuel, 'Informe Cisneros V — La incidencia del mobbing ó acoso psicológico en el trabajo en la administración (AEAT e IGAE)', Universidad de Alcalá, Madrid, 2004.
http://www.lasbarricadas.net/cisnerosV.pdf

[248] D. Zapf, C. Knorz and M. Kulla, 'On the relationship between mobbing factors, and job content, social work environment, and health outcomes', *European Journal of Work and Organizational Psychology*, No 5(2), 1996.

[249] A. Upson, 'Violence at work: findings from the 2002/2003 British crime survey, Home Office Online Report 04/04', Home Office, London, 2004.
http://www.homeoffice.gov.uk/rds/pdfs2/rdsolr0404.pdf

[250] International Labour Office, International Council of Nurses, World Health Organisation, Public Services International, 'Framework guidelines for addressing workplace violence in the health sector', Geneva, ILO/ICN/WHO/PSI, 2002.
http://www.icn.ch/proof3b.screen.pdf

[251] A. Almodovar Molina, A. Fraile Cantalejo, C. Nogareda Cuixart, M. V. de la Orden Rivera, M. Zimmermann Verdejo, M. F. Villar Fernández, J. M. Lara Mendaza and F. J. Pinilla García, *V Encuesta Nacional de Condiciones de Trabajo*, Instituto Nacional de Seguridad e Higiene en el Trabajo, INSHT-MTAS, Madrid, 2004.

[252] S. Giga and H. Hoel, 'Violence and stress at work in financial services', International Labour Organisation, Geneva, 2003.
http://www.ilo.org/public/english/dialogue/sector/papers/service/wp210.pdf

[253] M. Velázquez, *Mobbing, violencia física y estrés en el trabajo — Aspectos jurídicos de los riesgos psicosociales*, Gestión 2000, Barcelona, 2005.

[254] P. Paoli, 'Violence at work in the European Union — Recent finds', International Labour Organisation, Geneva, 2000.
http://www.ilo.org/public/english/protection/safework/violence/eusurvey/eusurvey.htm

[255] P. Paoli and A. Parent-Thirion, European Foundation for the Improvement of Living and Working Conditions, *Working conditions in the acceding and candidate countries*, Office for Official Publications of the European Communities, Luxembourg, 2003.
http://www.eurofound.europa.eu/publications/htmlfiles/ef0306.htm

[256] M. O'Moore, *Bullying at work in Ireland: a national study*, Anti-Bullying Centre, Dublin, 2000.

[257] European Agency for Safety and Health at Work, 'Bullying at work', Factsheet No 23, Office for Official Publications of the European Communities, Luxembourg, 2002.
http://osha.europa.eu/publications/factsheets/23/index.htm?set_language=en

[258] D. Salin, 'Ways of explaining workplace bullying: a review of enabling, motivating and precipitating structures and processes in the work environment', *Human Relations*, No 56(10), 2003, pp. 1213–1232.

[259] M. Vartia, 'The sources of bullying — Psychological work environment and organizational climate', *European Journal of Work and Organizational Psychology*, No 5(2), 1996, pp. 203–214.

[260] H. Hoel and S. Einarsen, 'Violence at work in hotels, catering and tourism', International Labour Organisation, Geneva, 2003.
http://www.ilo.org/public/english/dialogue/sector/papers/tourism/wp211.pdf

[261] C. L. Cooper and N. Swanson, 'Workplace violence in the health sector — State of the art', International Labour Organization, Geneva, 2002.
http://www.ilo.org/public/english/dialogue/sector/papers/health/state.pdf

[262] H. Hoel, K. Sparks and G. Cooper, 'The cost of violence/stress at work and the benefits of a violence/stress-free working environment', International Labour Organisation, Geneva, 2002.
http://www.ilo.org/public/english/protection/safework/whpwb/econo/costs.pdf

[263] M. Vartia, 'Consequences of workplace bullying with respect to the well-being of its targets and the observers of bullying', *Scandinavian Journal of Work, Environment and Health*, No 27, 2001.

[264] B. M. Kudielka and S. Kern, 'Cortisol day profiles in victims of mobbing (bullying at the work place): preliminary results of a first psychobiological field study', *Journal of Psychosomatic Research*, No 56, 2004, pp. 149–150.

[265] A. M. Hansen, A. Hogh, R. Persson, B. Karlson, A. H. Garde and P. Orbaek, 'Bullying at work, health outcomes, and physiological stress response', *Journal of Psychosomatic Research*, No 60, 2006, pp. 63–72.

[266] I. Piñuel and A. Oñate, 'La incidencia del mobbing o acoso psicológico en el trabajo en España: Resultados del barómetro CISNEROS II sobre violencia en el entorno laboral', *Lan harremanak: Revista de relaciones laborales*, No 7, 2002, pp. 35–62.

[267] A. Rodríguez Muñoz, *Valoración del daño psíquico y emocional en víctimas de acoso psicológico en el trabajo*, Universidad Autónoma de Madrid, Madrid, 2006.

[268] R. Verdugo and A. Vere, 'Workplace violence in the services sector with implications for the education sector: Issues, solutions and resources', Geneva, International Labour Organisation, 2003.
http://www.ilo.org/public/english/dialogue/sector/papers/education/wp208.pdf

[269] B. Essenberg, 'Violence and stress at work in the transport sector', International Labour Organisation, Geneva, 2003.
http://www.ilo.org/public/english/dialogue/sector/papers/transport/wp205.pdf

[270] I. Graham, 'Mopping up mobbing — legislate or negotiate?', Labour Education 2003/4, No 133, Violence at Work, International Labour Organisation, Geneva, 2004.
http://www.ilo.org/public/english/dialogue/actrav/publ/133/11.pdf

[271] S. Giga, H. Hoel and C. L. Cooper, 'Violence and stress at work in the postal sector', Geneva, International Labour Organisation, 2003.
http://www.ilo.org/public/english/dialogue/sector/papers/postelcm/wp200.pdf

[272] J. Richards, 'Management of workplace violence victims', Joint Programme on Workplace Violence in the Health Sector, Geneva, 2003.
http://www.icn.ch/SewWorkplace/WPV_HS_VictimManagement.pdf

[273] D. Salin, 'Workplace bullying among business professionals: prevalence, gender differences and the role of organizational politics', *Pistes*, No 7(3), 2005.
http://www.pistes.uqam.ca/v7n3/pdf/v7n3a2en.pdf

[274] European Agency for Safety and Health at Work, *Gender issues in safety and health at work — A review*, Office for Official Publications of the European Communities, Luxembourg, 2003.
http://osha.europa.eu/publications/reports/209/index.htm?language=en

[275] European Agency for Safety and Health at Work, *Expert forecast on emerging physical risks related to occupational safety and health*, Office for Official Publications of the European Communities, Luxembourg, 2005.
http://riskobservatory.osha.europa.eu/risks/forecasts/physical_risks/

[276] European Agency for Safety and Health at Work, *Priorities for occupational safety and health research in the EU-25*, Office for Official Publications of the European Communities, Luxembourg, 2005.
http://osha.europa.eu/publications/reports/6805648

[277] European Agency for Safety and Health at Work, 'Promoting occupational safety and health research in the EU', *Forum*, No 15, Office for Official Publications of the European Communities, Luxembourg, 2006.
http://osha.europa.eu/publications/forum/15?set_language=en

How to obtain EU publications

Our priced publications are available from EU Bookshop (http://bookshop.europa.eu/), where you can place an order with the sales agent of your choice.

The Publications Office has a worldwide network of sales agents. You can obtain their contact details by sending a fax to (352) 29 29-42758.

European Agency for Safety and Health at Work

Expert forecast on emerging psychosocial risks related to occupational safety and health

Luxembourg: Office for Official Publications of the European Communities

2007 — 127 pp. — 21 x 29.7 cm

ISBN 978-92-9191-140-0

Price (excluding VAT) in Luxembourg: EUR 25

In order to improve the working environment, as regards the protection of the safety and health of workers as provided for in the Treaty and successive Community strategies and action programmes concerning health and safety at the workplace, the aim of the Agency shall be to provide the Community bodies, the Member States, the social partners and those involved in the field with the technical, scientific and economic information of use in the field of safety and health at work.

European Agency for Safety and Health at Work

http://osha.europa.eu

European Agency
for Safety and Health
at Work

Gran Vía 33, E-48009 Bilbao
Tel.: (+34) 94 479 43 60
Fax: (+34) 94 479 43 83
E-mail: information@osha.europa.eu
Price (excluding VAT) in Luxembourg: EUR 25

Publications Office
Publications.europa.eu

ISBN 978-92-9191-140-0

TE-78-07-118-EN-C