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Calculating the cost of work-related stress and psychosocial risks

European Risk Observatory
Literature Review

European Agency for Safety and Health at Work

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Table of Contents

List of tables 2
1 Introduction 4
1.1 Impact of psychosocial risks 5
1.2 Purpose of this review 6
2 Findings 6
2.1 Costs at societal level 7
2.2 Costs to organisations 12
2.3 Costs at the sectoral level 12
2.4 Economic evaluation of interventions 14
2.5 Guidelines to help estimate the costs of psychosocial issues and work-related stress 15
3 Cost of psychosocial risk-related diseases 18
3.1 Mental health problems (depression) 18
3.2 Cardiovascular diseases 18
3.3 Musculoskeletal disorders 20
3.4 Diabetes 21
4 Summary 22
5 Conclusions 23
References 24
Appendix I: Factors taken into consideration while calculating psychosocial risk- and stress-related cost 33
Appendix II: Conversion of financial figures to euros in 2013 34
Appendix III: Cost Indicators for psychological disorders in the workplace (Brun and Lamarche, 2006) 38

List of tables

Table 1: Number of claims by sector for health problems associated with work-related stress in Australia for 2003–2005 13
Table 2. CIPD's guide to estimating the costs of work-related stress to organisations. 15
Table 3: Health care costs for CVD in the EU countries (in € thousands) 19

1 Introduction

Work-related psychosocial risks and stress, together with their associated negative health and business outcomes affect a remarkable number of European workplaces (EU-OSHA, 2014a, 2014b). Significant changes affecting workplaces over the last several decades and resulting in new occupational safety and health (OSH) challenges include global socio-political developments such as increasing globalisation and the establishment of a free market, advances in information and communication technology, new types of contractual and working time arrangements as well as significant demographic changes (EU-OSHA, 2007). In a wider sociological context, working life is affected by the general acceleration of the pace of life, contributing to work intensification, constant time pressure, multitasking and the need to learn new things just to maintain the status quo (Rosa, 2013). In addition to these structural and long-term changes, the current economic crisis is placing increasing pressure on both employers and workers to remain competitive.



Many of these changes provide opportunities for development; nevertheless, when poorly managed, they may increase psychosocial risks and result in negative health and safety outcomes. The research literature has been consistent in finding that workplace characteristics affect the level of stress and number of health problems experienced by workers (Sparks et al., 1997; Sverke et al., 2002; Stansfeld and Candy, 2006). According to the EU Labour Force Survey, in 1999–2007 nearly 28 % of respondents, corresponding to approximately 55.6 million European workers, reported that their mental well-being had been affected by exposure to psychosocial risks. Too little time and too much work was the most commonly selected main risk factor (23 %). Among workers with a work-related health problem, 'stress, depression or anxiety' was reported as the most serious health problem by 14 % (European Commission, 2010). Moreover, in the 5th European Working Conditions Survey (Eurofound, 2012), around 45 % of workers reported having experienced, during the previous three years, some type of organisational change affecting their work environment, and 62 % reported working to tight deadlines. Managers are also aware of this issue, with the European Survey of Enterprises on New and Emerging Risks (ESENER; EU OSHA, 2010a) finding that 79 % of European managers are concerned about stress in their workplaces. At the same time, less than 30 % of organisations in Europe have procedures for dealing with workplace stress, harassment and third-party violence. ESENER showed that more than 40 % of European managers consider that psychosocial risk is more difficult to manage than 'traditional' OSH risks (EU-OSHA, 2010a).

Employers have a legal responsibility to reduce risks to workers' health and safety stemming from the Framework Directive (89/391/EEC), and this also includes psychosocial risks. Nevertheless, in many organisations there is an erroneous perception that addressing psychosocial risks is challenging and will incur additional costs when, in fact, the evidence suggests that failure to address these risks can be even more costly for employers, workers and societies in general (Cooper et al. 1996; EU-OSHA, 2004; Bond et al. 2006).

1.1 Impact of psychosocial risks

Psychosocial risk is the risk of detriment to a worker's psychological or physical well-being arising from the interaction between the design and management of work, within the organisational and social context (Cox and Griffiths, 2005).

Cox (1993) reported that work factors associated with psychosocial risks include excessive workload and work pace, job uncertainty, inflexible work schedules, irregular, unpredictable or unsocial work hours, poor interpersonal relationships, lack of participation, unclear role in the organisation, poor communication, poor career development and conflicting demands of work and home. Additionally, some risks may be unique to particular organisations, and can be identified through regular risk assessments, or new risks might emerge as workplaces evolve and change over (Cox, 1993).

Exposure to psychosocial risks can lead to stress among employees, resulting in poor performance and, when prolonged, serious health problems. According to the European Agency for Safety and Health at Work (EU-OSHA), work-related stress is experienced 'when the demands of the work environment exceed the workers' ability to cope with (or control) them' (EU-OSHA, 2009, p. 14). Closely linked to work-related stress is the concept of job strain, which, like work-related stress, is characterised by working conditions in which workers face high demands, but have little control or influence over their work environments (Stansfeld and Candy, 2006).


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Studies have shown that short periods of exposure to psychosocial hazards and stress are associated with reactions such as sleep disturbance, changes in mood, fatigue, headaches and stomach irritability (Beswick et al., 2006; Chandola, 2010). Prolonged exposure to psychosocial hazards has been shown to be associated with a wide range of mental and physical health outcomes, including anxiety, depression, suicide attempts, sleep problems, back pain, chronic fatigue, digestive problems, autoimmune disease, poor immune function, cardiovascular disease, high blood pressure and peptic ulcers (Bosma et al., 1998; Guglielmi and Tatrow, 1998; Belkic et al., 2000; Stansfeld et al., 2000; Beswick et al., 2006; Sobeih et al., 2006; Stansfeld and Candy, 2006; Cohen, 2012).

Other 'human costs' of stress and psychosocial risks at work include the emotional strain and reduction in quality of life experienced by affected individuals (Hoel et al., 2001). There is evidence that workplace stress is related to a decline in the quality of relationships with spouse, children and other family members (Crouter et al., 2001; Dembe, 2001; Amick and Mustard, 2005).

Ultimately, psychosocial risks and their associated effects on health will impose a significant financial burden on individuals, organisations and societies (European Commission, 2002; EU-OSHA, 2009).

At the individual level, this may be related to increased medical and insurance costs and reduced income. Although the costs of health care in European countries are typically covered by the national health care systems, rather than by individuals (De Curtis, 2012), having to take time off work or leave employment as a result of stress-related illness or injury could have a direct impact on workers' level of earnings. In some countries workers are able to take sick leave on full pay, whereas in others workers on sick leave will have their wages reduced (Hoel et al., 2001; Scheil-Adlung and Sandner, 2010). Alternatively, some workers might have to leave employment completely. The 2009 Austrian Employee Health Monitor revealed, for example, that 42 % of white-collar workers taking early retirement do so because of work-related psychosocial disorders (Eurofound, 2010). Research on other occupational diseases such as work-related asthma (HSE, 2006) and musculoskeletal disorders (EU-OSHA, 2000) has shown that workers affected by these occupational diseases do indeed experience a drop in income. In some European countries, workers experiencing serious work-related mental health problems may receive compensation, nevertheless, the procedure to go through this process can be fairly hard (Eurogip, 2013).

At the organisational level, the financial implications of work-related stress and psychosocial risks are associated with deterioration of productivity, higher levels of absenteeism and employee turnover. In the United Kingdom, in 2011/12, work-related stress caused workers to lose 10.4 million working days, and workers were absent for on average 24 days (HSE, 2013). Other national studies show, for example, that about a fifth of staff turnover can be related to stress at work (CIPD, 2008a), and that among employees who state that they 'always work under pressure', the accident rate is about five times higher than that of employees who are 'never' subject to pressurised work (Eurofound, 2007).

At a societal level, ill health associated with chronic work-related stress and prolonged exposure to psychosocial risks at work can strain national health services and reduce economic productivity, having a negative impact on a country's gross domestic product (GDP) (Hoel et al., 2001; Béjean and Sultan-Taieb, 2005).

1.2 Purpose of this review

Whilst there is growing evidence suggesting that, in general, work-related stress comes with significant financial costs, data showing the actual nature of the financial burden of work-related stress and psychosocial hazards for employers and societies remains limited.

The purpose of this project was to conduct a literature review on the financial burden of work-related stress and psychosocial risk at work at societal, sectoral, organisational and individual levels. Although the review looked at the methodologies employed to calculate the costs, it does not provide a deeper economic analysis.[1] The aim was to collect the available data, and to explore and discuss the complexity of the issue, identifying the existing gaps.

The information included in the report is based on data published in the scientific and grey literature.

The sources used included:

- academic literature (i.e. searching academic databases and conference presentations)
- grey literature (i.e. Google/Google Scholar)
- information from reputable organisations (e.g. the International Labour Organization (ILO), World Health Organization (WHO), national OSH institutions,/labour inspections, etc.).

2 Findings

Most studies indicating the cost of psychosocial risks and stress utilise a deductive or inductive approach. In the deductive approach, the total cost of illness is determined and an estimate of the percentage of work-related cases is applied to that figure to obtain the total cost of work-related illness and diseases. The inductive approach identifies the different types of costs involved, before calculating them and summing them to obtain the total cost of work-related illness and disease. Additionally, many of the identified studies presented figures based on calculation of 'attributable fractions', the proportions of a negative outcome (e.g. disease) that can be attributed to, in this case psychosocial risks or stress at work. This allowed to 'extract' costs related to psychosocial risks or stress from the total financial burden associated with a particular problem. Whenever possible, the method of calculating the costs is indicated when reporting a particular study. Nevertheless, it should be noted that quite often the methodologies found were not purely inductive or deductive, and in some cases the type of methodological approach used was not reported.

The following chapters present the findings in terms of the financial costs of stress and psychosocial risks at the societal and organisational level. This is followed by a chapter presenting selected data on the economic burden of illnesses which evidence shows are associated with psychosocial working

[1] EU-OSHA has also carried out a literature review examining the costs associated with general occupational health and safety. This policy-oriented report presents a review of economic models that estimate the cost of poor or non-OSH, with the aim of understanding the rationale behind the different estimates and obtaining a better knowledge of the economic impact of poor OSH. Available at https://osha.europa.eu/en/publications/reports/estimating-the-costs-of-accidents-and-ill-health-at-work/view

conditions. It should be emphasised that, as the data presented were calculated utilising different methodologies, considered different sub-costs and used different currencies and time periods, any comparisons have to be made with great caution.

2.1 Costs at societal level

Europe

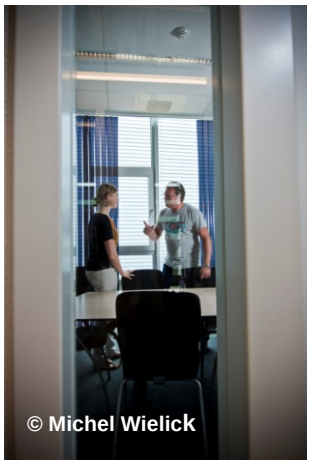
In 2002, the European Commission (2002) calculated the costs of work-related stress in the EU-15 at €20 billion a year. This figure was based on an EU-OSHA (1999) survey that found that the total cost to the EU-15 countries of work-related illness was between €185 and 289 billion a year. Using estimates derived from other researchers (Davies and Teasdale 1994; Levi and Lunde-Jensen, 1996) indicating that 10 % of work-related illness is stress related, this percentage was applied to a conservative estimate of the total cost of work-related illness (€200 billion) to obtain the figure of €20 billion for the cost of work-related stress for this group of countries.

In the recent EU-funded project carried out by Matrix (2013), the cost to Europe of work-related depression was estimated to be €617 billion annually. The total was made up of costs to employers resulting from absenteeism and presenteeism (€272 billion), loss of productivity (€242 billion), health care costs of €63 billion and social welfare costs in the form of disability benefit payments (€39 billion).[2]

Denmark

Juel et al. (2006) calculated the annual costs attributable to job strain in Denmark. They estimated the cost of health admissions to be DKK803 million[3] and insurance benefits costs of DKK52 million. In addition, depending on the methodology of the estimations, the cost of sick leave was calculated at between DKK1.4 and 1.5 billion, the cost of early retirement at between DKK0.2 and 9 billion and the cost of deaths at between DKK0.08 and 3.5 billion. However, it was further estimated that premature deaths reduced the health service bill by DKK169 million, and so this figure was deducted from the total costs. Thus, the final cost of job strain was calculated to be between DKK2.3 and 14.7 billion annually.

France



The cost of job strain in France, as calculated by Bejean and Sultan-Taieb (2005, based on data from 2000), can be attributed to sub-costs such as medical costs (€413 million), sick leave (€279 million), loss of productivity due to premature death relative to retirement age (€474 million) and years of life lost relative to life expectancy (€954 million). The sums of these categories lead to figures for workplace stress cost in France of between €1.17 and €1.97 billion a year. Additionally, it was estimated that depression due to high work demands cost France between €650 million and €752 million and work stress-related cardiovascular disease (CVD) cost between €388 million and €715 million. The cost of musculoskeletal disorders (MSDs) associated with high job demands was €27 million (Bejean and Sultan-Taieb, 2005).

More recently, Trontin et al. (2010) calculated the cost of job strain in France based on the findings of epidemiological studies including data for the prevalence of cardiovascular diseases, mental disorders and musculoskeletal problems. The estimated proportions of these disorders attributable to high job strain were then multiplied by various

[2] See also section 3.1.
[3] Appendix II presents the adjusted euro equivalents of the costs calculated in non-euro currencies.

types of costs, including health care (giving a figure of €124–199 million), absenteeism (€826–1 284 million), loss of activity (€756–1235 million) and loss of productivity due to premature death (€166–279 million). The total cost of job strain was estimated at €1.9 to €3 billion (in 2007).

Germany

In Germany, attributable fractions were used to estimate the direct and indirect costs of job strain and resulted in a total cost of €29.2 billion annually (Bodeker and Friedrichs, 2011). This included €9.9 billion in direct costs (prevention, rehabilitation, maintenance treatment and administration) and €19.3 billion in indirect costs (lost working years through incapacity, disability and premature death).

Another report (Booz and Company, 2011) estimated that in general, the annual sickness and presenteeism cost per employee in Germany to be €1 199 and €2 399 respectively.

The Netherlands

In the Netherlands, Blatter and colleagues (2005) used data from various national sources and surveys to calculate prevalence rates of self-reported disability, doctor visits, long-term disability and sickness absence due to psychosocial loads. These were then used to calculate the cost of absence (€1.3 billion), the cost of disability benefits (€1.7 billion) and medical costs (€1.02 billion), giving a total for the estimated annual cost of job strain in the Netherlands of €4 billion. In comparison, Koningsveld et al. (2003) estimated the cost of poor working conditions in the Netherlands in 2001 to be €6 billion, or 2.96 % of the country's GDP. The total estimated cost took into account absenteeism, occupational disability, work-related accidents, risk prevention, safety enforcement and health care. When broken down by diagnosis, it was found 40 % of these costs were attributable to psychosocial disease.

Spain

In Spain, it was estimated that between 11 % and 27 % of mental disorders can be attributed to working conditions (UGT, 2013). The direct health cost of mental and behavioural disorders attributable to work was estimated to be between €150 and €372 million in 2010. This represented 0.24 % to 0.58 % of total health expenditure in Spain for that year. Men accounted for almost two-thirds of the overall cost. In the case of substance abuse-related disorders, the total cost of which was calculated to be over €35 million, men accounted for almost four-fifths of the total. The cost of anxiety disorders, higher for women, was nearly €15 million.

According to the same report, the number of days of sick leave caused by temporary mental illness attributable to the workplace environment was 2.78 million in 2010, which is equivalent to a cost of €170.96 million. Furthermore, it has been calculated that of the 17 979 deaths related to mental health problems (including suicide and self-harm) in Spain in 2010, 312 could be attributed to working conditions. Calculation of the 'years of potential life lost' indicated that the cost of premature mortality that could be attributed to the work ranged between €63.9 and €78.9 million.

Pastrana (2002) used a deductive approach to calculate the cost of mobbing (harassment) in Spain, focusing on disability as a possible outcome. Among a sample of 6 500 cases of temporary disability, 1.71 % of were attributed to mobbing. Consequently, by applying this percentage to the cost of temporary disability in Spain, the estimated annual costs of mobbing totalled €52 million.

Another study focusing on mobbing was carried out by Carnero and Martinez (2006). The authors first calculated the cost of mobbing at the individual level (two different medical costs were taken into consideration: doctor visits and drug costs) and then multiplied this figure by the total number of the working population that may be affected by mobbing. In the 2003 Spanish Working Conditions Survey, 263 out of 5 236 (5.02 %) respondents could be identified as mobbing victims, and the authors chose to provide a conservative estimate (based on the lower number of cases). The medical cost for the affected individual depended on the severity of experienced mobbing and ranged from €0 to €1 710, with the average cost being €100. After multiplying the average medical costs by the percentage of Spanish workers who reported experiencing mobbing, and then extrapolating this to the entire Spanish

working population, the total medical costs related to mobbing at work were calculated to be approximately €62 million a year (0.12 % of public health expenses).

Switzerland

Ramaciotti and Perriard (2003) also utilised an inductive approach to estimate the costs of stress in Switzerland. Costs were summed at the individual level before being extrapolated to the working population. The information on which the calculations were based was collected through telephone interviews and home visits, and included information on work absence, use of inpatient and outpatient medical services and the costs of prescription drugs and self-medication and physiotherapy. The participants were also asked about the level of stress they were experiencing. Although the study examined stress 'in general', only 4.6 % of the sample attributed stress only to non-work stressors. Participants were then classified according whether they were 'often/very often', 'sometimes' or 'never' stressed. The cost of stress to an individual was then obtained by subtracting the average medical costs of someone who was 'never' stressed (CHF 461.68)[4] from those of respondents who reported being 'sometimes' stressed (CHF 967.75) or 'often/very often' stressed (CHF 1 315.33). This resulted in an average stress cost turned of CHF 648.60 per person. This was then extrapolated to the whole of Switzerland, to give an annual total of CHF4.2 billion, equivalent to 1.2 % of the country's GDP.

Sweden



Levi and Lunde-Jensen (1996) calculated the cost of job strain in Sweden based on health care costs, sickness absence costs and loss of productivity due to early death and retirement. This was achieved by estimating the proportion of workers who were exposed to high job demands and had low control in the workplace, using data from the First European Survey of the Working Environment in 1991/92. The total cost of job strain obtained was ECU 450 million.

Levi and Lunde-Jensen (1996) additionally found that cardiovascular disorders (CVD) accounted of 4 % of the costs of occupational accidents and ill health caused by work stress. Using figures from 1992 and calculating in euros, this equated to €177 million in Sweden and €125 million in Denmark.

United Kingdom

The Sainsbury Centre for Mental Health (2007) estimated that sickness absence due to stress, anxiety and depression costs British society approximately £1.26 billion a year[4]. This figure was obtained by multiplying the average duration, in days, of work-related illness absences by the daily absence cost and the total number of episodes of absence.

Chandola (2010) used data from 2001/02 indicating that 35 % of self-reported health complaints are due to stress, anxiety or depression. This percentage was then applied to the Health and Safety Executive's (HSE) cost of work-related ill-health and accidents in 2001/02 of £20–36 billion a year. This deductive approach resulted in a cost for work-related stress of between £7 and £10 billion for 2001/02, equivalent to 0.7–1.2 % of the country's GDP.

[4] Appendix II presents the adjusted euro equivalents of the costs calculated in non-euro currencies

In 2010/11, the Health and Safety executive (HSE, 2010/11) conservatively estimated the cost of stress, depression and anxiety at £3.6 billion. This was based on an estimated cost of one case (£16 400) multiplied by the reported number of cases of 'stress, depression and anxiety' (222 000). This is the total cost incurred by individuals, employers and the government, and includes health care and rehabilitation costs, costs resulting from disruption of production, loss of income, and administrative and legal costs.

Giga et al. (2008) examined how the use of different analytical approaches might affect the estimated final cost of workplace harassment. They first adjusted for inflation Beswick and colleagues' (2006) estimated costs of work-related stress from 1995/96 to obtain an estimated figure of £4.55 billion for 2007. As research has shown that harassment accounts for between 10 % and 20 % of the costs for work-related stress, the median estimate of 15 % was used to determine a figure for the cost of workplace harassment in the UK of £682 million a year. Applying the same figure of 15 % to the cost of stress-related absence only, the total annual cost of which is £1.33 billion, resulted in a cost of harassment-related absence of £199 million.

A second deductive approach was based on the previous finding by Gordon and Risley (1999, quoted in Giga et. al. 2008) suggesting that the cost of harassment in the UK is between 1.4 % and 2 % of GDP. Applying a conservative figure of 1.5 % to the UK economy shows that the cost of harassment may, in fact, be as high as £17.65 billion annually.

And finally, using an inductive approach, Giga et al. (2008) estimated the costs of harassment-related absence (number of lost days × median daily wage), staff turnover (number of harassment-related resignations × average cost of replacement) and loss of productivity (number of workers × working weeks × median weekly salary × productivity loss). Summing the individual totals of £3.06 billion, £1.55 billion and £9.14 billion gives an estimated total cost of harassment of £13.75 billion annually.

Consequently, Giga and colleagues (2008) were able to provide three figures ranging from £682 million to £17.65 billion, the latter being more than 25 times the former.

Non-European countries

Australia

Based on statistics from 2008/09, Safe Work Australia (2012a) estimated that work-related mental stress costs Australian society AU$5.3 billion annually[5]. This figure includes costs resulting from disruption of production and medical costs.

In 2009/10, Safe Work Australia paid out on 6 480 claims for work-related mental stress, with the median value of claims being AU$12 700 (Safe Work Australia, 2012b, 2013). In comparison, the median pay-out for all other claims (regardless of injury/illness type) was AU$1 500. A breakdown of the attributed cause of mental stress between 2008 and 2011 revealed that 33 % of mental stress claims were due to work pressure, 22 % to work-related harassment or bullying, 21 % to exposure to violence in the workplace and 14 % to other mental stress factors (Safe Work Australia, 2013).

LaMontagne et al. (2010) looked at the costs of lost work productivity, health service use, staff turnover and replacement and antidepressant medication due to job strain-related depression. Previous findings have shown that 13.2 % of depression in men and 17.2 % in women is due to job strain. The authors then applied these percentages to the total cost of depression in Australia. Their report revealed that the cost of depression related to job strain is around AU$730 million a year. Further analysis showed that workers with job strain-related depression in 2007 will cost Australia AU$11.8 billion over their lifetimes.

Sheehan and colleagues (2001) estimated the annual costs of bullying in the Australian workplace, using various estimates of the prevalence rates of bullying. When the authors used a conservative estimate (a prevalence of 3.5 %), the estimated cost of bullying was approximately AU$6–13 billion,

[5] Appendix II presents the adjusted euro equivalents of the costs calculated in non-euro currencies.

while a model based on a higher prevalence of bullying (15 %) resulted in a figure of between AU$17 and AU$36 billion.

Finally, Econtech (2008) estimated the costs of presenteeism and absenteeism due to work-related stress to be approximately AU$9.69 billion AU$5.12 billion respectively, or a total of AU$14.81 billion a year. However, no further details on how these figures were calculated has been published.

Canada

In Canada, the annual cost to society (including the cost of mental health care, social service costs and other costs) of work-related stress and stress-related illness was estimated to be CA$2.75 billion for a low prevalence of stress and CA$8.25 billion[6] for higher estimated prevalence (Shain, 2008). Similarly, a conservative estimate of the annual cost to Canadian employers of stress-related mental illness and lost productivity was between CA$222 million and CA$2.75 billion. The sum of these figures led the authors to estimate the total cost of work-related stress in Canada as between CA$2.9 billion and CA$11 billion.

United States

In 1987, Matteson and Ivancevich calculated that the annual cost of workplace stress to the US economy was US$300 billion[6]. They envisaged the US economy as being made up of notional firms of 1000 employees each and calculated the costs of stress-related absenteeism, additional overstaffing, counterproductive work performance/poor performance and staff turnover in businesses of this size. It was then found that, on average, stress costs US$2 770 per employee. This cost was then multiplied by the 108 million total workers in the USA at that time to obtain a cost of US$300 billion a year.

Rosch (2001) also estimated that stress costs the US economy US$300 billion annually, this figure being based on Albrecht's (1979) conservative estimate of the annual cost of stress-related absence and staff turnover of US$150 billion. This figure included staff costs relating to training and replacement of staff who are on sickness leave or have left the company. Some 20 years later, Rosch argued that absenteeism and staff turnover rates and their expenses have doubled.

NIOSH (1999, quoted by Jauregui and Schnall, 2009) estimated that work-related stress costs the American industry more than US$200 billion annually. However, this figure included 'only' absenteeism and employee turnover.

Kaufer and Mattman (1996) reported on studies estimating the cost of workplace violence in the USA at US$36 billion in 1993 and US$35.4 billion in 1995. The calculations were based on a survey among over 600 professionals from various organisations dealing with workplace violence, providing data on the prevalence and costs.

In a study carried out in the USA (Manning et al., 1996a) to estimate the costs of work stress at the individual level, the health care costs paid by workers were calculated and working conditions were assessed at baseline and then compared with the costs paid after 12 months. Certain stressful work events (e.g. being 'transferred against your will to a new position or assignment') and job strain, as well as the need for social support, and other psychosocial factors, predicted 16 % of health care costs measured after 12 months. Similarly, a study by Ganster et al. (2001) among nurses found that increased individual health care costs were associated with a subjective increase in workload, increased cortisol levels and increased patient contact hours and with a decrease in job control.

[6] Appendix II presents the adjusted euro equivalents of the costs calculated in non-euro currencies.

2.2 Costs to organisations

This section focuses on the costs of psychosocial risks and stress at the organisational level, including the cost-effectiveness of workplace interventions. It also presents some guidelines that organisations can use to assess the cost of psychosocial risks and stress in the workplace.



The evidence shows clearly that work-related stress and psychosocial issues lead to increased absenteeism and staff turnover rates, along with decreased productivity and performance (European Commission, 2002; Hoel et al., 2001). Nevertheless, methods to estimate the cost at organisational level are few and exact figures for the financial burden are rare.

The Sainsbury Centre for Mental Health (2007) suggests that the overall cost to British employers of stress, anxiety and depression amounts to £1 035 per employee per year (€1 220). Of this total, £335 (€400) (32.4 %) is due to absenteeism, £605 (€710), or 58.4 %, to 'presenteeism' and £95 to staff turnover (9.2 %).

In 2001, Hoel et al. estimated that 30 % of sickness absence is directly caused by stress. Consequently, they applied this percentage to data from the Confederation of British Industry, which had estimated the cost of absence at £438 per employee per year or £56 per employee per day. These figures equate to an average stress-related sickness absence cost of £131 per employee per year. However, when all forms of stress (i.e. impact of long hours, lack of commitment, personal problems and low workplace morale) are included, the ratio rises to 40 % of sickness absence. This, in turn, raises the average cost per employee to an estimated £175 per year. Hoel and colleagues (2001) further emphasised that these estimated costs still do not include loss of productivity or replacement costs.

Leymann (1990) estimated that in the USA mobbing (harassment) costs organisations between US$30 000 and US$100 000 per victim. Sandroff, in 1988 (cited by Faley et al., 2006) surveyed 160 women employed in 'Fortune 500' companies to estimate the cost of sexual harassment of women in the workplace. The costs associated with absenteeism, staff turnover and loss of productivity were added together and extrapolated to a hypothetical company with more than 20 000 workers; for a company of this size, the cost of sexual harassment was an estimated US$6.7 million annually.

2.3 Costs at the sectoral level

- **Construction**

In Germany (Bundesministerium für Arbeit und Soziales, 2012), psychosocial disorders are responsible for the loss of 1.5 million working days in the construction industry each year (5.2 % of the total working days lost), leading to an overall loss of €160 million to the sector's economy. The study does not specify however what portion of those psychosocial disorders are work related.

- **Education**

A survey of UK teachers by the Schools Advisory Service (2004) found that each year 213 300 days of work are lost as a result stress, anxiety and depression, at a cost of £19 million.

- **Health care**

The British National Health Service (NHS) has reported that the annual direct cost of sickness absence is £1.7 billion (Boormans, 2009). As the NHS data indicates that 25 % of absence is related

to ‘stress, depression and anxiety’, it may suggest that the cost of stress-related absenteeism is approximately £425 million a year.

The National Audit Office (2003) of the United Kingdom has estimated that third party violence and aggression towards health care workers cause 40 % of general work-related sickness absence, permanent injury benefits, ill health retirements and out-of-court payments cost in the health sector, costing £69 million annually.

- **Public administration**

The ‘public and private services’ sector in Germany encompasses social work, public administration as well as several other job groups. Bundesministerium für Arbeit und Soziales (2012) calculated a loss of 22.8 million days per year due to psychosocial disorders in this sector, leading to a production loss of about €2.03 billion and a loss of gross value of €2.51 billion. Again it is assumed that work-related psychosocial disorders account for a significant proportion of these costs.



Australia

Interesting figures illustrating work-related stress claims and its associated costs in different sectors are provided by the Australian Safety and Compensation Council (2007). The numbers of claims are presented in Table 1. The median cross-sector pay-out per claim was AU$13 100 (Australia Safety and Compensation Council, 2007; Safe Work Australia, 2012b).

Table 1: Number of claims by sector for health problems associated with work-related stress in Australia for 2003–2005 (median pay-out per case AU$13 100)

Sector	Number of claims
Construction	285
Education	3 065
Health care	3 480
Hotels and restaurants	630
Public administration and defence	1 450

Sources: Australia Safety and Compensation Council (2007), Safe Work Australia (2012b).

2.4 Economic evaluation of interventions

This chapter presents findings relating to the cost-effectiveness of workplace stress or psychosocial hazard interventions (for a review of different types of interventions see, for example, van den Bossche and Houtman, 2003; LaMontagne et al., 2007; European Commission, 2011b); EU-OSHA and Eurofound, 2014b).

A report prepared by Matrix (2013) examined the cost-effectiveness of different types of interventions focusing on mental health promotion and mental disorder prevention in the workplace, including improvements in the work environment, stress management and psychological treatment. The findings based on figures obtained in selected European countries show that every €1 of expenditure in promotion and prevention programme generates net economic benefits over a one-year period of up to €13.62.

In the Netherlands, the total cost of workplace interventions targeting psychosocial risks in the police sector over a period of 4 years was calculated to €3 million. As a result, the number of reported psychosocial risks decreased, with courses to handle violence and aggression perceived as the most effective measure implemented. A 3 % reduction in absenteeism was observed, with the associated savings estimated at €40 million (Houtman and Jettinghoff, 2007).

Organisational interventions aimed at reducing stress and sickness absence among council workers in the United Kingdom were reported to result in savings of £1.13 million over two years (Tasho et al., 2005).


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LaMontagne et al. (2007) reviewed 90 studies of the effectiveness of stress management intervention, of which eight included a cost–benefit analysis. All eight demonstrated a financial benefit from the intervention utilised, with outcome measures including sickness absence costs, sales revenue and productivity. As an example, LaMontagne et al. (2007) describe a study carried out in Dutch hospitals (Lourijsen et al., 1999), which found that the hospitals that implemented steering committees with a broad staff composition to identify psychosocial risks and develop solutions observed a reduction in absenteeism rates over a four-year period while no reduction in absence was observed in the 'control group', i.e. in the hospitals that did not implement this intervention. Moreover, the cost of the interventions (1.2 million guilders) was outweighed by the estimated benefits (1.6 million guilders). In another study highlighted by LaMontagne et al., sales staff attended stress management training and formed work groups to identify and reduce psychosocial hazards (Munz et al., 2001). Three months after the intervention, measures of perceived stress, depressive symptoms and negative affect were lower among the intervention group than in a control group. Furthermore, among workers exposed to the interventions, sales revenue increased by 23 % (compared with 17 % in the control group) and absenteeism decreased by 24 % (compared with 7 % in the control group).

In 2008 – 2011, Health Promotion Switzerland and the Association of Swiss Insurance services implemented the SWiNG project, a stress interventions programme involving eight large Swiss enterprises employing in total more than 5,000 workers (Health Promotion Switzerland, 2011). Interventions included management training to increase awareness of stress prevention, assessing the current situation of the organisation in relation to stress, stress management courses and 'team reflection' sessions, as well as implementing organisational changes to prevent stress. The results indicated that 25% of workers felt there were fewer psychosocial hazards present in the workplace than before (e.g. decrease in demands, more resources available), workers reported better general health, and up to 2.6 days less absence a year was observed. In terms of the cost-benefits, over a two and a half year period the programme cost CHF 755 per employee, while the average conservative

benefit per employee was CHF 195 a year. It has been suggested, however, that benefits of the interventions are long-term and in time the organisations would observe a positive financial return on their investment.

Hamberg-van Reenen et al. (2012) reviewed the evidence on the cost-effectiveness of and financial returns accruing from workplace mental health interventions in the USA. Of four economic evaluations on the prevention or treatment of mental health problems (such as stress and depression), three had low to moderate methodological quality but all four showed a positive cost–benefit ratio. Net benefits after one year ranged from US$29 to US$61 per employee, while returns per employee over longer time periods were US$257 after two years and up to US$257 after five years. However, of six interventions targeted at getting employees to return to work, only one demonstrated a positive cost-effectiveness.

2.5 Guidelines to help estimate the costs of psychosocial issues and work-related stress

Several guidelines developed to help organisations obtain a better understanding of the estimated financial cost to them of workplace psychosocial risks and stress have been found (Hoel et al., 2001; Tangri, 2002; Brun and Lamarche, 2006; CIPD, 2008b). These guides vary in complexity, but all are based on the inductive approach (i.e. an estimation method in which individual costs for identified categories are calculated and summed to obtain the total cost of stress or psychosocial risks). However, it is recognised that in some organisations, particularly micro- and small-enterprises, available data is usually limited and it may not be feasible to include all of the possible cost-generating factors when calculating the financial burden of psychosocial risks.

The review by Hoel and colleagues (2001) identified seven aspects that needed to be estimated in order to obtain a total cost of work-related stress to the organisation: stress-related sickness absence; premature retirement; staff replacement costs; grievance and litigation/compensation costs; damage to equipment and production resulting from accidents and mistakes; reduced performance/productivity; and loss of public goodwill and reputation.

Tangri (2002) proposed a formula to facilitate the calculation of the cost of stress in organisations. This is based on percentages drawn from the research literature for the proportions of certain workplace costs attributable to stress. According to this formula, a conservative estimate of an organisation's costs of stress can be obtained by summing the following costs (if applicable): 19 % of the absenteeism cost; 40 % of the staff turnover cost; 55 % of the cost of employee assistance programmes or related healthcare/counselling services; 30 % of short- and long-term disability costs; 10 % of drug plan costs (psychotherapeutic); 60 % of the total costs of workplace accidents; and the total cost of workers' compensation claims and lawsuits due to stress.

In 2008, the Chartered Institute of Personnel and Development (CIPD, 2008b) in the United Kingdom published a report examining the business case for managing stress. The report also provides guidance to enable to organisations to estimate the costs of work-related stress. The categories taken into consideration and some examples of calculating the cost (based on the data from the United Kingdom) are presented in Table 2.

Table 2: CIPD's guide to estimating the costs of work-related stress to organisations.

Sickness absence	First, estimate the proportion of sickness absence that is stress related. Alternatively, research averages can be used, such as for example the NHS Scotland's estimate that between 30 % and 60 % of absence is stress related. Secondly, estimate the annual cost of sickness absence per employee. Alternatively, the CIPD in 2008 estimated this figure to be £666 per employee.

	Third, multiply the figures from steps 1 and 2, and then multiply this figure by the number of employees in the company. For example, for a company with 10 employees that wants to calculate a conservative estimate of stress-related sickness, the formula would be (0.3 × 666) × 10 = £1 998
Presenteeism	If an organisation cannot estimate the cost of presenteeism or productivity loss, national estimates can be used instead. For example, in the United Kingdom the cost of stress-related presenteeism is estimated to be £605 per employee per year (Sainsbury Centre for Mental Health, 2007). Therefore, presenteeism costs a company with 10 employees an estimated £6 050 per year.
Turnover	The cost of stress-related staff turnover is calculated in similar way to the cost of sickness absence. First, the proportion of stress-related staff turnover is estimated. Alternatively, use the figure from the CIPD's Annual Survey in 2008, which showed that 19 % of UK turnover is stress related. Next, estimate the cost of replacing an employee. If this information is not available, the CIPD in 2008 estimated this figure to be £5 800 for the average employee but it depends on employee role and sector. Finally, multiply the figures from steps 1 and 2 and then multiply this figure by the number of employees who have left the company. For example, if three employees have left the company in the past year, the cost of stress-related staff turnover would be 0.19 × £5 800 ×3 = £3 306.
Other costs	For example, costs associated with accidents and injuries, workplace conflict, employee relations, insurance premiums
Costs related to stake holders	For example, company reputation, brand and investor relations.

Source: Chartered Institute of Personnel and Development (2008).

Another self-assessment tool developed in Canada by Brun and Lamarche (2006) is based on research evidence that the greatest costs to an organisation stems from absenteeism and presenteeism. Developed through focus groups with subject matter experts, Brun and Lamarche (2006) identified 39 cost indicators, broken down as follows:

- 14 baseline data indicators, such as total annual number of absences, total annual number of days worked, organisation's annual profits and organisation's average hourly wage;
- 14 absenteeism indicators, such as disability costs, costs of managing disability cases, premiums for workers' compensation and medical expertise;
- 2 presenteeism indicators: increase in errors and decrease in quality and production;
- 9 indicators common to absenteeism and presenteeism, including loss of productivity, union leave time, external expertise and employee assistance programmes.

A full list of all indicators and their descriptions are provided in Appendix III. Although it may be unrealistic for all organisations to have available all the indicated data, the cost indicators provide a guide for organisations to use to estimate the costs of stress.

Assessing the cost of absenteeism

There are two approaches to measuring the impact of absenteeism in the workplace: the lost wages method and the friction cost method (Brun and Lamarche, 2006).

The lost wages method, also called the human capital method, is mainly used to measure the economic impact of illness and premature death (Berger et al., 2001). It involves multiplying the number of days lost by the absent employee's daily salary or by the organisation's average salary. Therefore, it assumes that the absent employee's salary represents the cost of health problems to the organisation's productivity. As indirect cost indicators (i.e. legal fees, medical expertise fees, worker replacement costs, lost production) are excluded from this figure, this method provides a conservative estimate.

The friction cost method attempts to quantify the impact of absenteeism by identifying short-term costs (Koopmanschap et al., 1995). Short-term costs depend on the time taken by the organisation to resume normal levels of productivity (as it was prior to the absence), a period known as the friction period. It is assumed that productivity losses are restricted to this time required to replace the absent worker and for the replacement worker to become productive. However, a limitation of this method is that it does not take into account the possibility that absent workers are not replaced and/or work is redistributed to others.

Assessing the cost of presenteeism

Presenteeism is the reduction in an employees' performance as a result of health issues (Collins et al., 2005) when workers chose to attend work but are not able to perform at their normal capacity. Examinations of the costs of presenteeism associated with mental health (McDaid, 2007) and general health problems (Collins et al., 2005) have shown these to be multiple times higher than absenteeism costs. However, it is not easy to estimate the prevalence of presenteeism in a workplace or to quantify lost productivity (Tangri, 2002; Krol et al., 2012). Despite this, there are measures, such as the World Health Organization's Health and Work Performance Questionnaire (HPQ) and the Stanford Presenteeism Scale (SPS), which can be used to assess levels of presenteeism in the workplace.



Although both are self-report measures, the SPS (Koopman et al., 2002; Turpin et al., 2004) and the HPQ (Kessler et al., 2003) have been shown to be valid, reliable and consistent with organisations' own data. The SPS contains either 32 or 6 questions that assess the impact of health on productivity. An example item is: 'Compared to my usual level of productivity, when my (health problem) bothers me, the percentage of work that I was able to accomplish was…'. The HPQ, in contrast, examines absenteeism, presenteeism and critical incidents such as accidents and injuries in the workplace. An example item from the HPQ is 'How often was the quality of your work lower than it should have been?'. Respondents can chose from options ranging from 'all of the time' to 'none of the time'. Although neither measure examines actual financial costs, the prevalence and level of production loss can assist in the calculation of the cost of presenteeism.

3 Cost of psychosocial risk-related diseases

Research carried out over several decades provides evidence of an association between psychosocial risks and stress at work and negative health outcomes such as mental health problems (depression), cardiovascular disease, musculoskeletal disorders and also, recently, diabetes. The extent to which work contributes to the development of these negative outcomes is usually not easily determined; nevertheless, when exploring the financial burden of stress and psychosocial risks, it is worth taking into consideration the costs associated also with these health problems.

3.1 Mental health problems (depression)

Work-related stress has been established as important determinant of depressive disorders (Levi, 2005). The link between psychosocial work characteristics and severe depressive symptoms was observed, for example, in a longitudinal study conducted between 1995 and 2000 in Denmark (Rugulies et al., 2006). Among a sample of over 4 000 participants representative of the Danish workforce, psychosocial work characteristics, including quantitative demands, influence at work, possibilities for development, social support from supervisors and co-workers and job insecurity, were found to be related to the risk of developing severe depressive symptoms. In one review of 14 longitudinal studies examining this relationship, Netterstrøm et al. (2008) found that high job demands doubled the likelihood of developing depression. In another review of 16 population-based studies comprising 63 000 workers, Bonde (2008) found that job strain (characterised by high demand and low control) significantly increased the risk of subsequent depressive symptoms or a major depressive episode.

Cost of depression

Sobocki et al. (2006) collected national and European data from 28 European countries in order to estimate the total cost of depression in Europe. Using prevalence data over a one-year period, they found that in 2004 the cost of depression in Europe totalled €118 billion. This was equivalent to 1 % of Europe's GDP. Direct costs accounted for €42 billion, and consisted of drug costs (€9 billion), hospitalisation (€10 billion) and outpatient care (€22 billion). Indirect costs were higher (€76 billion) and consisted of morbidity- and mortality-related costs. Outside Europe, Greenberg and colleagues (2003) calculated that in 2000 the cost of depression in the USA was US$83.1 billion. This figure comprised medical costs (US$26.1 billion), suicide-related mortality costs (US$5.4 billion) and workplace costs (US$51.5 billion).

According to the European Network for Work Health Promotion, mental health disorders in general cost Europe €240 billion per year. This figure originates from a cross-European study led by Andlin-Sobocki et al. (2005), who developed a model that uses epidemiological and economic data to estimate the total cost of mental health and brain disorders in Europe. The study encompassed the EU countries, Iceland, Norway and Switzerland. The statistical model developed was based on converting the available economic data into euros, following which adjustments were made to account for differences in the purchasing power and economic size of the different European countries in order to calculate the total costs of each mental health issue or brain disorder. The study found that the costliest disorders were mental health disorders, which were estimated to cost €240 billion per annum. This figure included health care costs (€97 billion), direct non-medical costs (€9 billion) and indirect costs (€133 billion).

3.2 Cardiovascular diseases

The link between psychosocial factors, in particular work-related stress, and cardiovascular disease (CVD) is fairly well established (Schnall et al., 2000). In 2004, the WHO concluded that "overall, the evidence indicates that incidence of work stress-related cardiovascular disease is likely to be higher in the blue-collar occupations when the following factors are present: restricted discretion, shift work (particularly nightshift), effort–reward imbalance, high demands, poor psychosocial work environment,

social isolation, physical inactivity or occupational violence" (p. 1655, Concha-Barrientos et al., 2004). However, it is also important to note that this relationship is observed in all workers, not only in blue-collar workers (LaMontagne et al., 2010; Schnall et al., 2000).



Kuper et al. (2002) reviewed 13 studies of psychosocial risk and coronary heart disease (CHD), and found that 10 out of 13 studies reported strong or moderate associations between psychosocial work characteristics such as job strain, demands, resources and control and CHD. The same authors found that six out of nine studies reviewed reported associations between lack of social support and CHD (Kuper et al., 2002). Another review, by Everson-Rose and Lewis (2005), found that chronic and acute psychosocial factors (i.e. job strain, high demands, low rewards), as well as a lack of social support, are related to CVD. Similarly, a meta-analysis of 14 studies comprising over 100 000 employees in total demonstrated that employees with high job strain were 1.5 times more likely than those with a low level of job strain to develop CHD (Kivimäki et al., 2006).

▪ Cost of cardiovascular diseases

The 2012 report from the European Heart Network (Nichols et al., 2012) examined the general cost of CVD to the overall EU economy as well as to each Member State. It calculated the cost of CVD to the EU economy in 2009 to be €196 billion a year. This could be broken down into direct health care costs (54 %), productivity losses (24 %) and the informal care of people with CVD (22 %). CHD accounted for €60 billion of the total cost of CVD, of which an estimated 33 % was attributed to direct health care costs, 29 % to productivity losses and 38 % to the informal care of people with CHD. Table 3 provides a breakdown of the total health care cost, the cost per capita and the percentage of total health expenditure on CVD in each EU country. The countries spending the highest proportion of their health care budget on CVD were Latvia, Estonia and Poland (17 % in each case). At the other end of the spectrum, the percentage of health expenditure attributable to CVD was lowest in Luxembourg and Denmark: 4 % and 5 % respectively.

Table 3: Health care costs for CVD in the EU countries (in € thousands)

Country	Total health care costs for CVD	Cost per capita	Percentage of total health expenditure
Austria	2 338 617	280	8 %
Belgium	2 374 817	221	6 %
Bulgaria	347 877	46	13 %
Cyprus	66 750	84	7 %
Czech Republic	1 567 633	150	14 %
Denmark	1 244 403	226	5 %
Estonia	166 457	124	17 %
Finland	1 958 752	368	12 %

Country	Total health care costs for CVD	Cost per capita	Percentage of total health expenditure
France	12 731 261	198	6 %
Germany	30 679 159	374	11 %
Greece	2 799 545	249	11 %
Hungary	998 760	100	14 %
Ireland	925 547	208	6 %
Italy	14 488 331	241	10 %
Latvia	203 355	90	17 %
Lithuania	250 913	75	12 %
Luxembourg	133 045	270	4 %
Malta	48 511	117	11 %
Netherlands	5 797 817	352	8 %
Poland	4 157 650	109	17 %
Portugal	1 215 392	114	6 %
Romania	802 565	37	12 %
Slovakia	594 854	110	10 %
Slovenia	263 352	130	8 %
Spain	7 935 489	173	8 %
Sweden	2 430 301	263	8 %
United Kingdom	9 635 790	156	6 %
Total EU	**106 56 940**	**212**	**9 %**

Source: Nichols et al. (2012).

3.3 Musculoskeletal disorders

Studies have shown that psychosocial factors at work may play significant role in development of musculoskeletal problems (MSDs). Poor work organisation and a lack of social support were found to be associated with lower back pain (EU-OSHA, 2010b). Similarly, Sobeih and colleagues (2006) carried out a systematic review of 10 studies that examined the link between psychosocial factors and MSDs among workers in the construction industry. All studies reported a relationship between MSDs and at least one psychosocial factor, most commonly job stress, low job satisfaction, low job control and high job demands. In another literature review, Leka and Jain (2010) found 16 studies that described a link between psychosocial factors (such as stress, low pay and benefits, long working hours, lack of job control, lack of social support) and MSDs including repetitive stress injuries (muscle injuries due to frequent usage of the same muscles such as welding or typing on a keyboard) and pain in the upper limbs, neck, back and muscles.

Cost of musculoskeletal disorders

The wide variety of MSDs makes it difficult to estimate their cost with any accuracy; while some authors attempt to quantify the cost of MSDs overall, others focus on specific MSDs such as back pain or arthritis (Parsons et al., 2011). At an EU level, it is estimated that up to 2 % of GDP is spent on the direct costs of MSD, with back pain in the European workforce costing over €12 billion per year (Bevan et al., 2009) and rheumatoid arthritis costing €45 billion per year (Lundkvist et al., 2008).

It has been estimated that, in the United Kingdom, 'MSDs and joint diseases' cost the National Health Service £186 million in 2008, while the health care cost associated with rheumatoid arthritis is £560 million per year, rising to £1.8 billion when loss of employment and sick leave are included (Morse, 2009). Also in the United Kingdom, it has been calculated that in 1998 the health care costs, informal care costs and production losses due to back pain totalled £10.67 billion (Maniadakis and Gray, 2000). In the Netherlands, the annual cost of work-related repetitive strain injury is €2.1 billion (Bevan et al., 2009), while annual cost of rheumatoid arthritis has been estimated at €1.6 billion in Ireland (Arthritis Ireland, 2008) and €2 billion in Spain (Lajas et al., 2003).

3.4 Diabetes

A number of studies have shown a link between psychosocial hazards and diabetes mellitus (diabetes). In one such study, Heraclides et al. (2009) found that that among a sample of 5 895 women, psychosocial work stress was a predictor of type II diabetes 15 years later, although the same was not observed in men. More recently, analysis of longitudinal data from 7 443 participants in Canada revealed that women (but not men) with low job control were at increased risk of developing diabetes (Smith et al., 2012). Other authors have also found that an increased risk of diabetes in women with low job control (Agardh et al., 2003; Leynen et al., 2003; Nordberg et al., 2003) or high job strain (Leynen et al., 2003; Nordberg et al., 2003). Interestingly, the studies did not find significant relationships between psychosocial factors and increased risk of diabetes in men. While researchers have speculated that there might be an interaction between gender and psychosocial hazard exposure, further research is required to explain this difference.

Costs of diabetes

Estimates of the costs of diabetes typically encompass the costs associated with both type I and type II diabetes, and include direct medical costs (e.g. drug costs, inpatient and outpatient treatment), as well as indirect costs such as productivity losses and costs associated with medical conditions related to diabetes (e.g. renal failure, cardiovascular disease, foot disease).

A survey of health economists examined the costs associated with diabetes and its complications in five EU countries: France, Germany, Italy, Spain and the United Kingdom (Kanavos et al., 2012). Using data from 2010, the total cost of diabetes in these five countries was estimated to be €90 billion. The cost was highest in Germany, at €43.2billion, followed by the United Kingdom (€20.2 billion), France (€12.9 billion), Italy (€7.9billion) and, finally, Spain (€5.4billion).

Elsewhere, the cost of diagnosed diabetes in the USA (Herman, 2013) is calculated to have risen from US$174 billion in 2007 to US$245 billion in 2012, an increase of 41 %. The total cost for 2012 is made up of US$176 billion for direct medical costs and US$69 billion due to loss of productivity. In Australia, the costs attributable to type I and type II diabetes alone have been calculated at AU$6 billion and AU$570 million respectively (Colagiuri et al., 2003, 2009). In Canada, economic models not put the cost of diabetes at CA$6.3 billion in 2000, predicting that by 2020 the annual cost will have increased to CA $16.9 billion (Canadian Diabetes Association, 2009).

4 Summary

For the purpose of this review, some of the financial figures obtained in the previous years and calculated in a currency other than euro were inflated to 2013 rates and converted to a single currency (euro) (see Appendix II). In general, the findings suggest that the cost related to stress and psychosocial risks at work paid by societies and organisations is considerable. The majority of the costs obtained originate from Western and Northern European countries, and there is a distinct lack of representation from the Eastern and Southern European countries. Although these countries are represented in some European-level analysis (e.g. Matrix, 2013), it is difficult to comprehensively understand and, in turn, to estimate the costs of work-related stress and psychosocial issues at a Europe level when certain regions are under-represented.

In Europe, direct monetary costs are mostly paid by societies through the public health care systems. Organisations are mainly affected by costs related to absenteeism, presenteeism, reduced productivity or high staff turnover. Those costs ultimately affect also national economies. The main costs for individuals relate to health impairment, mortality and reduced quality of life (Hoel et al., 2001). Although psychosocial risk- and stress-related problems can clearly affect individual's income, data in this area are not available across Europe.

Any general comparisons of financial costs, and especially comparisons between countries, must be made with great caution as the figures stem from countries of varying geographic and economic size, with different currencies and inflation rates. In addition, identified costs are based on different aspects considered, including direct and indirect costs related to, for example, lost productivity, health costs, etc. (see Appendix I). In terms of the methodological approach, the majority of reports used an inductive approach, which allows sub-costs of interest to be identified (Ramaciotti and Perriard, 2003; Bejean and Sultan-Taieb, 2005). At the same time, the calculations use a number of different methodologies and statistical techniques (such as attributable fractions and human capital method). Studies such as those by Juel et al. (2006) and Giga et al. (2008) demonstrate that the use of different approaches and methodologies can lead to varying results. Despite the different costs categories, methodology and approaches, it is unlikely that any one method or approach is better than another, but they do have to be suitable for the context in which they will be used.

The sub-costs most commonly examined are health and medical costs, absenteeism and production loss, and, less often, the costs attributable to early retirement or disability or, at organisational level, presenteeism. Presenteeism as a concept has garnered much attention in the academic field (Cooper and Dewe, 2008), but, being an indirect cost, is far more difficult to quantify. Calculations that consider presenteeism are to result in increased estimates of total costs, as it has been found to be much costlier than absenteeism (Sainsbury Centre for Mental Health, 2007).

The figures reported in the literature are frequently conservative estimates of the financial costs associated with work-related stress and psychosocial issues, which is related to the difficultly of identifying all the different types of costs involved (Levi and Lunde-Jensen, 1996; Ramaciotti and Perriard, 2003; Juel et al., 2006). Psychosocial hazards have a diverse impact, and it can be difficult to identify and quantify all the costs involved (Chandola, 2010). Similarly, organisations have also struggled with identifying and obtaining relevant costs to them (Brun and Lamarche, 2006).

Further data related to the costs of stress and psychosocial risks at the organisational level will be of great importance to build a 'business case' for the management and prevention of stress in the workplace. The secondary analysis of ESENER data (EU-OSHA, 2012) showed that, across all sectors, one of the key drivers for managing psychosocial risk in the workplace is a desire to reduce absenteeism. The guides presented in this report may make it easier for organisations to calculate costs and strengthen the 'business' argument for employers. The main cost indicators relate to stress-related absenteeism, presenteeism and staff turnover, but other cost-generating factors could also be included (a comprehensive list of aspects to be considered when calculating the costs of psychological disorders, proposed by Brun and Lamarche (2006), is given in Appendix III). Insight into the costs associated with work-related stress and psychosocial risks in organisations and encouraging employers to involve in this kind of assessment are believed to have significant positive impact on the prevention and management of those risks (European Commission, 2011b). This can be further

enhanced by gathering more evidence on the cost-effectiveness of interventions focusing on stress and psychosocial risks.

5 Conclusions

This report summarises the results of a literature review focusing on the costs of work-related stress, job strain, workplace violence and harassment (mobbing, bullying) and other psychosocial risks (such as lack of support at work, excessive workload or lack of control). Nevertheless, comparisons between or even within countries are extremely difficult for a variety of reasons, such as differences in currencies, economy sizes, the period of data collection, the aspects included in calculations and the methodology employed. Furthermore, it is likely that these figures are in fact conservative estimates and that the true costs are even higher as the studies reviewed were usually focused on only selected cost-generating factors. The findings show the financial costs of work-related stress and psychosocial risks at work can manifest and be quantified in a variety of forms (e.g. health care costs, productivity loss, absenteeism, etc.). In addition to this diversity, many of these costs operate at multiple levels affecting the individual, the organisation and society.

Studies indicate that there is a strong 'business case' for preventing stress and psychosocial risks at work

The identified studies from Europe and beyond provide evidence that the financial burden on societies and organisations related to stress and psychosocial risks at work is considerable. Moreover, there is evidence suggesting that appropriately planned and implemented workplace interventions focusing on preventing stress, improving psychosocial work environment and promoting mental health are cost-effective.

Additionally, more recent developments in the area of psychosocial research have argued that work characteristics can have a positive, not just a negative, effect on employee health and well-being (Fullagar and Kelloway, 2010; Mellor et al., 2012). There is also some evidence that positive work factors, such as work engagement and job resources, may also have a strong relationship with employee health and performance (Vazquez et al., 2009). There is a need for studies to examine if the promotion of positive factors and resources in the workplace, as part of a comprehensive approach to psychosocial risk management, can be beneficial and to quantify the economic benefits that this can bring (LaMontagne et al., 2007)

Simple methodologies at the organisational level are needed

The review highlights the importance of assessing costs related to stress and psychosocial risks resulting from absenteeism, presenteeism and staff turnover in organisations. A few methods which may facilitate this process has been identified; nevertheless, there is a further need for developing and promoting simple methodologies and approaches to help employers to estimate the costs of work-related stress and psychosocial risks in the workplace. Obtaining a clearer perspective of the costs associated with work-related stress and psychosocial issues at the enterprise level will contribute to a stronger business case for the management of work-related psychosocial risks.

Consolidating the research on health problems associated with work-related stress and psychosocial risks

The report outlines the relationship between work-related stress and psychosocial risks and mental health problems (depression), cardiovascular disease, musculoskeletal disorders and diabetes. Further exploration of the relationship between the psychosocial work environment and negative mental and physical health outcomes is needed to estimate more precisely the contribution of work and the associated financial burden. This should include an analysis of how recovery from illness can be influenced by psychosocial risks at work, a problem which has so far received little attention (Harma, 2006).

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Appendix I: Factors taken into consideration while calculating psychosocial risk- and stress- related cost

Outcome measure	Source	Cost (if available)
Absenteeism	Blatter et al. (2005), Bejean and Sultan-Taieb (2005), Econtech (2008), Giga et al. (2008), Juel et al. (2006), Koningsveld et al. (2003), Matteson and Ivancevich (1987), Ramaciotti and Perriard (2003), Rosch (2001), Sainsbury Centre for Mental Health (2007), Trontin et al. (2010)	AU$5.1 billion £3.1 billion DKK1.4–1.5 billion €279–1 284 million
Accidents	Koningsveld et al. (2003)	
Administrative	Bodeker and Friedrichs (2011), HSE (2012), Safe Work Australia (2012a)	
Compensation	HSE (2012), Safe Work Australia (2012b)	Median pay-out AU$18 100
Disability	Bodeker and Friedrichs (2011), Blatter et al. (2005), Koningsveld et al. (2003), Pastrana (2002)	
Early death	Bodeker and Friedrichs (2011), Bejean and Sultan-Taieb (2005), Juel et al. (2006), Trontin et al. (2010)	DKK0.09–3.5 billion €166–474 million
Early retirement	Juel et al. (2006)	DKK0.2–9 billion
Health and medical costs	Andlin-Sobocki et al. (2005), Bejean and Sultan-Taieb (2005), Blatter et al. (2005), Bodeker and Friedrichs (2011), Carnero and Martinez (2005), HSE (2012), Juel et al. (2006), Koningsveld et al. (2003), Levi and Lunde-Jensen (1996), LaMontagne et al. (2010), Matrix (2013Ramaciotti and Perriard (2003), Safe Work Australia (2012a), Shain (2008), Trontin et al. (2010)	€124 million to 97 billion
Legal costs	HSE (2012), McGovern et al. (2000)	
Loss of earnings	McGovern et al. (2000)	
Medication	Carnero and Martinez (2006), LaMontagne et al. (2010), Ramaciotti and Perriard (2003)	
Overstaffing to compensate	Matteson and Ivancevich (1986), Rosch (2001)	
Presenteeism	Econtech (2008)	AU$9.7 billion
Prevention	Bodeker and Friedrichs (2011), Koningsveld et al. (2003)	
Production loss	Bejean and Sultan-Taieb (2005), Giga et al. (2008), HSE (2012), Juel et al. (2006), LaMontagne et al. (2010), Matrix (2013), Ramaciotti and Perriard (2003), Safe Work Australia (2012a), Shain (2008), Trontin et al. (2010)	£9.1 billion €756 million to €242 billion
Rehabilitation	Bodeker and Friedrichs (2011), HSE (2012)	
Turnover	Giga et al. (2008), LaMontagne et al. (2010), NIOSH (1999), Matteson and Ivancevich (1987), Rosch (2001)	£1.6 billion

Appendix II: Conversion of financial figures to euros in 2013

As the financial costs quoted in the studies reviewed varied in terms of both currency and time frame, they were translated into a single currency (euro) to take into account inflation and currency differences. Using an online historic currency inflator (FXTOP, 2013), costs for the year in which the report or study was published were adjusted for inflation to 1 March 2013. Subsequently, using an online currency convertor (XE, 2013), these figures were converted into euros (€).

It is important to stress that these revised figures are only rough estimates and were not always obtained using a robust methodology.

Adjusted figures for cost at the societal level

Author	Country	Psychosocial hazard	Original financial cost per year	Financial cost adjusted to 1 March 2013	Adjusted cost converted to euro (€)
European Commission (2002)	EU-15	Work stress	€20billion	€25.4billion	€25.4billion
Andlin-Sobocki et al. (2005)	Europe	Mental disorders	€240 billion	€285.65 billion	€285.65 billion
Matrix (2013)	EU-27	Work-related depression	€617 billion	€617 billion	€617 billion
Econtech (2008)	Australia	Work stress	AU$14.81billion	AU$16.98billion	€13.79billion
LaMontagne et al. (2010)	Australia	Job strain-related depression	AU$730 million a year	AU$790 million	€641 million
Safe Work Australia (2012a)	Australia	Mental stress	AU$5.3 billion	AU$5.4billion	€4.3billion
Safe Work Australia (2012b)	Australia	Mental stress	6 480 claims, median claim of AU$18 100	AU$18 519 median claim	€15,038 median claim
Sheehan et al. (2001)	Australia	Bullying	Low prevalence: AU$6–13 billion	Low prevalence: AU$8.38–18.17 billion	Low prevalence: €6.8–14.8 billion

Author	Country	Psychosocial hazard	Original financial cost per year	Financial cost adjusted to 1 March 2013	Adjusted cost converted to euro (€)
Shain (2008)	Canada	Work stress	High prevalence: AU$17–36 billion	High prevalence: AU$23.76–50.32 billion	High prevalence: €19.3–40.9 billion
			Low prevalence: CA$2.97billion	Low prevalence: CA$3.2 billion	Low prevalence: €2.5 billion
			High prevalence: CA$11billion	High prevalence: CA$11.7 billion	High prevalence: €8.96 billion
Juel et al. (2006)	Denmark	Job strain	DKK2.3–14.7billion		€0.5–2.3 billion*
Bejean and Sultan-Taieb (2005)	France	Job strain	€1.17–1.98 billion	€1.36–2.3 billion	€1.36–2.3 billion
Trontin et al. (2010)	France	Job strain	€1.9–3 billion	€2.05–3.24 billion	€2.05–3.24 billion
Bodeker and Friedrichs (2011)	Germany	Job strain	Total: €29.2 billion	€30.86 billion	€30.86 billion
Koningsveld (2003)	Netherlands	Job strain	€12 billion	€14.9 billion	€14.9 billion
			2.96 % of GDP		
Blatter et al. (2005)	Netherlands	Job strain	€4 billion	€4.76 billion	€4.76 billion
Carnero and Martinez (2005)	Spain	Mobbing	€62 billion	€77 billion	€77 billion
Pastrana (2002)	Spain	Mobbing	€52 billion	€66 billion	€66 billion
Levi and Lunde-Jensen (1996)	Sweden	Job strain	ECU450 million	€634 million	€634 million

Author	Country	Psychosocial hazard	Original financial cost per year	Financial cost adjusted to 1 March 2013	Adjusted cost converted to euro (€)
Ramaciotti and Perriard (2003)	Switzerland	Job strain	CHF4.2 billion 1.2 % of GDP	CHF4.5 billion	€3.7 billion
Chandola (2010)	UK	Stress, depression and anxiety	£7–12.6billion (0.7–1.2 % of GDP)	£7.8–14.1 billion	€9.2–16.7 billion
Giga et al. (2008)	UK	Stress and bullying	Deductive: stress £4.55billion	Deductive: stress £5.4 billion	Deductive: stress €6.4 billion
			Bullying £682.5 million/£17.65 billion	Bullying £811 million/£20.97 billion	Bullying €961 million/€24.9 billion
			Inductive: Bullying-£13.75billion	Inductive: bullying £16.3 billion	Inductive: bullying €19.3 billion
HSE (2013)	UK	Stress, depression and anxiety	£3.6 billion	£3.6 billion	€4.3 billion
Sainsbury Centre for Mental Health (2007)	UK	Stress, depression and anxiety	£1.26 billion	£15.2 billion	€18 billion
Kaufer and Mattman (1996)	USA	Workplace violence	US$36 billion (1993)	US$59 billion (1993)	€46billion (1993)
			US$35.4 billion (1995)	US$55.2 billion (1995)	€43billion (1995)
Matteson and Ivancevich (1987)	USA	Work stress	US$300 billion	US$634 billion	€494billion
NIOSH (1999) (in Jauregui and	USA	Work stress	US$200 billion	US$285billion	€219 billion

Author	Country	Psychosocial hazard	Original financial cost per year	Financial cost adjusted to 1 March 2013	Adjusted cost converted to euro (€)
Schnall, 2009)					
Rosch, 2001	USA	Work stress	US$300 billion	US$402 billion	€313 billion
Sainsbury Centre for Mental Health (2007)	UK	Stress, anxiety and depression	Absenteeism: £335	Absenteeism: £408	Absenteeism: €484
			Presenteeism: £605	Presenteeism: £737	Presenteeism: €874
			Turnover: £95	Turnover: £115	Turnover: €136
			Total: £1,035	Total: £1 260	Total: €1 494
National Audit Office (2003)	UK	Violence and aggression	£69 million	£90 million	€107 million
Sandroff (1988)	USA	Sexual harassment	US$6.7 million	US$13.68 million	€10.67million

*Owing to a lack of relevant inflation data, these figures are instead first converted to euros (€) and then adjusted for inflation to 1 March 2013.

Appendix III: Cost Indicators for psychological disorders in the workplace (Brun and Lamarche, 2006)[7]

1. **Annual number of absences related to a psychological disorder**: For this these baseline data, calculate the number of absences due to short- and long-term disability, specifically those related to psychological disorders.
2. **Total annual number of absences**: For this baseline data, calculate the number of absences due to short- and long-term disability, taking into account all causes.
3. **Total annual number of days lost due to psychological disorders**: Track the number of days lost for absences due to short-term disability as well as for absences due to long-term disability, specifically those related to psychological disorders.
4. **Total annual number of days lost due to absenteeism (all causes)**: Track the number of days lost due to absences attributable to short-term disability as well as for absences attributable to long-term disability, taking into account all causes.
5. **Number of regular employees (FTE) within the organisation**: This data is expressed in terms of the number of full-time employees (FTE) as follows:

   FTE = $\frac{\text{total annual number of days worked.}}{\text{220 working days (or the annual number of working days for the organisation)}}$

6. **Total annual number of days worked**: For this baseline data, tabulate the total number of days worked by all employees within the organisation during the year.
7. **Organisation's average hourly wage**: To obtain the value of this baseline data, add up the salary of all employees in the organisation and then divide by the number of full-time employees (FTE).
8. **Organisation's annual sales**: Refer to the organisation's annual report to obtain the annual sales figure.
9. **Organisation's annual profits**: Refer to the organisation's annual report to obtain the annual profit amount.
10. **Absenteeism rate**: This rate may be calculated differently from one organisation to another. As a result, it is important to know which calculation method organisations have adopted before using this indicator. In general, this rate is calculated based on the number of days lost or the number of absences.

This rate generally includes short- and long-term disability and, in some cases, sick leave (if data is available).

11. **Turnover rate**: The turnover rate is calculated based on the number of people who have left the organisation. It equals:

    $$\frac{\text{Number of departures during the year X 100}}{\text{Average annual number of employees}}$$

12. **Internal mobility rate**: This rate shows the movement of staff within the organisation itself. It equals:

    $$\frac{\text{Number of employee moves during the year X 100}}{\text{Average annual number of employees}}$$

13. **Cost of staff turnover**: The cost of staff turnover can be linked to numerous factors (all costs involved in hiring a new employee, the total costs for training this employee, etc.). For this indicator, refer to the organisation's definition and take the elements included in this definition into account in order to interpret the value obtained.
14. **Prevalence of psychological distress**: Proportion of individuals who report frequent symptoms (related to depression and anxiety, cognitive problems and irritability) during the week.

[7] Provided with the author's permission

15. **Disability cost**. External insurance, self-insurance, and benefits. Workers' salaries, including benefits, employment insurance, etc.), paid by the employer during disablement periods due to a psychological disorder (self-insurance) and/or wage-loss insurance premiums paid to an outside insurance company by the employer. By knowing what percentage of absences within the organisation are related to psychological disorders, it is possible to determine what portion of this premium is attributable to psychological disorders (if the insurance company does not provide this information directly).
16. **Premium for workers compensation**: Cost of premium paid to the CSST[8] for workers with psychological disorders.
17. **Overtime**: Cost of overtime worked by other employees in order to carry out the work of employees who are absent due to psychological disorders.
18. **Replacement workers**. Human resource cost, physical resource cost.
    Includes two components: the human resource cost (replacement worker's salary, cost of hiring and training a replacement worker as a result of an employee's absence due to a psychological disorder) and the cost of physical resources purchased for the replacement worker (e.g. desk and computer).
19. **Salary and benefit savings while the position was vacant**: Savings to the employer when a worker is absent due to a psychological disorder and is not replaced. The extent of these savings will depend on the company's disability plan (which pays for disability cases and resulting costs).
20. **Return to work**. Gradual return, assignment, relapse and accommodation.
    Gradual return: Aggregate costs of an employee's gradual return to work following an absence due to a psychological disorder. A gradual return involves an employee's progressive reintegration into their position. For example, someone who was absent due to a psychological disorder could work two days a week for the first two weeks following their return and gradually increase their work time to three or four days a week, and so on.

    Assignment: Aggregate costs of a temporary assignment when an employee returns to work following an absence due to a psychological disorder. A temporary assignment allows an employee to return to work even though they may not have completely recovered from their medical condition (in this case, a psychological disorder). At this point, the employee may either be assigned tasks other than those they usually carry out or be assigned tasks that are part of their regular work but that will be modified for a given time period.

    Relapse: Aggregate costs of a relapse suffered by an employee who was previously absent due to a psychological disorder. In other words, the relapse in this case is characterised by the fact that an employee was off work due to a psychological disorder, returned to work for some time and was again off work due to the same psychological disorder.

    Accommodation: Aggregate costs of accommodation measures taken when an employee returns to work following an absence due to a psychological disorder. Accommodation measures can vary, but they are essentially designed to allow an employee to return to work by taking their specific condition into consideration. For example, training an employee for a position other than the one they normally occupy (if they are unable to return to their regular position due to a psychological disorder) can constitute an accommodation measure.

21. **Information management system for absenteeism data**. Technical cost, human resource cost.
    Includes two components: the technical cost of managing disability cases (aggregate costs of computer system for managing absenteeism data) and the human resource cost (time devoted by an individual or individuals to managing absenteeism data). By knowing what percentage of absences within the organisation are related to psychological disorders, it would be possible to determine what proportion of these costs is attributable to psychological disorders.
22. **Costs of managing disability cases**. Administrative cost and human resource cost.
    Includes two components: the administrative cost of managing disability cases (communication, administration and follow-up) and the human resource cost (time devoted by an individual or individuals to managing disability cases). By knowing what percentage of absences within the

[8] The Commission de la Santé et de la Sécurité du Travail – 'Workers' Compensation Board', Canada

organisation are related to psychological disorders, it would be possible to determine what proportion of these costs is attributable to psychological disorders.

23. **Medical expertise**: Cost of medical expertise sought following an employee's absence due to a psychological disorder.
24. **Quantitative work overload for colleagues**: Assessment of the quantitative work overload for colleagues resulting from the absence of an employee due to a psychological disorder (not to be confused with overtime).
25. **Indirect harm to work team**: Impact on the work team when an employee is absent due to a psychological disorder.
26. **Sick leave**: Cost of sick leave taken due to a psychological disorder.
27. **Reduced work time**: Estimated cost resulting from the number of hours not worked each day due to the occurrence of a psychological disorder (e.g. an employee who leaves two hours before the end of the shift).
28. **Loss of intellectual capital**: Cost of expertise lost due to the departure of an employee (temporary absence or permanent departure from the organisation) due to a psychological disorder.
29. **Increase in errors**: Cost associated with the fact that the employee is at work but their performance is below expectations (increase in errors) due to a work-related mental health problem.
30. **Decrease in quality of production**: Cost associated with the fact that the employee is at work but their performance is below expectations (decrease in quality of production) due to a work-related mental health problem.
31. **Health insurance premium** (individual or family plan) associated with the use of psychotherapeutic drugs: Portion of health insurance premium paid by the employer specifically for psychotherapeutic drugs.
32. **Health insurance premium (individual or family plan) associated with alternative care**: Portion of health insurance premium paid by the employer for alternative care (massage, naturopathy, etc.).
33. **Employee assistance program (EAP)**: Overall cost of running the EAP. The reasons for consultations within the scope of this assistance program could help determine the proportion of costs attributable to mental health problems in the workplace.
34. **External expertise**: Cost of external expertise (e.g. stress audit) aimed at preventing, assessing or addressing mental health problems in the workplace.
35. **Union leave time**: Cost associated with the amount of time union authorities devote to mental health in the workplace.
36. **Time devoted to mental health issues in the workplace**. Meetings, intervention and prevention. Cost associated with the amount of time various stakeholders devote to mental health in the workplace. This time may be spent in meetings or on intervention and prevention. This indicator does not include time already tracked in previous indicators.
37. **Legal costs**. Legal disputes, and grievances.
    Legal disputes: Legal and administrative costs associated with an absence due to a psychological disorder and/or with an employee who is at work but whose performance is below expectations due to a workplace mental health problem (presenteeism).
    Grievances: Legal and administrative costs associated with an absence due to a psychological disorder and/or with an employee who is at work but whose performance is below expectations due to a workplace mental health problem (presenteeism).
38. **Loss of productivity**: Estimated cost of lost productivity resulting from mental health problems in the workplace. This loss of productivity can be expressed in terms of aspects such as production objectives or deadlines that are not met, unfinished projects, production deficiencies (e.g. errors), service retakes and customer complaints.
39. **Prevention**. Training, interventions, programs.
40. Cost associated with the prevention of work-related mental health problems within the organisation (cost of prevention activities and freeing up staff). This cost can be related to training activities (e.g. managing work attendance), intervention and other programs designed to prevent mental health problems within the organisation.

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The European Agency for Safety and Health at Work (EU-OSHA) contributes to making Europe a safer, healthier and more productive place to work. The Agency researches, develops, and distributes reliable, balanced, and impartial safety and health information and organises pan-European awareness raising campaigns. Set up by the European Union in 1996 and based in Bilbao, Spain, the Agency brings together representatives from the European Commission, Member State governments, employers' and workers' organisations, as well as leading experts in each of the EU Member States and beyond.

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