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Economic impact of musculoskeletal disorders (MSDs) on work in Europe



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A B S T R A C T

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Musculoskeletal disorders (MSDs) are the leading cause of work disability, sickness absence from work, 'presenteeism' and loss of productivity across all the European Union (EU) member states. It is estimated that the total cost of lost productivity attributable to MSDs among people of working age in the EU could be as high as 2% of gross domestic product (GDP). This paper examines the available evidence on the economic burden of MSDs on work across Europe and highlights areas of policy, clinical and employment practice which might improve work outcomes for individuals and families and reduce the economic and social costs of MSDs.

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This paper sets out what we know about the economic and productivity impact of MSDs on people of working age in Europe and describes the challenges faced by both current and future European workers, their families and carers, their employers and, ultimately, state agencies. It also looks at the economic case for early, work-focussed interventions that promote job retention and vocational rehabilitation and reduce productivity losses.

Context

There are four contextual factors, which frame the issue of workforce health in most European Union (EU) member states.

The first is the 'ageing workforce'. Across the EU, the proportion of workers aged 50 years or more is 2 times that of those aged 25 years or younger. This is a disparity which is expected to worsen for several decades to come. With ageing comes a greater risk of poor health and premature withdrawal

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from the labour market. In some developed economies, almost half of those aged between 45 and 65 years, who are no longer in the workforce, have become economically inactive as a result of poor health [1].

Second, with a 'pension crisis' in most member states (difficulty in paying for pensions due to a difference between pension obligations and resources set aside to fund them), we know that a higher proportion of older workers will need to work longer than they do today and, increasingly, beyond the default retirement age. Policy-makers know that, with dependency ratios (the number of economically active people supporting the economically inactive) becoming more stretched, this trend needs to be mitigated.

Third, the 'growing burden of chronic disease' in the EU population will mean that (with an ageing workforce increasingly having to retire later) the productive capacity of the workforce risks is being compromised by ill health. Each year cardiovascular disease (CVD) causes over 4 million deaths in Europe and over 1.9 million deaths in the EU. CVD causes 47% of all deaths in Europe and 40% in the EU. In 2009, production losses due to mortality and morbidity associated with CVD cost the EU almost €46 billion, with 59% of this cost due to death (€27 billion) and 41% due to illness (€19 billion) in those of working age [2]. Almost 700,000 EU citizens die from smoking-related illnesses in Europe each year (and around 50% of smokers die prematurely – on average 14 years earlier) [3]. Forecasts tell us that the proportion of EU workers with long-term chronic conditions is on the rise; by 2030 over 20 million UK workers will have a long-term condition [4]. Chronic diseases with low mortality, but high morbidity, impact on the individuals' ability to participate in the labour market. For example, 100 million European citizens suffer from chronic musculoskeletal pain and musculoskeletal disorders (MSDs) [5], including 40 million workers who attribute their MSD directly to their work [6].

Fourth, 'widening health inequalities' in many EU member states remain a significant burden. As Marmot et al. [7] have pointed out, work is a 'social determinant' of health and these labour market inequalities can 'spill over' into wider public health outcomes, especially if access to good-quality jobs is limited or unequally distributed.

Economic growth and social inclusion both rely on the ability of individuals of working age to remain connected to the labour market, to develop and contribute their skills and to sustain high levels of work productivity. In this context, it is important that individuals remain healthy and active [8]. As the European Commission's Health Strategy argues:

'Health is important for the wellbeing of individuals and society, but a healthy population is also a prerequisite for economic *productivity and prosperity*.' [8]

In the current economic environment, these factors still impede progress towards the achievement of the goal of a healthy and productive working-age population. Some of the solutions lie in the erosion of rigidities in some EU labour markets, some have their origins in declining public health, others focus on the behaviour of individuals and employers and some others focus on the way that health care priorities are set.

The consequences of poor workforce health are wide-ranging, resulting in a large and varied burden of costs. Chronic ill health means that many workers are not available to work or are not working productively on a daily basis. According to the latest European Working Conditions Survey (EWCS) (Parent-Thirion et al.) [9], 35.6% of European workers missed between 1 and 15 days of work due to ill health in 2010, with further 7.5% staying away from work for more than 15 days [9]. In addition, even when individuals are at work, they may not be performing to their full capacity. EWCS reports that 39.2% of Europeans went to work despite being unwell enough to take sickness absence (so-called 'presenteeism'). Reduced work productivity associated with mental health-related presenteeism has been estimated to cost employers about 1.5 times more than sickness absence [10].

Having a significant proportion of the Europe's working-age population unable to work through ill health – even in a favourable economic climate – can reduce the aggregate level of labour productivity in an economy and can damage the competitiveness and effectiveness of European businesses.

In addition to the losses in the labour market, European health care and welfare systems are facing an increasing burden from supporting individuals with chronic disease who are out of work. We know that early onset of chronic conditions, coupled with unemployment and job loss, has serious financial and health consequences for individuals [7]. Australian data among 45–65-year-olds show that,

collectively, those leaving work prematurely owing to ill health lost up to US\$18 billion in income each year, thereby increasing the risk of falling into poverty and social exclusion [11]. Studies have also shown widespread deterioration in aspects of physical and mental well-being amongst those who lose their jobs, which can persist for many months [12,13].

Another area of concern, if people leave the labour market prematurely owing to ill health, is the impact on their families and carers. Not only does informal care for those with long-term, chronic, or fluctuating health conditions incur intangible costs, it is often the case that the working lives and productivity of family members with caring responsibilities are disrupted and compromised [14]. This compounds the impact of premature labour market exit.

In this paper, we focus specifically on musculoskeletal disorders (MSDs) in the EU working-age population. The Global Burden of Disease data show that back pain accounts for the highest proportion of years lost to disability (YLDs) of all conditions, with neck pain and other MSDs all in the top 10 ranking. MSDs affect at least 100 million people in Europe, accounting for half of all European absences from work and for 60% of permanent work incapacity. In some EU countries, MSDs account for 40% of the cost of worker compensation, leading to a reduction of 1–2% in the gross domestic product (GDP) of individual member states. There is also a link between MSDs and mental health [15], and there is growing evidence that the ‘co-morbidity’ of these two conditions is a significant factor inhibiting early return to work (RTW). Individuals with MSDs are also likely to have depression or anxiety problems related to their conditions [16,17].

Against this background, this paper examines some of these issues and highlights why better co-ordinated efforts to improve the musculoskeletal health of the EU workforce are essential if we are to achieve the goals for economic prosperity and social inclusion, to which both the European Commission and national governments aspire.

The prevalence of MSDs and their impact on work

In an ad hoc analysis of the European Labour Force Survey commissioned by DG Employment and Social Affairs in Brussels [18], MSDs accounted for 53% of all work-related diseases in the EU-15. Work-related MSDs resulted in most lost days and permanent incapacity to work. Overall, they accounted for 50% of all absences from work lasting for more than three days, 49% of all absences lasting two weeks or more and about 60% of all reported cases of permanent incapacity. The analysis estimated that the total costs of work-related MSDs were in the region of €240 billion or up to 2% of GDP. MSDs are, according to this analysis, responsible for 40–50% of the costs of all work-related health issues.

The impact of MSDs on the individual and their ability to work varies significantly from person to person. As a result, attempts to measure the extent of work disability differ according to the methods of data collection being used, respondent selection, sick pay regulations and definitions of work disability. Work disability usually refers to cessation of employment, reduced working hours or claiming of disability benefits.

MSDs can cause work-limiting pain and fatigue which many people feel unable to disclose. One study suggests that chronic musculoskeletal pain (CMP) remains undiagnosed in 42% of adult cases [5]. Despite this, 67% reported that pain caused a significant reduction in their quality of life, 49% were limited in the kind of work they were able to perform and 25% of adults with CMP have never consulted a doctor with regard to their pain. Other research shows that up to 30% of workers with conditions such as rheumatoid arthritis (RA) are reluctant to disclose their condition to their colleagues and managers because they fear discrimination [19]. The stigma associated with non-disclosure may also lead to increased mental distress as well as ‘presenteeism’ – the tendency of workers to go to work when they are ill enough to stay at home.

In the following sections, we will study the workability impact of three distinct MSDs – work-related upper limb disorders (WRULDs), back pain and RA.

Work-related upper limb disorders

The Global Burden of Disease data indicate that neck pain accounts for the fourth largest proportion of YLDs of all health conditions across the world. Just over 22.8% of European workers report that they have experienced muscular pain in their neck, shoulders and upper limbs [20]. Whilst no agreed classification of WRULDs exists, there is a common consensus that symptoms of WRULDs can present in the tendons, muscles, joints, blood vessels and/or the nerves and may include pain, discomfort, numbness and tingling sensations in the affected area. These conditions can be caused, or exacerbated, by working which involves repetitive movements, prolonged keyboard use, heavy lifting, poor posture or other forms of work-related physical strain.

Almost all symptoms and impacts on work associated with MSDs are associated with WRULDs. Research has investigated the links between the physical and psychosocial aspects of WRULDs [21,22]. This has highlighted that workers with upper limb, neck and shoulder pain are likely to experience more prolonged work disability and find RTW after a period of absence more difficult if their psychological well-being is also poor. It also suggests that ergonomic changes to the work environment, while important, will rarely be the main pillar of a successful job retention and vocational rehabilitation strategy unless aspects of psycho-social health are also addressed including job design which promotes control, task discretion and employee involvement. The EWCS (2005) [20] has collected self-report data from workers who attributed muscular pain in their neck, arms and shoulders to their work. These findings are presented in Fig. 1.

These data show considerable differences between countries. While cross-country comparisons are difficult, a handful of studies at the national level have illustrated the prevalence and impact of WRULDs in European countries:

- The prevalence of repetitive strain injury (RSI) in the Netherlands stood at about 27% in 2006 [23].
- Research in Belgium [24] has identified that although workers in Belgium are slightly less likely than other European workers to have WRULDs, many of the symptoms have both a physical and psychological dimension. This can not only include traditional ergonomic factors such as repetitive motion, force or posture, but also workplace 'stress', control over the pace of work and job satisfaction.
- Studies in Norway have identified that 54% of the workforce use a computer for at least half of the working day and that this may be associated with the relatively high prevalence of WRULDs relative to other European countries [25].

The research tells us that aspects of the physical work environment (e.g., ergonomic design) and the psychological health of the individual worker can have a decisive impact on both the degree of work disability and the ease with which successful RTW can be achieved. It is possible that, for a proportion of workers with WRULDs, work by itself may not be the only cause of their condition.

Low back pain

Back pain is common, episodic, often recurrent and generally self-limiting. It ranks as the health condition with the highest impact on YLDs in the Global Burden of Disease. Recorded absence is greatest amongst the minority of sufferers whose condition is chronic – if pain lasts for more than 12 weeks – or recurrent – if there are several episodes of pain in one year lasting <6 months. Most people who are affected by back pain either remain in work or return to work promptly. About 85% of people with back pain take <7 days off, yet this accounts for only half of the number of working days lost. The rest is accounted for by the 15% who are absent for more than 1 month [26].

There is a growing consensus that psychological factors are the differentiating factor as they are strongly associated with the progression of back pain from an acute to a chronic condition that affects 2–7% of people [27], and to disability [26,27].

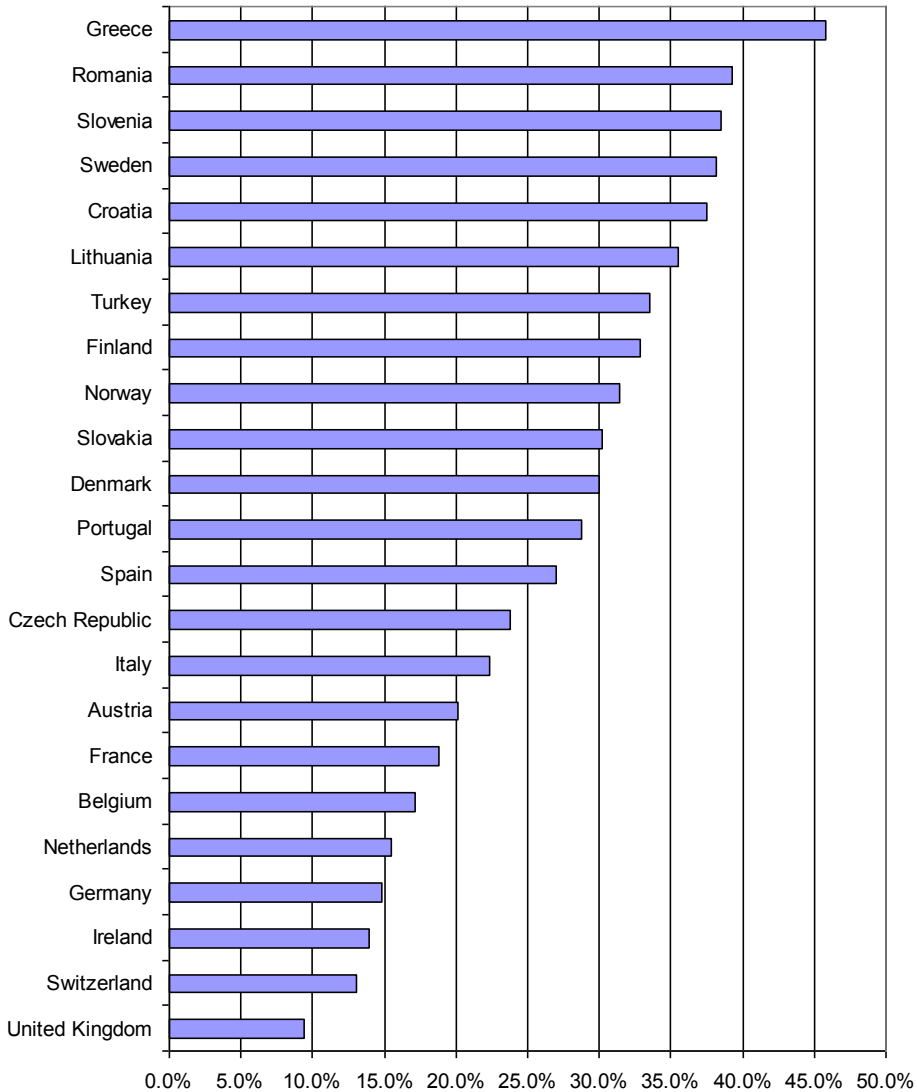


Fig. 1. Work-related upper limb pain: self-reports from European workers.
Source: Parent-Thirion et al., 2005 [20].

The EWCS [20] collected self-report data from workers throughout Europe on the prevalence of back pain attributable to work. Fig. 2 shows the percentage from each country reporting any degree of work-related back pain in the year prior to the survey.

These data suggest relatively low prevalence in northern European countries, with Greece, Slovenia and Romania reporting the highest proportion of workers with back pain. In most countries, there is also an industrial and occupational pattern to the prevalence of chronic back pain. These obviously reflect the physical nature of work and job demands that require lifting (construction and some health care occupations) or those where the risk of physical strain and poor posture is high.

Rheumatoid arthritis

RA is an example of a specific and progressive MSD. It is a form of inflammatory arthritis with a prevalence of between 0.3% and 1% in most industrialised countries [14]. Data on the prevalence of RA were obtained largely from studies performed in the USA and Europe. The disease affects people of any age, although peak incidence is in the mid-age range of the working-age population, between 25 and 55 years. Epidemiological studies have shown that RA can shorten life expectancy by around 6–10 years.

Whilst the clinical course of RA is extremely variable, its features include pain, stiffness in the joints and tiredness and fatigue, particularly in the morning or after periods of inactivity. It affects the synovial joints, producing pain and eventual deformity and disability. The disease can progress very rapidly, causing swelling and damaging cartilage and bone around the joints. It can affect any joint in the body, but it is often the hands, feet and wrists that are affected. RA can also affect the heart, eyes, lungs, blood and skin.

RA can go from a mild and even self-limiting form to being severe and destructive within a short time [28]. It is usually chronic (persistent) and sufferers often have ‘flares’ of intense pain frequently

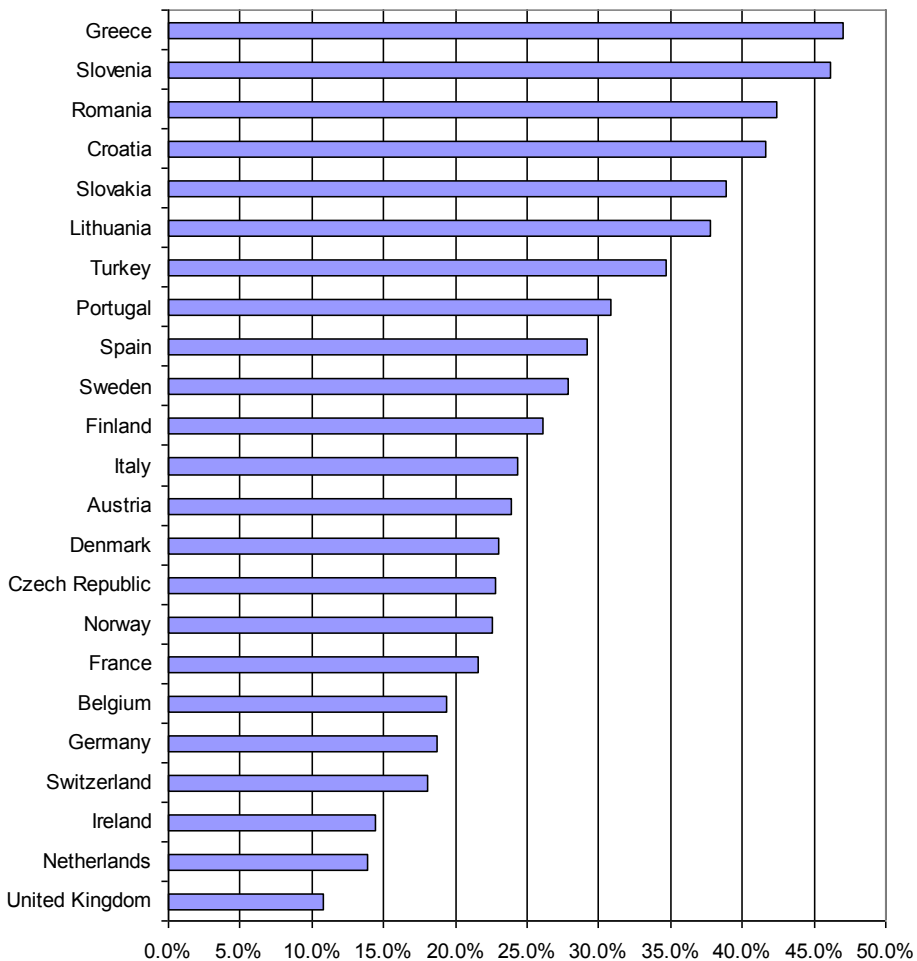


Fig. 2. Work-related backache: Self-report from European workers.

Source: Parent-Thirion, 2005 [20].

associated with fatigue. ‘Flares’ mean that one day someone will be able to perform everyday physical activities (e.g., dressing) or their work duties, and the next they cannot. Managing these ‘flares’ in employment requires close communication and understanding between employees and employers.

Table 1 shows prevalence and incidence data from a cross-national review [29]. These data illustrate a consistent finding in RA research that prevalence is generally lower in the Southern European countries than in Northern Europe.

The effects of the disease can therefore make it difficult to complete everyday tasks, often forcing many people to give up work. Work capacity is affected in most individuals within 5 years [14]. One review of work productivity loss due to RA estimated that work loss was experienced by 36–85% of people of working age living with RA in the previous year, for an average (median) of 39 days [22]. Young et al. [30] reported that 22% of those diagnosed with RA stopped work at 5 years because of RA. However, in some cases, the condition itself is not the main or only cause of having to leave work. Indeed, Young et al. [30] found a further group of respondents who stopped work due to a combination of RA and other factors such as depression, giving an estimate of 40% of those with RA withdrawing from the workforce because of their condition. Every third patient with new RA becomes work disabled – people in poor countries remain working with high levels of disability and disease activity [31].

Patient surveys also reveal the work experiences of people with RA. A survey conducted by Arthritis Ireland provides further insights into the impact of the condition on employment. In 2008, a survey of people with RA showed that 70% were not able to work outside home because of their condition and that the annual cost of lost productive time due to RA was estimated to be €1.6 billion [32]. A second survey, this time including Irish people with other forms of arthritis, showed that 67% of those who did not work or worked part-time stated it was because of their condition and that almost half had changed or left employment because of arthritis. Among those not employed, over 60% were considering returning to work, though 57% felt that fatigue represented their biggest barrier for returning to work. A survey in 2007 by the UK National Rheumatoid Arthritis Society (NRAS) [33] showed that people’s working lifetimes appear to be significantly curtailed because of RA. Of those surveyed who were not in employment, nearly two-thirds (229 out of 353, or 65%) stated that ‘they were not in employment because they gave up work early as a result of their RA. This includes people above and below statutory retirement age. This represents 29 per cent of all respondents (229 out of 782).’ [33] Whilst a high proportion cited pain and physical limitations as factors affecting their ability to perform their duties, 11% of those respondents who were employed and 17% of respondents who were unemployed cited a lack of understanding or support as a barrier to job retention. The report goes on to say that ‘of respondents who had had to give up work early because of their RA, 13 per cent (30 out of 229) said that their employer had wanted them to leave once they became aware of the respondent having a long term health problem’ [33]. The NRAS survey also highlighted that the majority of those with RA would like to remain in work.

Table 1
RA prevalence and incidence in Southern and Northern Europe.

	Country	Prevalence rates	Incidence rates
North Europe	England	0.9–1.1	0.02–0.07
	Finland	0.8	0.03–0.04
	Sweden	0.5–0.9	
	Norway	0.4–0.5	0.02–0.03
	Netherlands	0.9	0.05
	Denmark	0.9	
	Ireland	0.5	
South Europe	Spain	0.5	
	France	0.6	0.01
	Italy	0.3	
	Greece	0.3–0.7	0.02
	Bulgaria	0.9	
	Yugoslavia	0.2	

Source: Alamanos, 2006 [29].

The scenario in many other European countries supports the view that RA can have a damaging impact on the health and labour market participation of people of working age:

- About 16% of RA patients in Lithuania have withdrawn from the labour force after 1 year of the onset of the disease and almost 50% after 10 years [34].
- In Germany, 42% of female and 58% of male RA patients are employed (18–60-year-olds). About 76% of males with RA between the ages of 18 and 40 are employed, compared with only 46% of males between the ages of 51 and 60 [35].
- The prevalence of RA in Greece is 0.68%. The prevalence rate increased significantly as age increased up to the 50–59-year-old age group. Individuals aged 50–59 years had the highest prevalence rate of 1.2% [36].
- Czech data [37] reveal that the annual incidence for RA was 31 per 100,000 adults aged 16 or above. The prevalence rate of RA was shown to be 610 per 100,000 adults aged 16 and above.

These data show that most people are affected with RA when they are of working age, undermining the myth that it is predominantly a condition of the retired or elderly.

The impact of the workplace on MSDs

The risk factors for MSDs are wide ranging. Whilst there is a broad consensus among experts that work may be a risk factor for MSDs, non-work activities such as sport and housework can contribute to musculoskeletal strain. Some studies, for example, have noted that a higher prevalence of musculoskeletal pain among working women may be linked to the fact that women are still mainly responsible for doing the majority of housework [38]. In addition, caring responsibilities can also increase the risk of MSDs; carers frequently report back, neck and shoulder problems associated with lifting, washing and bathing activities. Intrinsic risk factors also have a part to play in the onset and deterioration of MSDs. Some intrinsic factors can be altered while others, such as genetic predisposition, cannot.

In terms of evidence and risk factors for the impact of work on MSDs, a distinction needs to be made between ‘work-related’ disorders and ‘occupational’ disorders [38]. Certain MSDs are recognised as occupational diseases by some European governments, such as wrist tenosynovitis, epicondylitis of the elbow, Raynaud’s syndrome or vibration white finger and carpal tunnel syndrome [39]. As such, the fact that work can cause and contribute to these conditions is widely recognised and the use of assessments of workplace risk to reduce the incidence of these conditions is well established.

The evidence linking other nonoccupational MSDs and work is not conclusive, and attributing cause and effect between specific aspects of work and particular parts of the body is difficult. However, many of the established risk factors that may contribute to the development of nonspecific musculoskeletal conditions can be encountered at work; even if work does not cause a condition, it may aggravate it. Moreover, if we consider risk factors beyond the physical, then the impact of the workplace on MSDs is likely to be much greater. The most frequently cited risk factors for MSDs encountered in the work place include the following:

- Rapid work pace and repetitive motion patterns
- Heavy lifting and forceful manual exertions
- Non-neutral body postures (dynamic or static), frequent bending and twisting
- Mechanical pressure concentrations
- Segmental or whole-body vibrations
- Local or whole-body exposure to cold
- Insufficient recovery time [38].

Many jobs involve activities that can constitute a risk factor for MSDs. The EWCS reports that 17% of European workers are exposed to vibrations from hand tools or machinery for at least half of their

working time, 33% work in painful or tiring positions for the same period, 23% carry or move heavy loads, 46% are subjected to repeated hand or arm movements and 31% work with a computer [20].

The European Agency for Safety and Health at Work [40] indicates that the following industry sectors have the highest rates of WRULDs across Europe:

- Agriculture, forestry and fishing
- Manufacturing
- Construction
- Wholesale and retail
- Hotel and catering.

Similarly, the Economic Dimension of Occupational Safety and Health (ECOSH) highlights the following high-risk occupations:

- Manual workers and craftsmen
- Machine operators
- Secretaries and typists
- Packers.

Much of the attention that employers pay to the issue of MSDs and the impact of the workplace on their onset or deterioration is driven by a concern to avoid or limit litigation and ensure that they are fulfilling their legal duty of care, by performing workstation assessments and giving guidance on manual handling. However, this neglects a wider issue that other work-associated factors can also contribute to MSDs. These aspects are often missed out in the literature and advice on dealing with health and safety. Even where 'stress' is mentioned, the connection between psychosocial factors and physical conditions is often omitted, reinforcing the primary focus on safety [41]. Up to one-third of people with MSDs also present with comorbid mental illness such as depression or anxiety [42]. Not only can this impede functional capacity, it can also inhibit job retention and RTW.

Generally, there is an increased risk of injury when any of the physical risk factors mentioned above are combined, or adverse psychosocial factors, personal or occupational are present [43]. Psychological and organisational factors can also combine with physical factors to influence the probability that someone with MSDs will leave work prematurely. For example, Sokka and Pincus [44] reviewed 15 studies and showed that physically demanding work, a lack of autonomy, higher levels of pain, lower functional status and lower educational levels were predictors of an RA sufferer leaving work early. This highlights that it is not only the physical elements of work that can influence someone's functional work capacity and likelihood of staying in the labour market but also the psychosocial and organisational factors, which are as follows:

- Rapid work pace or intensified workload
- Perceived monotonous work
- Low job satisfaction
- Low decision latitude/low job control
- Low social support
- Job stress

Job stress is a broad term and can result from a variety of sources such as high job demands, a mismatch between skills and job requirements or abuse or violence at work. While job stress might lead to lost productivity, it may also lead to MSDs caused by tension or strain. An increased probability of experiencing a high level of pain has also been associated with low social support, low social anchorage or low social participation [45]. 'Good work' and the provision of high-quality jobs are therefore crucial [46,47].

The wider economic and social impact of MSDs

The effect that MSDs can have on an individual's ability to work and the time they may require to be absent from work means that MSDs have significant associated costs to individuals, families, carers, employers and the wider economy. Calculating the exact costs is not straightforward. Several factors need to be considered and obtaining accurate, reliable and consistent figures is a challenging task. For example, welfare payments (e.g., disability benefit) are transfer payments. They move resources across the economy but do not consume resources. They need to be treated separately when calculating the total costs of interventions. However, the existing figures on the economic impact of MSDs based on conservative approximations show that MSDs are a significant economic burden to most European countries.

To calculate the cost of MSDs (or any illness), the following factors must be estimated:

- **Direct costs** (including medical expenditure, such as the cost of prevention, detection, treatment, rehabilitation, long-term care and ongoing medical and private expenditure);
- **Indirect costs** (including lost work output attributable to a reduced capacity for activity, such as lost productivity, lost earnings, lost opportunities for family members and lost earnings of family members);
- **Intangible costs** (including psychosocial burden caused by job stress, economic hardship, family stress and suffering induced by health problems resulting in reduced quality of life) [14].

These costs vary considerably depending on the condition, on the severity of the symptoms and whether these cause short- or long-term absence or disability. Moreover, they vary depending on the particular methods used to calculate the costs. Some factors which affect the calculations include the following:

- perspective of the analysis including whether all societal costs are included or just publicly funded costs
- severity of patient's conditions in a study
- mix of patient demographics in a study
- calculation method (e.g., bottom-up or top-down costing) and for productivity losses
- definitions of work disability
- baseline year and setting of a study
- change in health care financing systems
- incidence- or prevalence-based estimates of costs.

Intangible costs are rarely included in cost calculations, as it is not possible to properly express the intangible costs in monetary terms [48]. However, the evaluation of intangible costs gives useful information regarding the price paid by people with MSDs in terms of quality of life, and quality-of-life measures should be used as further indicators to measure the effectiveness of interventions [49].

Direct costs

As mentioned above, cost-of-illness estimates require input from a number of different factors, and great variation is found across different studies. For low back pain, the most significant direct costs are related to physical therapy, inpatient services, drugs and primary care [50]. Nachemson, Waddell and Norlund [51] calculated that about 80% of health care costs are generated by 10% of those with chronic back pain and disability. For RA, although direct health care costs have been relatively small in the past [52], a number of studies indicate that direct costs increase as functional capacity decreases, making functional capacity a major cost driver [49,53,54].

Calculations of the costs of treatment tend to evaluate the clinical costs and benefits of treatments. The wider impact of sufferers remaining in work or returning to work early extends to the

biopsychosocial and economic effects to the individual of being in work and to the reduced costs to governments. They may also not include the private costs to individuals, such as transport, and out-of-pocket payments towards the cost of their treatment. Taking a wider joined-up approach to an analysis of costs of treatments for illness in general and MSDs in particular may provide a different and perhaps more realistic assessment of the overall costs of treatments.

Indirect costs

There are two main types of indirect costs most commonly measured in association with ill health in employees. These are absence from work and what is termed 'presenteeism', or loss of productivity in an employee while they are at work with an illness or incapacity. Presenteeism is extremely difficult to measure reliably. As a result, most estimates of indirect costs are based on absence data. However, it is worth noting some of the limitations of data collected on absence from work. The recording of sickness absence is rarely accurate. Different organisations have different ways of recording absence: in some cases, employees complete records themselves; in other cases, managers must record the absence for them. Self-report surveys ask individual employees to complete the survey with respect to a particular reference time. Each method has limitations, for example, with the self-reported surveys; employees might report sickness on days when they were not due to work anyway. With employer surveys, the responses are limited by the quality of the absence records employers maintain. Employer surveys are also subject to response biases where only organisations with good methods to measure absence are likely to be able to respond quickly to the survey request. In all cases, records and reports are subject to biases.

The available cost figures still underestimate the true cost of conditions such as MSDs. Most people with MSDs do not become disabled. In fact, whilst there is a relatively high background prevalence of MSDs, most people (even those with diagnosed conditions) continue to work [55]. For back pain, Nachemson et al. [51] calculated that about 80% of health care costs are generated by 10% of those with chronic pain and disability. However, there are still potentially significant costs associated with lost productivity where people remain at work but in pain or distress while awaiting intervention or workplace adjustments.

The indirect costs of ill health extend beyond lost productivity of the individual, often impacting on the labour participation of family members [56,57]. According to one study [58], the costs of lost employment and informal caring costs can in fact more than outweigh the direct health care costs. A UK study in 1996 revealed that these indirect costs accounted for 52% of the total costs [59]. Indirect costs are not explicitly accounted for at all in some European countries (e.g., Turkey). While this is often attributable to an acknowledged difficulty in collecting comprehensive and reliable data, it also risks severely underestimating the total costs of MSDs to wider society [60].

Total costs

The cost calculations for MSDs in general provide relatively good estimations of the costs of nonspecific MSDs given that nonspecific MSDs constitute the vast majority of cases. Calculating the costs for specific MSDs is fraught with the same difficulties as for MSDs as a whole. The majority of studies estimating the economic burden of RA have provided cost estimates specific to the US population and health care system [61]. Findings across countries with respect to work disability rates are generally not directly comparable given the differences in working terms and conditions, such as the length of social insurance qualification periods and other conditions of statutory sick pay [48].

The limitations of data collection highlight some of the difficulties encountered in trying to cost the impact of MSDs for employers and society. However, Lundkvist et al. [52] estimated that the total cost of treating RA patients in Europe was €13,000 per patient or €45 billion. These costs included medical, drug, nonmedical, informal care and other indirect costs. These figures are slightly higher, per patient, than those for other Western European countries. Table 2 provides a snapshot of the national data on costs.

Work as a ‘clinical outcome’ for workers with MSDs?

If the clinical, societal and economic burden of musculoskeletal disorders in Europe's working-age population is not to become overwhelming as the workforce ages and works longer, then there are several areas of both policy and practice which may need to be re-focused. In this final section, we will examine two such areas. The first is Health Technology Assessment (HTA) and the second is work-focused early intervention. The argument is that if both had the principle that work should be a clinical outcome of care for most people of working age with MSDs, then productivity loss could be reduced and quality of life and independent living could be maximised.

Health technology assessment

HTA is a process that informs decisions on the allocation of money across health care systems. HTA is now widely practised around the world; however, the approach taken and the influence of HTA within policy-making differ both across and within countries. In this study, we are more concerned with the perspective taken in these decisions:

- Theoretically, most governments across Europe aim to take the societal perspective, which includes consideration of the impact of a health care intervention on the patient's ability to work and its economic effects;
- In reality, we see that a health care system perspective is taken, covering only those costs and benefits of immediate relevance to the health care system.

Thus, if the cost–utility of a new clinical intervention to treat hip osteoarthritis or RA is calculated through the traditional cost per quality adjusted life year (QALY) gained method, but in a way which excludes consideration of any impact the intervention may have on job retention, RTW or productivity, then it is possible that access to the intervention will be denied to some patients of working age or the cost not reimbursed.

Similarly, case studies compiled by Barham and Bevan [68] also highlight a need for transparency in the approach to analyse productivity in HTA. Some European countries have sought to be as clear as possible how they treat productivity data in HTA:

- In the Netherlands, guidelines state that productivity costs should be presented separately and analysis conducted both with and without productivity included. This allows health care decision-makers to be in possession of all the relevant data and to decide if the labour market and productivity benefits which are likely to accrue are worth the ‘investment’.

Table 2
A glimpse of National data on the costs of MSDs.

Some national data on costs
<ul style="list-style-type: none">• In the Netherlands, it is estimated that work-related repetitive strain injury (RSI) costs a total of €2.1 billion each year [62]. Of this, €808 million is attributed to productivity loss.• Studies of Swedish back and neck pain patients on sick leave have shown that the total cost to health services (including costs for the relatively few who receive surgery) is about 7% of the total cost of health services [63].• In the Czech Republic in 2007, the cost of an average duration of stay in hospital for people with diseases of the musculoskeletal system and connective tissue amounts to CZK31,623 (€1243), based on the average cost of 1 day of stay in hospital of CZK3,810 (€150) [64].• The annual impact of RA on Spanish society could be more than US \$2 billion [65]; lower back pain costs Spanish Social Security €66 million.• Work by Chorus et al. [66] estimated that the total annual cost of AS per patient in 2003 was US \$11,843 (compared with US \$7243 in the USA) and that 72% of these costs were indirect costs.• Early RA can result in a substantial loss in productivity. In a 5-year study in Finland [67], lost productivity per patient-year averaged €7217 (€6477 for women and €8443 for men).• A study by Dagenais et al. [50] estimated that the total annual cost of lower back pain in Europe was £12.3 billion in 1998 and that 87% of these costs were indirect.

- In Poland, guidelines state that separate categories of costs (direct medical and non-medical costs, indirect costs [such as productivity] and intangible costs) should be presented separately. Analysis should present the costs exclusively to the public payer separately.
- In Spain, guidelines state that the National Health System perspectives and societal perspectives should be presented separately. They also note that productivity analysis should separately identify paid employment losses and unpaid work (e.g., housework).

Thus, we have examples of productivity data that can be accommodated within HTA taking the societal perspective, separately presenting the analysis and allowing all interested parties to see the impact of a decision [69,70]. The eight European case studies [68] also found that:

- The ‘scope of HTA agencies differ’: from a wide scope encompassing public health interventions through to individual technologies such as drugs and devices (as seen in England and Wales through the work of National Institute for Health and Care Excellence (NICE) and in Sweden through the work of SBU) to a narrow scope focussed on new medicines (as seen in Poland). There is already a debate about widening the scope of HTA to encompass many more interventions [71].
- The incentives to adopt the HTA results differ: from commitments for funding HTAs, which suggest that investment is cost-effective (as seen with technology appraisals from NICE) to no commitments at all (as seen with clinical guidelines from NICE).

This means that the ability of HTA to consider a wide range of investments (such as new services and techniques) can be limited, as is ensuring implementation of the recommendations informed by HTA. If productivity and workability become core considerations in HTA, then we may see HTA itself applied broadly and the resulting recommendations implemented. That is because interventions which are successful in getting people with an MSD back to work are not limited to drugs and medical devices. The broader delivery of earlier interventions, such as physiotherapy, from a range of health care professionals also supports efforts to maximise job retention and RTW (Department of Social and Family Affairs, 2004) [72].

Early health care interventions for working-age people with MSDs

Improving timely access to early health care interventions for working-age people with MSDs who may be at risk of reduced work ability or even job loss has several advantages:

1. *Timely treatment and care:* In general, the quicker an individual receives an accurate diagnosis, the more rapidly they get access to appropriate treatment which can stabilise or control their symptoms.
2. *Reducing the risk of developing comorbid conditions.* For many people with chronic conditions, issues like pain, fatigue, depression or anxiety can increase health care costs and reduce functional capacity;
3. *Aiding a return to activities of daily living.* People with chronic conditions can become more self-reliant and rely less on health and social care services if they have access to early intervention, especially if they are playing an active part in the management of their condition [73];
4. *Staying in or returning to work.* People whose health conditions are being well managed are more likely to remain economically active, continue to pay taxes and be less reliant on welfare payments.
5. *Reducing the burden on carers.* There is considerable evidence that the working lives of carers providing support for people with chronic illness can be severely disrupted [74]. Improving work ability of those with chronic illness through earlier intervention would ease this care burden and allow carers themselves to improve their working lives.

There is growing evidence that if ‘work’ is regarded as a clinical outcome and that if MSD patients of working age are given early access to treatments and therapies, this can help improve their functional capacity and work ability. Despite these arguments, it is too often the case that opportunities to align

clinical interventions, workplace interventions and welfare system support are frequently missed or not given sufficient priority.

There are several barriers to early intervention, especially where they might be accessible to and benefit people of working age:

1. *Primary care*: Often, many family doctors or general practitioners (GPs) do not regard work as a clinical outcome to which they should attach priority. This means that condition management, treatments or therapies which may help an individual stay in or RTW may not be prescribed, commissioned or referred to early enough to affect lost productivity or work loss.
2. *Secondary care*: Again, work ability is most often a second-order priority in these clinical settings. Here the focus will inevitably be on establishing an effective treatment regime. However, RTW should also be seen as a treatment goal among MSD patients of working age, especially if they face an extended period away from work because of their symptoms or because of their treatment.
3. *Health technology appraisal (HTA)*: As we have seen, in some countries, the remit of HTA allows estimation of the economic and societal benefits of giving patients access to treatment which will help them remain in work [68]. In others, only the direct clinical benefits and cost are examined. This makes the funding or early clinical interventions less likely.
4. *Employer behaviour*: Among many employers, failure to refer employees early to an occupational health specialist (if one is available and if they are tasked with prioritising early RTW) can extend the time that they are away from work through sickness absence and can increase their risk of leaving work permanently.
5. *Social welfare, insurance or workers' compensation*: Some welfare or insurance systems place more emphasis on interventions which reduce flows of claimants onto benefits than aligning with clinical and workplace interventions to prevent job loss. This can mean that some people with chronic or progressive MSDs leave the labour market before receiving a welfare-related intervention.
6. *Concerns over costs*: It is still common to find that early intervention is regarded as the most costly option. This is clearly an issue at a time when health care spending is subject to greater controls. However, where there is evidence that targeting resources at early interventions can save money in the medium to long term, it is increasingly important to highlight practical examples which can give clinicians and others to see such interventions as investments rather than costs.
7. *Silos in budgeting and cross-collaboration*: At both national and local levels, the segmentation of budgets into 'silos' for health, welfare, employment and social care can impede the delivery of joined-up or integrated services which allow working people with chronic illness to get access to early support. Even if earlier access to health care can be demonstrated to improve work outcomes and reduce welfare or social insurance costs, it can be hard to convince health care decision-makers to advance finance from their budgets if the benefits ultimately accrue mainly to the budgets of another agency or department (see Ref. [75] for a Swedish example of budget pooling focussed on vocational rehabilitation for people with MSDs). In the UK, for example, the National Audit Office [76] has calculated that improved clinical outcomes for people with RA could be achieved if early intervention was increased by 10%. However, these gains would need to be achieved by first increasing expenditure in the health care system (NHS) by £11 million over 5 years. A productivity 'payoff' – estimated to be £31 million from reduced sick leave and lower lost employment – would accrue to individuals, employers and to the Department of Work and Pensions. However, the incentive for a 'spend to save' approach within the UK NHS, especially in a time of austerity, is currently negligible.
8. *Patient awareness and education*: Patients may often be unaware of the option or benefits of early interventions and will not seek them out, understandably preferring to be directed in their care pathway by their physician's advice. In many circumstances, patients follow the advice of their doctors about the timing of RTW very rigidly [77] even if earlier, phased RTW might be beneficial. If demand from MSD patients for early interventions which support RTW is low through lack of awareness, then pressure on clinicians to prioritise it will also be low.

Many of these barriers coexist and can be exacerbated in the case of conditions which are not well known (e.g., some inflammatory conditions such as ankylosing spondylitis or Crohn's disease can take

several years to diagnose, tend to affect young people initially and can have a cumulative life-course impact on education, employment income and social inclusion).

Effective early intervention is, ultimately, a form of prevention as it can ensure that symptoms are discovered, treated and have only a minimal impact on an individual's work ability. In order to achieve the clinical, societal and economic benefits of early intervention, however, it will be important that all stakeholders (clinicians, policy-makers, employers and patients) coordinate their efforts. As chronic ill health becomes more prevalent, early intervention will need to become a more prominent feature of the sustainable healthcare landscape.

A recent review [78] of several published early intervention studies aimed at improving work outcomes for people living with MSDs has highlighted several potential benefits. It concludes that, in the right combination, early interventions focussed on positive work outcomes for people with chronic illhealth can:

1. Reduce 'sick leave' and lost 'work productivity' among workers with MSDs by more than 50%. Early intervention is commonly more cost-effective than 'usual care';
2. Reduce 'healthcare costs' by up to two-thirds;
3. Reduce 'disability benefits costs' by up to 80%;
4. Reduce the risk of permanent 'work disability' and 'job loss' by up to 50%;
5. Reduce the risk of developing a comorbid 'mental illness'
6. Deliver 'societal benefits' by supporting people with work-limiting chronic conditions to optimise their 'functional capacity' and remain active at work and maintain 'economic independence'.

The challenge for many clinicians is that even though they know that early intervention can often have clinical and occupational benefits, it can be hard to find or get payment for support services or medical interventions which deliver early benefits. In many European health care systems, especially those which prioritise treatment over prevention, investment in early intervention is harder because the infrastructure is focussed on acute care and the 'mind-set' of health care decision-makers is not attuned to the notion of 'investment' rather than 'cost'. Another problem is that building RTW into a care plan for a patient is not incentivised in many health systems nor is the principle that work should be regarded as a clinical outcome of care. This is especially the case in systems where the QALYs gained by a health care intervention dominate the 'cost-effectiveness' decision, even though there may be a supplementary societal benefit (e.g., work productivity, improved support for carers, etc.).

Conclusion

MSDs among Europe's working-age population represent a considerable economic burden at a time when labour productivity is close to stagnant and health care costs are under severe scrutiny. Over the next two decades, the workforce will age, it will be required to retire later and it will – as a result – be more likely to have its productivity further undermined by a growing burden of chronic ill health and co-morbidity.

If the economic, societal, clinical and individual consequences of this burden are to be mitigated, it will take a number of coordinated steps from a range of stakeholders. Policy-makers will need to prioritise interventions which promote job retention and RTW among both employees with MSDs and those who are unemployed. They may also need to make it easier for health care decision-makers to take a societal perspective in HTA to allow early clinical interventions which enhance 'work ability' to be reimbursed. Clinicians will need, more routinely, to regard work as a clinical outcome of care for patients with MSDs – even those which are not work-related such as inflammatory arthritis, osteoarthritis, ankylosing spondylitis and osteoporosis. Among other things, this means that job retention or RTW should be treatment goals embedded in care plans.

Employers too need to play their part, with early referral and flexibility in supporting vocational rehabilitation and graduated RTW forming a routine part of the way that employees with MSDs and other health conditions are accommodated.

Despite the fall in the proportion of the European workforce engaged in heavy, physically demanding work, MSDs are set to remain a major cause of health-related productivity loss. There is growing evidence for effective interventions. The time for a joined up response has come.

Conflict of interest declaration

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