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Invited Review

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Regional musculoskeletal pain in workers—is the traditional medical model increasing disability?

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Abstract

Introduction: **Musculoskeletal disorders frequently cause work disability. For low back pain, a de-medicalized approach is advocated, whereas a biomedical approach is taken for shoulder and elbow/forearm pain.**

Sources of data: **PubMed, Cochrane Library, Google Scholar.**

Areas of agreement: **Guidelines for the management of low back pain recommend de-medicalization, rapid mobilization, avoidance of imaging, second-line use of pharmacological treatments, and an emphasis on self-management and remaining in or rapidly returning to work.**

Areas of controversy: **Despite evidence for many treatment modalities, shoulder pain and elbow/forearm pain are still managed using a biomedical model that separates conditions into distinct diseases and treats them accordingly.**

Growing points: **Should pain at the shoulder and elbow/forearm be de-medicalized, with greater emphasis on maintaining mobility and work participation?**

Areas timely for developing research: **Testing integrated occupational and health interventions for musculoskeletal disorders, focusing on their effectiveness in work rehabilitation and reducing disability.**

Keywords musculoskeletal pain, musculoskeletal disorders, work participation, sickness absence, back pain, non-specific arm pain, elbow/forearm pain

Introduction

Adults in decent employment experience greater financial security, higher social status in society, and more meaningful, purposeful lives [1]. Compared with work-disabled adults, they have better mental health [2] and lower pain [3], reduced risk of self-harm and suicide [4], lower use of health and social care resources [5], less financial distress [6], and have a 5–10 year longer life expectancy [7]. Work disability in working-aged adults is caused by various health conditions, but the leading causes are mental health conditions and musculoskeletal disorders [1]. The focus of this narrative review is on disability for work caused by musculoskeletal pain.

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Musculoskeletal pain has long affected humans (e.g. back pain was described in ancient papyri) but disability from back pain has risen by 50% since 1990, increasing most rapidly in low- and middle-income countries [8]. Our aim is to re-examine work disability caused by musculoskeletal pain by comparing the extensive evidence on low back pain with that for shoulder pain and elbow/forearm pain. We consider the modes of diagnosis and treatment of pain across these sites and explore why, despite substantial knowledge of their epidemiology and risk factors, work disability, with its accompanying disadvantages, is increasing and consequently the burden of health inequalities continues to widen. We then use this evidence to highlight the need for new approaches.

Low back pain

The burden

The most recent data from the UK Health and Safety Executive (HSE) show that the 2023/24 rates of work-related musculoskeletal disorders are similar to those prior to the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (COVID-19) pandemic in 2018/19 with 543 000 total cases (prevalence rate 1600/100 000 workers) [9]. They accounted for a third of all work-related ill-health and a quarter (26%) of working days lost. In total, the prevalence rate of work-related back pain was 690/100 000 workers resulting in 2 550 000 working days lost [9]. Similar patterns are seen globally [10–12]. Disability from back pain has increased by over 50% since 1990, with the greatest impact among people of working age; it is the commonest cause of medically certified sick leave and early retirement in Europe and accounts for more sick days than any other musculoskeletal condition in the USA [10, 13].

Low back pain causes greater work disability among people from socio-economically deprived circumstances with lesser educational attainment who are generally doing the least autonomous and most physically demanding jobs. These groups also have fewer opportunities for alternative employment opportunities, thereby worsening health inequalities. The prevalence of low back pain is increasing most rapidly in low- and middle-income countries [8], where it has been shown to cause similar disability for work among rural farmers, compounding its economic impacts [14].

Risk factors and causation of low back pain

Despite the substantial disability caused by back pain, a specific cause is rarely identified [10]. This is the case despite numerous recognized risk factors (see Table 1) [15–18]. Although relatively under-studied, low back pain rarely appears to be effectively prevented by occupational intervention strategies aimed at reduction of lifting, bending, heavy manual tasks, awkward postures, and performing activities while tired or distracted [19]. Prognostically, low back pain follows a chronic episodic course which relapses and remits over time with poorer outcomes best predicted by general ill-health (poor self-rated health, psychological ill-health, other chronic disease) and/or previous episodes of low back pain [10].

Treatment of low back pain

Despite multiple trials and the use of increasingly complex imaging techniques, there is no evidence that dividing most cases of non-specific low back pain into presumed diagnostic categories improves treatment outcomes. There is also clear evidence that much of the care provided for low back pain is non-evidence-based, low value, or even harmful [12]. For example, among workers with accepted compensation claims for low back pain, physical treatments have been associated with more delayed return-to-work [20]. In workplaces, a biomedical model reinforces a commonly-held belief that low back pain results from injury, implying blame or negligence, and the need for compensation.

Recent evidence suggests that promoting a biomedical model of low back pain within communities increases the associated disability [13]. At the same time, the expansion of costly diagnostic and treatment services has driven overuse of unnecessary low-value care, while more affordable, high-value care remains underused [11]. This is demonstrably the case in high-income countries but is increasingly apparent in low- and middle-income countries. Opioids, gabapentinoids, spinal fusion surgery, spinal cord stimulation, and regenerative therapies have been widely adopted over the past two decades despite limited evidence of benefit for low back pain and insufficient evaluation of harm [11].

Guidelines for managing low back pain

As early as the 1990s, evidence of the disabling impact of biomedical approaches to low back pain led to a range of evidence-based international guidelines with broadly similar recommendations [21]. These emphasized history-taking and examination to rule out rarer pathology requiring specific and/or urgent management, screening for risk factors for chronicity (including psychosocial factors and work factors); avoiding unnecessary imaging and other investigations; promoting a patient-centred biopsychosocial approach to education and maintenance

Table 1 Risk factors for musculoskeletal pain at the low back, elbow, forearm, wrist/hand, and shoulder.

	Low back pain (10)	**Elbow/forearm pain (15–17)**	**Shoulder pain (18)**
Age	Increases with age at least until eighth decade of life	Increases with age at least until sixth decade of life	Increases with age at least until eighth decade of life
Gender	Females > males	Females > males	Females > males
Socio-economic status	Chronic: Increased with more deprivation Increased with lower household income	Chronic: Increased with more deprivation	Chronic: Increased with more deprivation
Educational attainment	Chronic: Increased with lower educational attainment	No evidence	No evidence
Cigarette smoking	Chronic: Increased risk in smokers	Some evidence of increased risk	Increased risk
Leisure-time physical activity	Increased risk of disability in people with low levels of exercise	No evidence	No evidence
Obesity	Chronic: Increased risk with increasing BMI	No evidence	Increased risk with increasing BMI
Other musculoskeletal pain	Previous episode of low back pain Increases risk of number of future episodes Chronic: increases risk	Increased risk with pain at other sites	Increased risk with pain at other sites
Occupational mechanical factors	Physical workload, heavy lifting, awkward postures, heavy manual tasks, feeling tired or distracted whilst performing an activity at work whole body vibration	Carrying weights, high demands, working with arms above shoulder height, bending/straightening the elbow, repetitive tasks, hand/arm vibration	Working with arms above shoulder height, heavy physical load, lifting, pushing/pulling, repetitive work, hand/arm vibration, awkward postures, combinations of these exposures particularly important
Occupational psychosocial factors	Low job satisfaction	Low job satisfaction, perceived stress at work, high job demands, monotonous work	Low job satisfaction, perceived stress at work, high demands/low control, lack of support at work, career prospects, psychosocial work environment
Mental health and wellbeing	Poor self-rated health, fear-avoidance beliefs, catastrophizing, psychological distress, depression, comorbid disease (asthma, headache, diabetes), somatic symptoms	Psychological distress (worry), illness behaviour score, negative beliefs about causation/prognosis, somatization	Emotional distress (stress), comorbid disease (stroke, diabetes), somatization

of physical activity; supporting continued work participation and avoidance of prolonged sickness absence; and minimizing drug use, particularly harmful prescriptions such as strong opioids [21].

More recent publications have reinforced these principles, with greater emphasis on active self-management and reserving pharmacological therapies as second-line options [11]. Foster and colleagues have proposed some new approaches to reduce disability from low back pain, including integrating clinical care with occupational health, reforming compensation and disability policies, and promoting healthier beliefs about back pain to influence public behaviour. Only time will tell how successful these suggested approaches will be in reducing the burden of disability from low back pain.

While low back pain accounted for the largest proportion (43%) of work-related musculoskeletal disorders according to the 2023/24 UK data shown above, the next biggest cause (37%) of the burden came from disorders mainly affecting the upper limbs or neck [9]. The next sections will compare and contrast non-specific low back pain with non-specific musculoskeletal pain occurring at two upper limb sites: the distal upper limb and the shoulder.

Shoulder pain

The burden of shoulder pain

Shoulder pain is highly prevalent, affecting an estimated 16% of the population (range 0.67%–55.2%) [22]. Like back pain, it is a common cause of healthcare use and disability for work, resulting in substantial direct and indirect costs [23].

Risk factors and causation of shoulder pain

The currently established risk factors for shoulder pain are remarkably alike those identified for low back pain (Table 1). Over the past century, a wide range of pathoanatomical diagnoses for shoulder pain have been proposed, including conditions affecting different soft tissue components of the shoulder region, such as ligaments, muscles, capsule, tendons, labrum, and bursae. For rotator cuff disease, nomenclature has varied somewhat (e.g. rotator cuff tendinitis, subacromial bursitis, impingement syndrome), particularly as imaging techniques have become more sensitive. Excluding glenohumeral joint osteoarthritis, there is little evidence that separating different pathoanatomical shoulder conditions, either clinically or by imaging, improves treatment outcomes or prognosis [24]. As with non-specific low back pain, advances in imaging techniques and increased use of imaging have not translated into better outcomes (pain, disability, workability). A possible exception is the subset of people being considered for repair of full-thickness rotator cuff tears, but a systematic review of the evidence for surgical repair has failed to find convincing evidence of benefit [25].

Treatment of shoulder pain

Rotator cuff disease

Multiple systematic reviews of treatments for rotator cuff disease show little evidence beyond short-term benefit (oral NSAIDs, glucocorticoid injections, therapeutic exercise, and manual therapy) [26]. Similarly, in people with presumed rotator cuff pathology or impingement syndrome, there has been no benefit found for subacromial decompression surgery compared with sham surgery [27]. Evidence also suggests that shoulder pain persists beyond 6–12 months in at least one-third of patients [26, 28], and current treatments do not appear to reduce chronicity or relate to baseline examination findings [25].

As with low back pain, despite extensive research and numerous randomized controlled trials, shoulder pain appears to be a common disabling symptom for which, to date, diagnosis, imaging, and treatment options have not substantially reduced the risk of disability or chronicity. Unfortunately, as with back pain, there is also evidence of considerable low-value care being provided [29].

Elbow/forearm pain

The burden of elbow/forearm pain

Elbow/forearm pain is another major cause of work disability [30]. Although not separately reported in the UK HSE data, population studies have estimated a prevalence of pain lasting a day or longer in the past 7 days of 19% and 21% in working-aged men and women, respectively [31].

Risk factors/causation of elbow/forearm pain

As shown in Table 1, risk factors for pain in the elbow/forearm are similar to those for low back pain, including occupational, mechanical, and psychosocial factors, as well as mental health and wellbeing, and beliefs/perceptions [15–17]. There have also been major occupation-related epidemics of elbow/forearm pain, such as the outbreak of Repetitive Strain Injury, which occurred in the 1980s in Australia, where many workers developed severe, chronic, and disabling arm pain [32].

Treatment of elbow/forearm pain

Management of pain in the elbow/forearm typically involves a specific diagnosis of conditions such as epicondylitis based on history, examination, and imaging. Following this, arm pain attributed to epicondylitis should be treated with combinations of splints or orthoses, non-steroidal anti-inflammatory drugs, glucocorticoid injections, physical therapy, and, in resistant cases, surgery. It is interesting, therefore, to explore the evidence of the effectiveness of this approach (see Table 2) [33–38]. Evidence from systematic reviews shows only limited benefit for any of these treatment modalities. However, the meta-analysis by Ikonen *et al*. found that symptoms resolve in around 90% of people with untreated epicondylitis in the placebo arms of randomized controlled trials, suggesting a favourable natural history [39].

Given the lack of convincing evidence for the effectiveness of differentiating the above specific conditions and treating them, a multicentre randomized controlled trial was undertaken, which recruited anybody referred for physiotherapy with pain affecting the elbow or forearm [40]. Participants were randomized into three arms—immediate physiotherapy vs delayed (usual waiting-list), or physiotherapy providing different information during the delay. One group received conventional injury-diagnosis-treatment information consistent with

Table 2 Summary of evidence from Cochrane systematic reviews synthesizing evidence for treatments of elbow/forearm pain.

Condition	Treatment modality	Findings
Lateral epicondylitis/Tennis elbow/Lateral elbow pain	Manual therapy and exercise [33]	Total 23 studies with 1612 patients (mean age 38–52 years). Low certainty evidence from 12 trials comparing with placebo (sham) to suggest that manual therapy and exercise may slightly reduce pain (pain score from 4.1 with sham to 2 points on Visual Analogue Scale (VAS) scale) and disability (disability score 40 with sham and 15 with active treatment on 100-point scale) without any benefit for quality of life. Unclear whether more adverse effects from the treatments.
	Autologous blood or Platelet-Rich Plasma (PRP) injection [34]	Total 32 trials with 2337 participants (mean age 36–53 years). Pain. Moderate certainty evidence to suggest that autologous blood or PRP injections, compared with placebo, probably provides little or no benefit that is clinically important in reducing pain or improving function. Low-certainty evidence indicates that there are not more adverse events with injections.
	Non-steroidal anti-inflammatory drugs (NSAIDs) [35]	Total 13 trials with 664 participants. Limited evidence about relative benefits or harms of topical or oral NSAIDs for treating lateral elbow pain due to methodological problems with the evidence. NSAID gel may cause a skin rash.
	Shock wave therapy [36]	Total 9 trials including 1006 participants to suggest that there is strong evidence that, compared with placebo, shock wave therapy provides little or no benefit for pain or function in people with lateral elbow pain.
	Glucocorticoid injections [37]	Short-term benefits for pain (lasting 6–8 weeks) but possibly inferior over longer-term compared with exercise or other treatments.
	Orthotic devices [38]	Total 5 trials of small size. Insufficient evidence to draw conclusions about effectiveness of orthoses.

the medical model and the other group received the 'arm book' [41], which was derived similarly to the 'back book' in avoiding the medical language and featured biopsychosocial messages about maintaining activities and having expectations of good recovery. After 6 months, the primary outcome was the absence of disability according to the modified Disability of the Arm Shoulder and Hand scale. Strikingly, the group who were least disabled at 6 months follow-up were those who received delayed physiotherapy but given advice to remain active (Fig. 1) [40]. Disability in the other two groups was comparable. Subsequently, the trial data were analysed for the two-thirds of participants who were in paid work when recruited [42]. Although this secondary analysis was under-powered, again the levels of disability appeared less among those with delayed physiotherapy after biopsychosocial advice, including among those who fulfilled diagnostic criteria for lateral epicondylitis at baseline (Fig. 2) [42].

Although elbow/forearm pain has been less studied than low back pain, many parallels can be drawn. Risk factor profiles are very similar (Table 1), and current treatment paradigms suggest little benefit from separating states of disease into presumed diagnostic entities. There is also emerging evidence supporting de-medicalization and avoidance of prolonged rest.

Multi-site pain and pain sensitization

Until the last two decades or so, most research on musculoskeletal pain focused on incidence, prevalence, risk factors, or treatment options for pain at a single site (most commonly the low back). However, it has become clear that, at least in the workplace, few people actually report single-site musculoskeletal pain when asked. In the Cultural and Psychosocial Influences on Disability (CUPID) study of over 8000 workers doing manual work, nursing, and office work, only a small proportion ($<$10%) reported single-site pain [43]. In the same study, the authors found that mechanical risk factors were most strongly associated with single-site pain, while psychosocial factors (e.g. beliefs, fear of pain, somatization, mental health, psychological distress) were more closely linked with pain in at least two anatomical locations [43].

Researchers using brain imaging techniques and functional Magnetic Resonance Imaging (MRI) scans have postulated the phenomenon of peripheral and central sensitization, identifying characteristic features in people with both chronic low back pain and shoulder pain [44]. It is hypothesized that once central sensitization develops, it is less responsive to peripheral treatments, consistent with findings from some trials and systematic

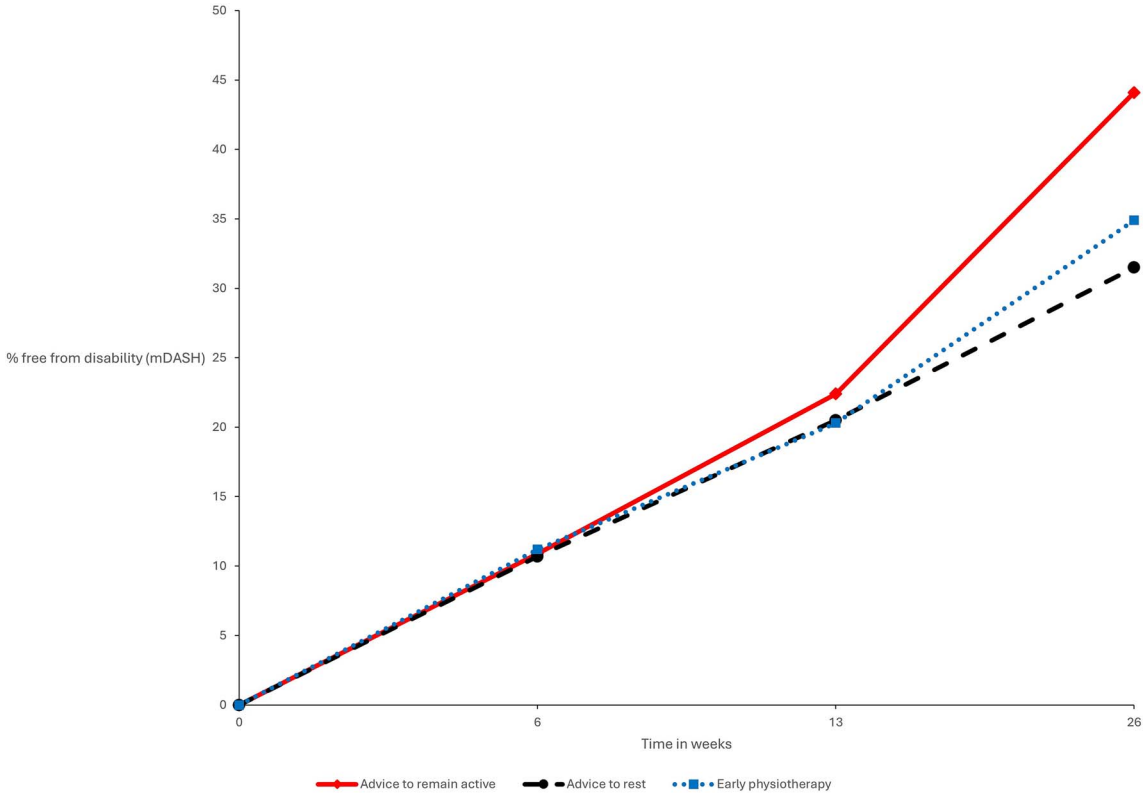


Figure 1 Proportion of each group (delayed physiotherapy with advice to remain active; delayed physiotherapy with advice to rest; fast-track physiotherapy) attaining the primary outcome at 6 months (absence of disability according to the modified Disability of the Arm, Shoulder and Hand) in the ARM pain trial [40].

reviews. It is therefore unsurprising that the factors associated with poor prognosis for shoulder pain (pain duration and intensity; previous episode of shoulder pain; catastrophizing; fear-avoidance beliefs; severity of disability; comorbid mental health; current sickness absence; comorbid pain at other sites) resemble those for low back pain (pain intensity; psychological distress; comorbid pain at other sites) [10].

Discussion

This narrative review compared low back pain, a leading cause of work disability in working-aged adults, with musculoskeletal pain from two other regional sites: the shoulder and the elbow/forearm. For low back pain, a substantial evidence-base and clinical guidelines support de-medicalization, avoidance of imaging, prioritization of non-pharmacological approaches, promotion of self-management, and changes in healthcare pathways and public health messaging to reshape the public's views about pain and disability. This has been accompanied by calls to better integrate occupational health with healthcare and broader reconsideration of workers' compensation arrangements [11]. For shoulder pain and elbow/forearm pain, the available evidence indicates similar risk factors and diagnostic approaches that fail to separate disease/conditions requiring different treatments or with different prognosis. Moreover, much of the care provided makes minimal difference to outcomes, particularly in the long-term. Achieving sustained reductions in work disability may therefore require longer-term workplace adaptations and different healthcare approaches.

Thus, there is a pressing need to apply lessons learned from low back pain to musculoskeletal pain at other regional sites. Work disability has a major individual and societal impact, reducing national productivity, increasing healthcare costs, and placing strain on welfare systems. However, as recently highlighted by Reneman and colleagues, the emphasis on physical occupational risk factors (e.g. heavy lifting and low back pain) may reinforce the belief that it is possible to damage the back through lifting too much weight at work [45] and that back pain is a sign of tissue damage and injury. This perpetuates a biomedical model of pain—injury—blame—compensation, potentially contributing to increasing rates of disability [45]. While abandoning manual handling

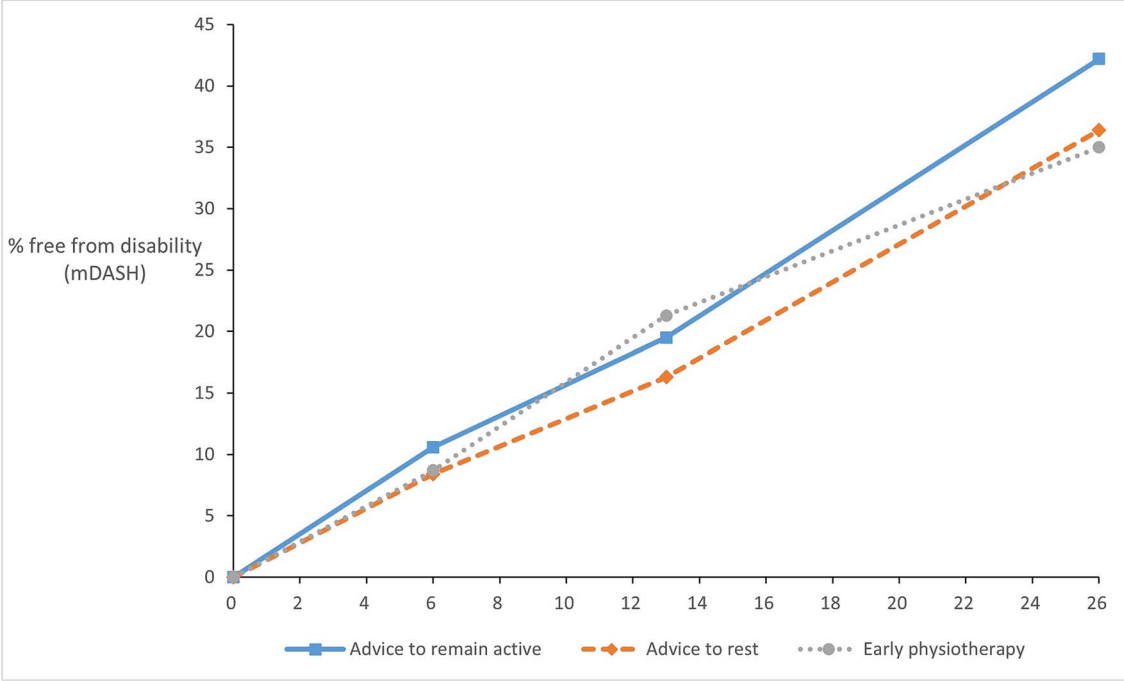


Figure 2 Proportion of working people in each group (delayed physiotherapy with advice to remain active; delayed physiotherapy with advice to rest; fast-track physiotherapy) attaining the primary outcome at 6 months (absence of disability according to the modified Disability of the Arm, Shoulder and Hand) in the ARM pain trial [42].

regulations in workplaces is unrealistic, a new approach is needed. As called for in the Lancet back pain series (2018), integrating occupational health with health care is an important step [11]. Rehabilitation for musculoskeletal pain should prioritize maintaining work participation as far as possible, focusing on problem-solving and function, not on the pain itself, with appropriate modifications to duties where needed.

It is important to reinforce the message that working is better for health than sickness absence and does not require an individual being 100% pain-free. For the future, greater emphasis may be needed on normalizing pain and managing it proactively to reduce disability, alongside more balanced messaging about the benefits of work, physical activity, and overall health. Such a paradigm shift will require reconsidering routine reporting of pain symptoms at work and placing less emphasis on physical occupational exposures, with greater focus on holistic messages about the value of decent work for health and the importance of prevention through exercise both within and outside the workplace.

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Karen Walker-Bone: (Original idea, conceptualisation, first draft, review and editing) and Rachelle Buchbinder (Conceptualization, Writing—review & editing)

Conflicts of interest

Both authors declare that they have no conflicts of interest.

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