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Trajectories of Multisite Musculoskeletal Pain and Implications for Prevention

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Musculoskeletal pain, especially in the back and upper limb, is a major cause of disability in people of working age. Observational studies have consistently demonstrated associations with occupational activities such as heavy lifting and forceful repetitive movements of the wrist and hand, which physically stress relevant anatomical structures [1]. Thus, although there is often no demonstrable underlying injury to tissues that would account for reported symptoms [2], preventive efforts in the workplace have focused mainly on ergonomic measures designed to reduce mechanical loading. Disappointingly, randomised controlled trials of ergonomic interventions have failed to demonstrate major benefits in the prevention either of low back [3] or upper limb pain [4], although evidence on the latter is rather sparse. Moreover, research has revealed large international variation in the prevalence of disability from musculoskeletal pain, even among workers with similar jobs [5], and also major temporal changes within countries that cannot be explained by biomechanical factors [6]. These observations indicate that there must also be other important causes.

Another notable epidemiological feature of musculoskeletal pain is its tendency to recur, and to affect multiple anatomical sites simultaneously or close in time [7,8]. The latter is not simply chance coincidence. Analysis of cross-sectional data from a large international study (CUPID) has shown that when account was taken of the prevalence of pain at individual body sites, the frequency of multisite pain was much higher than would have been expected if the occurrence of pain at each site were statistically independent [8]. This applied especially when the number of affected sites was large. Furthermore, it appears that pain which is localised to a single site may differ in its severity, causes and prognosis from that which occurs in a context of more widespread symptoms [9–11]. This suggests that to prevent pain at specific anatomical sites such as the back and wrist/hand, we need to understand better the drivers of multisite pain.

The paper by Neupane and colleagues in this edition of OEM is therefore timely [12]. By applying latent class analysis to data obtained by questionnaire at up to four time points in a longitudinal study of employees at a Finnish food company, they distinguished five trajectories of musculoskeletal pain, and assessed their association with risk factors

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ascertained at baseline. The high frequency of multi-site pain was confirmed. Only 35.6% of participants persistently had no (or only mild) pain, and among the remainder, more than four out of five at least once reported pain in the past week at two or more of the four anatomical sites studied (hands or upper extremities; neck or shoulders; lower back; and feet or lower extremities).

In comparison with the group who were pain-free throughout the period of study, persistent complaint of pain at three or four anatomical sites (29% of the study sample) was associated with female sex, and baseline report of poor work ability, high physical and mental strain, poor work environment and high exposure to repetitive movements. Corresponding associations for the other three trajectories (newly developing, increasing and decreasing musculoskeletal pain) were in the same direction, but weaker and not all statistically significant. In contrast, no differences were observed between white and blue collar workers.

Interpretation of these findings is not straightforward. Assignment to the trajectories that were compared depended in part on the pattern of pain at baseline (the first of the four time points). Thus risk factors determined at baseline cannot be considered simply as “predictors” (the term used by the authors). This may explain the apparent paradox that factors associated with developing and increasing musculoskeletal pain were also linked with decreasing pain. All were more common in people who had pain at some point during the study than in those who were always pain-free. Furthermore, the three trajectories which showed the strongest relationship to baseline exposures (persistent, increasing and decreasing pain) all entailed symptoms at baseline, and their associations with risk factors may in part reflect reverse causation – perceptions of stress, work ability and work environment being influenced by the presence of pain. It is also possible that people differ in their awareness of, and propensity to, report pain, and that those who complain more readily tend also to be more negative in their perceptions of work. Differential subjective reporting of the physical demands of work might account for positive associations even when risk was not clearly higher in blue as compared with white collar occupations.

For these reasons, Neupane and colleagues may not be justified in their conclusion that modifications to the physical and psychosocial work environment should be an important first step in the development of interventions to change persistent pain pathways. More certain is that musculoskeletal pain at any given anatomical site usually occurs in a context of pain elsewhere, either simultaneously or close in time, and that this happens much more frequently than would be expected by chance. It follows that efforts to prevent pain should look beyond biomechanical factors that are specific to only one or two regions of the body, and focus also on what drives differences in propensity to musculoskeletal pain across multiple anatomical sites. Established psychological risk factors such as low mood, somatising tendency, and (to a lesser extent) psychosocial aspects of work, may contribute [8,12], but the sizes of associated relative risks suggest that they are unlikely to be the full answer.

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References

1. Bernard, BP. A critical review of epidemiologic evidence for work-related musculoskeletal disorders of the neck, upper extremity and low back. US Department of Health and Human Services; 1997. https://www.cdc.gov/niosh/docs/97-141/pdfs/97-141.pdf
2. Endean A, Palmer KT, Coggon D. Potential of MRI findings to refine case definition for mechanical low back pain in epidemiological studies: A systematic review. Spine. 2011; 36:160–9. [PubMed: 20739918]
3. Driessen MT, Proper KI, van Tulder MW, Anema JR, Bongers PM, van der Beek AJ. The effectiveness of physical and organisational ergonomic interventions on low back pain and neck pain: a systematic review. Occup Environ Med. 2010; 67:277–285. [PubMed: 20360197]
4. Hoe VC, Urquhart DM, Kelsall HL, Sim MR. Ergonomic design and training for preventing work-related musculoskeletal disorders of the upper limb and neck in adults. Cochrane Database of Systematic Reviews. 2012; (8) Art. No.: CD008570. doi: 10.1002/14651858.CD008570.pub2
5. Coggon D, Ntani G, Palmer KT, et al. Disabling musculoskeletal pain in working populations: Is it the job, the person or the culture? Pain. 2013; 154:856–63. [PubMed: 23688828]
6. Coggon D. Occupational medicine at a turning point. Occup Environ Med. 2005; 62:281–283. [PubMed: 15837843]
7. Papageorgiou AC, Croft PR, Thomas E, Ferry S, Jayson MI, Silman AJ. Influence of previous pain experience on the episode incidence of low back pain: results from the South Manchester Back Pain Study. Pain. 1996; 66:181–185. [PubMed: 8880839]
8. Coggon D, Ntani G, Palmer KT, et al. Patterns of multi-site pain and associations with risk factors. Pain. 2013; 154:1769–1777. [PubMed: 23727463]
9. Natvig B, Bruusgaard D, Eriksen W. Localised low back pain and low back pain as part of widespread musculoskeletal pain: two different disorders? A cross-sectional population study. J Rehab Med. 2001; 33:21–25.
10. Sarquis LM, Coggon D, Ntani G, Walker-Bone K, Palmer KT, Felli VE, et al. Classification of neck/shoulder pain in epidemiological research: a comparison of personal and occupational characteristics, disability and prognosis among 12,195 workers from 18 countries. Pain. 2016; 157:1028–36. [PubMed: 26761390]
11. Coggon D, Ntani G, Walker-Bone K, et al. Epidemiological differences between localized and non-localized low back pain. Spine. 2016 Epub ahead of print http://journals.lww.com/spinejournal/Abstract/publishahead/Epidemiological_Differences_Between_Localised_and.95786.aspx.
12. Neupane S, Leino-Arjas P, Nygård C-H, Oakman J, Virtanen P. Developmental pathways of multisite musculoskeletal pain: what is the influence of physical and psychosocial working conditions? Occup Environ Med. 2016 to be completed.