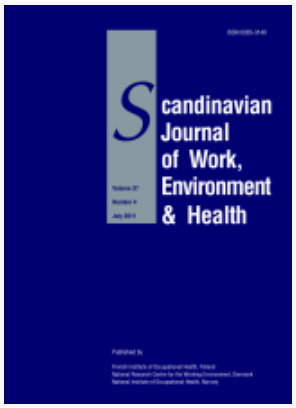

Editorial

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Psychosocial factors at work and musculoskeletal disorders

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Psychosocial factors at work and musculoskeletal disorders

Research on occupational stress and research on work-related musculoskeletal disorders have long developed as two separate fields. Traditionally, stress researchers have concentrated on the so-called role stressors, such as the underutilization of skills, responsibility for others, role conflict, and the ambiguity of one's job future. They paid little attention to blue-collar stressors, such as noise and shift work, or to physical workload. Experts in work-related musculoskeletal disorders, on the other hand, mainly focused on such factors as energetic workload, manual lifting, postural workload, and vibration in explaining these disorders and tended to disregard the so-called psychosocial factors at work. In the literature, a clear definition of the latter concept is often lacking, and it seems that the term "psychosocial" is assumed to be self-explanatory. We define "psychosocial factors" as the work factors that are related to job content—that is, the job itself, including its functional and social contacts (1). The most prominent features are job demands, job variety, autonomy, and social support. A well-designed psychosocial work environment is characterized by high (but not too high) levels of these work features. In inadequately designed work environments psychosocial factors may cause psychological harm, but they are not the only factors that may do so. Poor physical work conditions may also affect the experience of stress and the psychological and physical health of employees. Poor workspace design, for example, can act as both a physical and a psychological stimulus. It may cause both back problems and psychological effects, such as discomfort and fatigue, the experience of stress, and impaired performance, especially in demanding tasks. Apart from direct "physical" effects, work conditions may cause stress because they may hinder employees in performing their tasks. Another potential adverse effect of physical factors on health and well-being takes place through cognitive processes, such as anticipation (future exposure) or worrying (past exposure). There is increasing evidence that such cognitive processes limit sleep duration and quality (2, 3). Disturbed sleep, in turn, may have a negative impact on health and well-being. It thus is increasingly recognized that the stress response may not only be caused by exposure to psychosocial work characteristics, but also by physical factors, and by combinations of and interactions between such job features. Of course, individual factors do play a role as well.

What holds for work-related stress also holds for work-related musculoskeletal disorders. Nowadays, there is general recognition that factors other than those associated with physical workload play a role in the onset and maintenance of musculoskeletal disorders. Among such other factors are adverse psychosocial factors at work, health behavior, and pain-related cognitions (4). Fortunately, over the last two decades the traditional gap between the two different research fields has thus been reduced, and researchers have learned that they face similar research questions and research problems. Some comparable research questions are "What are risk factors and risk groups (monitoring)?", "What are the effects on health, performance, and productivity?" (societal impact), "What is the causal role of nonwork factors and personality factors in the development of health problems?" (work–home interaction and individual differences), "Are there differences between men and women in exposure and reporting?" (gender differences), and "What are adequate interventions on an individual level and on the group level?" (prevention and treatment). Some examples of comparable research problems are "What is the validity of self-reports, behavioral measures, and psychophysiological markers, such as epinephrine and norepinephrine?", "How can we develop and get the most of longitudinal study designs?", and "What is the role of worker involvement in prevention and intervention (compare with participatory ergonomics)?" The largest impetus towards narrowing the gap between these research fields stems from empirical

research into the etiology of musculoskeletal and psychological disorders. This is an intriguing field of research. On one hand, we have come to understand that traditional physical workloads (such as manual lifting or a forced work posture) are heavily intertwined with psychosocial (or work organizational) factors like job variety (eg, continuous lifting), social support (eg, no support when lifting), workpace (eg, having to lift at a fast pace), quantitative job demands (eg, having to lift frequently), and the like. Over the years, we have also learned that crucial bodily systems are influenced by both physical and mental loads (eg, the sympathetic–adrenal medullary system, the cardiovascular system). On the other hand, we are making the step from data-driven epidemiology, in which physical workloads and psychosocial work characteristics are statistically related to health outcomes, towards theory-driven research, in which the causation of health problems is tested. In other words, hypotheses are developed and tested regarding the causal pathways between exposure and health outcomes, in which both physical and psychophysiological parameters play an important role. We refer to the document by Lundberg (5) for an overview of such interesting research. Several mechanisms have been mentioned by him. For instance, the "Cinderella model" [referring to Cinderella who was the first to rise and last to go to bed (6)] focuses on the overuse of low-threshold motor units of the muscles. From this model, hypotheses can be derived that state that stress leads to the activation of the sympathetic–adrenal medullary system and can therefore result in sustained activation of these low-threshold motor units and, in the end, in musculoskeletal pain.

Somewhat later, the integrated physiological "Brussels model" was developed [referring to the place where the group of authors met (7)]. The "Brussels model" hypothesizes that physical workload not only causes increased concentrations of metabolites in muscles, but also gives rise to a release of inflammatory substances. This phenomenon results in the impaired accuracy of information transmitted by muscle spindles and therefore leads to disturbed neuromuscular control. To prevent postural deviations, agonistic and antagonistic muscles around the joints have to co-contract more strongly, and close the vicious cycle. Psychosocial factors, such as high time pressure, could reinforce this adverse process. Clearly, the sympathetic nervous system is also an important component in the "Brussels model", which predicts that sustained exposure to the vicious cycle process leads to higher sensitivity to painful stimuli and, in the end, to chronic musculoskeletal pain.

This issue of the *Scandinavian Journal of Work, Environment & Health* includes a paper (8) that reduces the gap between stress research and musculoskeletal epidemiology by testing the aforementioned hypothesis based on the "Cinderella model". The aim of this field study was to test whether a high level of work stressors is associated with musculoskeletal pain and higher urinary norepinephrine excretion rates at work, after work, and on Sundays. It is an interesting study for the following reasons: (i) the assessment of work stressors was based on the observatons of independent and well-trained observers and not on self-reports only (this multi-method recommendation is often made, but seldom realized), (ii) the study involved theoretically derived biological markers, (iii) the study utilized repeated measurements and intensive sampling (3 weeks were covered for each person, up to 18 urinary samples for each person), (iv) data were collected during work and during the recovery time [ie, also during "unwinding" (9)], and (v) adequate statistical analyses were used. The authors concluded that increased activity of the sympathetic–adrenal medullary system plays an important role in work-related musculoskeletal pain.

This issue also presents another interesting study in this area (10). Both studies underline the usefulness of connecting research on stress factors at work with research on work-related musculoskeletal disorders. This journal welcomes such interdisciplinary studies!

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