

CPH News and Views

A semi-monthly column on emerging topics related to healthy workplaces

Issue # 9: How job stress contributes to musculoskeletal disorders: Work organization as the underlying cause.

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What are MSDs?

Musculoskeletal disorders (MSDs), cumulative trauma disorders (CTDs), repetitive strain injuries (RSIs) and other similar names all refer to the same phenomena--disorders of the musculoskeletal system, affecting joints, muscles, tendons, ligaments, cartilage, nerves and so on. One way that these conditions develop is the accumulation (hence 'cumulative') of repeated, small injuries ("micro-trauma").

A well-studied set of **biomechanical (physical) stressors** contributes to the development of MSDs¹. These include repetition, forceful exertions, awkward postures and motions, tissue compression, and vibration. A person may be affected by these factors in the workplace or in other settings (sports, housework, etc.). Any combination of these stressors can cause MSDs if the rate of microtrauma exceeds the body's rate of healing.

More recent research strongly suggests that **psychosocial stressors** and resultant **job stress** may also contribute to causing MSDs. Psychosocial risk factors identified by this research include: high psychological demands combined with low job control; high effort expended combined with low rewards or recognition; low social support; job insecurity, and others.

The risk experienced by any given individual depends on the intensity of the biomechanical and psychosocial exposures and the duration of the exposure. The effects also depend on an individual's anatomical, physiological, and psychological capacity. Some components of individual capacity are genetically determined (e.g., gender, basic anatomical characteristics, physiology), and some are modifiable (e.g., health behaviors, skill learning). Differences in individual capacity help explain why one worker in a job with high levels of stressors will develop an MSD, while another working the same job may not develop these diseases.

While the mechanisms by which biomechanical exposures can cause MSDs are well described, we are still learning how job stress, a general body reaction mediated through the central nervous system, can contribute to MSD development. Several mechanisms have been proposed; these are not mutually exclusive and may operate in different proportions for different people and job settings. For example, job stress may cause:

- Reduction in the body's ability to heal microtrauma
- Disturbances in muscle fiber recruitment, leading to chronic overexertion of and damage to particular fibers
- Behavior changes, such as altered work technique and increased muscle tension
- Psychological changes in pain perception and reporting behavior

The Central Role of Work Organization

Given the multiple stressors that combine to cause MSDs, what is the best strategy to reduce these diseases? In the last 20 years, it has become evident that risk factors workers encounter at the job level have deep roots at the organizational level, in the way work is organized. Thus, a deeper understanding of the **work organization** is crucial to effective interventions.

The 2002 NIOSH publication, "The Changing Organization of Work and the Safety and Health of Working People"², created an inclusive definition of work organization: "organization of work

refers to the **work process** (the way jobs are designed and performed) and to the **organizational practices** (management and production methods and accompanying human resource policies) that influence job design.” You can imagine how the following examples might affect levels of biomechanical and psychosocial stressors on the job:

1. Work process
 - a. Production technology
 - b. Production organization: mass/line, process, batch, lean production, just-in-time, etc.
 - c. Scheduling: shift work, work hour distribution, etc.
 - d. Wage systems: hourly, piece-rate, contingent pay, etc.
 - e. Staff size
 - f. Communication/coordination structures
 - g. Flow of material, information, product and/or service
2. Organizational practices
 - a. Structure: hierarchical, flat, other
 - b. Culture and climate
 - c. Labor relations, anti-discrimination, and other policies
 - d. Personnel policies: out-sourcing, temporary or contract labor, etc.
 - e. Management techniques
 - f. Sales strategies

Clearly, the reduction of risk factors for MSDs requires attention to both job-level risk factors and the underlying work organization. While this multi-level approach may be more difficult than traditional control strategies, it has the enormous advantage of simultaneously reducing occupational multiple diseases and accidents that stem from the same poor work organization.

1. NIOSH Musculoskeletal Disorders and Workplace Factors. Bernard, B., (Ed.) U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication # 97-141. 1997
2. NORA Organization of Work Team. The Changing organization of work and the safety and health of working people. Knowledge gaps and research directions. Cincinnati: NIOSH, Department of Health and Human Services, National Institute for Occupational Safety and Health. 2002.

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Recommended websites

- <http://www.workhealth.org/> Job Stress Network, the home page of the [Center for Social Epidemiology](#) .
- <http://www.cdc.gov/niosh/topics/workorg/tools/> NIOSH Organization of Work
- <http://www.cdc.gov/niosh/topics/stress/> NIOSH Stress at Work

Recommended books and journal articles: See footnotes, above



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