Individual Factors: what are they, and why are they important?

Wellnomics® White Paper

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Introduction

Musculoskeletal discomfort and disorders that are related to work have a multi-factorial origin. Possible risk factors are physical, psychosocial[1] or individual. These factors can reinforce each other or be mediated by cultural or societal factors. Individual factors include things about a person that they can't change, e.g. gender; things that they can change, e.g. exercise levels, and some factors that may be difficult to change, e.g. coping strategies and personality traits.

Individual factors are of interest to organizations seeking to successfully prevent and manage musculoskeletal discomfort and disorders since the presence or absence of these factors is likely to influence the risk of individuals developing problems. This, in turn, has an impact on injury related costs, absenteeism and productivity.

Gender

Most studies investigating the risk factors of musculoskeletal disorders and discomfort among computer users have found an association with gender. Cross-sectional studies have shown greater incidence of reported symptoms amongst females. Bergqvist et al (1995)[2] found associations with several musculoskeletal problems and gender with female gender having a strong, independent influence on shoulder problems. Karlqvist et al (2002)[3] reported that women experienced higher prevalence of symptoms than men in all body regions and that they were more often exposed to physical and psychosocial risk factors than men. Similarly, Polanyi et al (1997) [4] found that women reported significantly higher levels of symptoms than men.

Prospective studies have found that gender also plays a role in the *development* of musculoskeletal disorders and discomfort. Kryger et al (2003)[5] found that female gender (along with high job demands and time pressure) were risk factors for the onset of forearm pain with women having a twofold increased risk of developing forearm pain. Similarly, Jensen (2003)[6] and Juul-Kristensen et al (2004)[7] found that in a large follow-up study women were more likely than men to develop shoulder, neck, elbow, wrist, hand and back symptoms. Gerr et al (2002)[8] found when following new recruits the development of neck, shoulder, hand and arm symptoms or disorders was associated with female gender.

Gender has also being implicated as a factor which influences recovery from severe elbow, wrist and hand pain with Lassen et al (2005)[9] reporting that there was a tendency for women to have a poorer prognosis than men.

The reasons that female gender is a risk factor for musculoskeletal disorders and discomfort are not clear though many hypotheses have been proposed. Some suggest a reporting phenomenon, i.e. women report symptoms more than men[10], though in Gerr (2002)[8] it was noted that there was also a greater incidence of examination–confirmed diagnosis among women. In addition, women's symptoms tend to be more severe than men's symptoms, which would not be expected if women report symptoms (of equal severity) sooner than men[11]. This provides evidence that a lower threshold of reporting cannot entirely explain women's increased risk of symptoms. Some suggest that women have different work tasks with different variations and durations than men even in the same occupations[3], e.g. more data entry type roles with fewer opportunities for breaks, and that higher job demands and lower decision latitude are experienced by women which increases their risk to discomfort and disorders. This theory has been disputed by other studies in which these factors were taken into account and men and women were compared for equal

circumstances and women still had more symptoms[11]. Other authors have discussed the 'double-shift' influence[2], i.e. women work at work and work at home, and 'women with children at home' as a specific risk factor has been associated with musculoskeletal problems[2]. In addition, the gender differences seen may be due to an increased biological susceptibility to musculoskeletal discomfort for females or due to anthropometric differences which make workstations less comfortable for women[3].

Conclusion

It is clear that female gender is associated with an increased risk of both incidence and development of musculoskeletal discomfort or disorders amongst computer users. The reasons for this increased risk remain unclear.

Sensitivity to stress and a tendency to continue

Stress has been implicated in the pathway between physical and psychosocial workplace risk factors and musculoskeletal discomfort and disorders[12]. A sustained stress response may result in increased muscle co-activation and increased loading on the musculoskeletal system. Also, perceived job stress may reduce the ability of the musculoskeletal system to recover during or after work and the central nervous system's response to perceived job stress may increase sensitization to pain stimuli.

The United Kingdom's Health and Safety Executive (HSE) 2004 study (Devereux et al[12]) conducted a prospective study to investigate whether high perceived job stress and other stress reactions increased the likelihood of reporting musculoskeletal complaints in a large number of industries including VDU operators and office workers. They found that individual stress reactions (e.g. symptoms of headaches, loss of appetite, feeling tense) increased the likelihood of new episodes of upper back, shoulder and wrist and hand complaints being reported. Perceived job stress was found to be an intermediate factor between high exposure to both physical and psychosocial work risk factors and self-reported low-back, upper back and hand and wrist complaints.

Bergqvist et al (1995)[13] reported associations with neck and shoulder discomfort and stomach-related stress reaction if in combination with working with a computer for more than 20 hours per week and involving repetitive movements. Their other study at this time[2] similarly reported that stomach-related stress reactions increased the musculoskeletal problem impact of both organizational and ergonomic factors. They also found some effects were associated with fatigue-related stress reactions such as 'psychological tiredness' and an 'inability to relax'.

If an individual's coping pattern is characterized by factors such as being overwhelmed by time pressures, an inability to relax and switch off after work and sacrificing too much for the job they are said to have a high 'intrinsic effort'. The HSE study[12] found that high exposure to both physical and psychosocial[1] work risk factors increased the likelihood that new episodes of musculoskeletal disorders would be reported. They linked intrinsic effort to the development of low back, neck and hand/wrist problems.

Another concept which has been proposed to help explain the link between physical ergonomics and psychosocial factors in the development of musculoskeletal discomfort and disorders is that of *workstyle*.

Workstyle has been defined as the behavioural, cognitive and physiological response that can occur in some individuals to increases in work demands which may interact with specific physical and psychosocial risk factors in the workplace[14]. The individual's workstyle, when work demands or job stress are high may result in risky, non-optimal biomechanical and cognitive processes, for example adopting poor postures, continuing to work without breaks, working through symptoms of discomfort and high personal work expectations. The Workstyle measure has been found to be predictive of future pain and functional limitations in office workers with upper extremity symptoms[15]. It has also been found to act as a mediator in the relationship between job demands and computer work exposure and symptoms and in the relationship between over-commitment and symptoms[16].

Conclusion

Sensitivity to stress and a tendency to continue to work intensely influence the development of musculoskeletal discomfort and disorders and are therefore important risk factors to consider, in combination with physical and psychosocial factors, to prevent and manage musculoskeletal problems.

Physical activity, physical strength and physical fitness

It is widely accepted that a physically active lifestyle has a beneficial effect on general health. Physical activity, physical strength and physical fitness can also have a positive effect on preventing and managing musculoskeletal discomfort and disorders and on reducing absenteeism.

Linton et al (2001)[17] in a review of interventions aiming to prevent back and neck pain (including education and back supports) found that *only* exercises were an effective preventive intervention. Supporting this Jensen & Harms-Ringdahl (2007)[18] strongly recommended different forms of exercise for populations at risk of developing neck pain. A randomised controlled trial considering the effect of different exercise programs for neck and shoulder symptoms found that both specific resistance training (i.e. strength training) and all-round physical exercise (i.e. motivation to exercise, walking, running, cycling) were effective in reducing the duration and intensity of symptoms amongst office workers compared to the control group[19]. They also found that specific resistance training was more effective than general exercise at preventing the development of symptoms.

A protective element of physical activity for neck and shoulder symptoms was also found in a large, prospective study[20]. The authors found that practicing sports for at least 10 months per year decreased the risk of neck/shoulder symptoms and that employees not doing sports to this level were at an almost threefold risk of long-term sickness absence due to neck or upper limb symptoms. This finding replicates that of several studies where a significant relationship was found between absenteeism and exercise. Jacobsen & Aldana (2001)[21] found a significant relationship between exercise frequency and illness-related absenteeism. Specifically, one day of aerobic activity (>=20 minutes) was associated with lower absenteeism when compared to no exercise and two days of exercise was more favourable than one. Proper et al (2006)[22] found that the people performing physical activity at a vigorous level for at least three times per week had significantly less sick leave than others not exercising to that level.

Given this evidence, considering the amount and type of physical activity that computer users do is important to both assess those at risk of developing musculoskeletal problems and to identify those who might benefit from targeted, physical fitness workplace promotions or interventions.

Conclusion

Physical activity, physical strength and physical fitness play a positive role in preventing and managing musculoskeletal symptoms and importantly has a significant effect on absenteeism. Levels of physical activity, physical strength and physical fitness are therefore important to consider when assessing an individual's risk of problems and strategies to counter this risk.

The productivity impact

The information presented above clearly shows that individual factors influence the incidence and development of musculoskeletal discomfort and disorders. A recent study also shows that individual factors affect self-reported *productivity*. Hagberg et al (2007) [23]examined the incidence and risk factors involved in self-reported reduced productivity due to musculoskeletal symptoms in computer users. They found that women had about twice the incidence of self-reported reduced productivity than men for symptoms in the neck, shoulder, forearm or hand. Participating in physical exercise less than eight times (for 30 minutes or more) in the last month was a risk factor for self-reported reduced productivity due to neck, shoulder and forearm/hand symptoms. Working overtime and high job demands were risk factors for self-reported reduced productivity due to neck and back symptoms. The authors conclude that

> *'Thus, both life style factors and occupational factors should be targeted to prevent self-reported reduced productivity owing to musculoskeletal disorders.' p 1832*

Summary

1. Women are at greater risk than men of developing musculoskeletal disorders or discomfort and reporting reduced productivity associated with it.
2. Sensitivity to stress and an individual's response to work demands, for example a tendency to continue, mediate the influence of physical and psychosocial risk factors and therefore influence the development of musculoskeletal disorders or discomfort.
3. Physical activity, physical strength and physical fitness play a protective role in the development of musculoskeletal disorders or discomfort, are effective in managing musculoskeletal problems, and have a positive effect on absenteeism and self-reported productivity.
4. Individual factors are a relevant and important part of the multi-factorial nature of work related musculoskeletal discomfort and disorders.

Implications for organisations

Individual factors including gender, sensitivity to stress, the tendency to continue and physical fitness need to be considered and addressed in order for organisations to prevent and manage musculoskeletal discomfort and disorders successfully. Benefits of doing this effectively include decreased absenteeism and improved productivity.

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