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Special Issue: Special Issue: Gender, Women's Work and Ergonomics

Rima R. Habib & Karen Messing. *Gender, women's work and ergonomics.* Pages 129-132.

Jin Wook Bahk, Hyunjoo Kim, Kyunghee Jung-Choi, Myung-Chul Jung & Inseok Lee. *Relationship between prolonged standing and symptoms of varicose veins and nocturnal leg cramps among women and men.* Pages 133-139.

The relationships between occupational characteristics and symptoms of varicose veins and nocturnal leg cramps and their gender differences were explored in a Korean population. The study population was 2165 workers from various occupations (55.6% female). Multiple logistic regression analyses were conducted to reveal factors related to symptoms of varicose veins and nocturnal leg cramps. The prevalence of varicose veins and nocturnal leg cramps was higher among women than men. The characteristics of standing work were different according to gender. In gender stratified analysis, the odds ratio of varicose veins was significantly high for prolonged standing for male and female workers. However, the odds ratio of nocturnal leg cramps was only significant among prolonged standing male workers. The models including gender, prolonged standing and occupations in this order presented that gender is not significantly associated with varicose veins after occupations were added to the model. Prolonged standing at work may be a more important risk factor for varicose veins and nocturnal leg cramps than biological differences between women and men. Therefore, effective interventions to interrupt or reduce prolonged standing at work should be implemented for the prevention of varicose veins and nocturnal leg cramps.

Practitioner Summary: This paper shows associations between occupational characteristics and symptoms of varicose veins and nocturnal leg cramps and their gender differences. These findings will contribute to knowledge of gender-specific occupational risk factors for symptoms in the distal lower extremities.

- **Keywords:** gender differences, nocturnal leg cramps, prolonged standing, varicose veins

Silvana Salerno, Lucilla Livigni, Andrea Magrini & Irene Figà Talamanca. Gender and ergonomics: a case study on the 'non-formal' work of women nurses. Pages 140-146.

Women's work activities are often characterised by 'non-formal actions' (such as giving support). Gender differences in ergonomics may be due to this peculiarity. We applied the method of organisational congruencies (MOC) to ascertain the 'non-formal' work portion of nurses employed in three hospital units (haematology, emergency room and general medicine) during the three work shifts in a major University Hospital in Rome, Italy. We recorded a total of 802 technical actions performed by nine nurses in 72 h of work. Twenty-six percent of the actions in direct patient's care were communicative actions (mainly giving psychological support) while providing physical care. These '*double actions*' are often not considered to be a formal part of the job by hospital management. In our case study, the 'non-formal' work of nurses (psychological support) is mainly represented by *double actions* while taking physical care of the patients. The *dual task paradigm* in gender oriented research is discussed in terms of its implications in prevention in occupational health.

Practitioner Summary: The main purpose of the study was to assess all the formal and non-formal activities of women in the nursing work setting. Offering psychological support to patients is often not considered to be a formal part of the job. Our case study found that nurses receive no explicit guidelines on this activity and no time is assigned to perform it. In measuring the burden of providing psychological support to patients, we found that this is often done while nurses are performing tasks of physical care for the patients (*double actions*). The article discusses the significance of non-formal psychological work load of women nurses through *double actions* from the ergonomic point view.

- **Keywords:** nurses, gender, double actions, non-formal work, method of organisational congruencies

Susan R. Stock & France Tissot. Are there health effects of harassment in the workplace? A gender-sensitive study of the relationships between work and neck pain. Pages 147-159.

The aim of this study was to identify workplace physical and psychosocial risk factors for neck pain among male and female workers and, in particular, to study the relationship between neck pain and intimidation and sexual harassment in the workplace in a representative sample of the Quebec working population. The study sample included 5405 men and 3987 women. In multiple logistic regression analyses, when taking into account individual and other workplace factors, neck pain was significantly associated with intimidation at work among both male (odds ratio (OR) 1.4 (1.01-1.8)) and female workers (OR 1.3 (1.01-1.8)). Among female workers, neck pain was also significantly associated with unwanted sexual attention (OR 1.6 (1.1-2.4)). If confirmed in prospective studies, these results suggest that interventions to prevent harassment in the workplace may help reduce musculoskeletal disorders in the workplace and that workplace programmes to reduce harassment in the workplace should include prevention of sexual harassment.

Practitioner Summary: While taking into account relevant personal factors and previously identified workplace physical and psychosocial risk factors, this gender-based study identifies new work exposures associated with neck pain that have not previously been studied, including unwanted sexual attention, intimidation and difficult or tense situations with the public.

- **Keywords:** neck pain, physical work demands, psychosocial work demands, sexual harassment, workplace harassment

Bénédicte Calvet, Jessica Riel, Vanessa Couture & Karen Messing. *Work organisation and gender among hospital cleaners in Quebec after the merger of 'light' and 'heavy' work classifications.* Pages 160-172.

In Québec, Canada, cleaning tasks were once divided into 'light' or 'heavy' cleaning, assigned respectively to women and men. These categories are being merged; in principle, both genders are assigned the same tasks. Activity analysis using observations and interviews examined work activity of male and female cleaners in two hospitals. In one hospital, work activity could be compared before (time 1) and after the work reorganisation (time 2). Some gender segregation of tasks appeared to have persisted at time 2, in both hospitals. Some route assignments contained components that were difficult for all cleaners, especially women of average strength. Only about one-third of the recommendations for improvement made at time 1 had been carried out by time 2, 12 years later. In a low-status job, it may be hard to meet equality, health and efficiency goals because commitment to improving equipment and worksite design may be lacking.

Practitioner Summary: Current attempts to desegregate jobs should be accompanied by attention to physical job demands in order to protect employee health and access to equal employment. The study also shows the need to follow up ergonomic interventions, particularly in low-status jobs such as cleaning, where recommendations can be forgotten.

- **Keywords:** cleaning, ergonomics, gender, hospital, work organisation

Julie N. Côté. *A critical review on physical factors and functional characteristics that may explain a sex/gender difference in work-related neck/shoulder disorders.* Pages 173-182.

The objective of this paper is to critically review recent literature on physical and functional sex/gender (s/g) differences, with focus on physical determinants associated with neck/shoulder musculoskeletal injuries. It is well known that there are s/g differences in anthropometrical and functional body characteristics (e.g. size and strength). However, s/g differences may be wrongly attributed if data analysis does not include appropriate corrections (e.g. by strength for endurance). Recent literature on motor control shows that there may indeed be s/g differences in muscle coordination and movement strategies during upper limb tasks that are not currently explained by methodological inadequacies. Moreover, recent studies have shown differences between men and women in sensory hypersensitivity characteristics associated with neck/shoulder injuries. Taken together, the literature points to the importance of accounting for possible s/g differences at all levels of the biopsychosocial system in order to better understand sex- and gender-specific issues relevant to workplace health.

Practitioner Summary: This article critically reviews recent literature and a conceptual model highlighting s/g differences in physical and functional characteristics related to neck/shoulder musculoskeletal disorders (NSMSD). Findings have implications on understanding how personal factors may affect NSMSD risk. With better understanding, practitioners can make more appropriate decisions to prevent work-related NSMSD.

- **Keywords:** fatigue, neck/shoulder musculoskeletal disorders, physical capacity, sex/gender differences

N. Theberge. *Studying gender and injuries: a comparative analysis of the literatures on women's injuries in sport and work.* Pages 183-193.

This article provides a review and analysis of the literatures on the gendering of injuries in sport and in work. It argues that, while research on women's work-related injuries has

considered the interaction of biological and social bases of risk, research on women's injuries in sport has concentrated to a greater extent on biological risk factors alone. The difference in emphasis between these two literatures has, in turn, provoked contrasting responses to these sets of research. While bringing women into the discussion of work-related injuries is seen as an advance, the profiling of women's sport-related injuries has been viewed with alarm by critics, who see this as a return to historical notions of women's frailty. The analysis suggests that contrasts between these bodies of research derive from differences in the social organisation of sport and work and the broader literatures on health and safety in each setting. The article highlights the importance of conceptualisations of gender in research agenda devoted to understanding health-related concerns.

Practitioner Summary: The analysis presented here has important relevance to ergonomics because of the need to better understand how gender is implicated in ergonomics research and practice.

- **Keywords:** gender, injuries, sport and work

Meng-Jung Chung & Mao-Jiun Wang. *Gender and walking speed effects on plantar pressure distribution for adults aged 20–60 years. Pages 194-200.*

This study investigates gender and walking speed (80%, 100%, 120% and 140% of preferred walking speed (PWS)) effects on plantar pressure parameters. In total, 30 healthy males and females, aged between 20 to 60 years, participated in this study. A plantar pressure measurement device was used to measure the peak pressure, peak force and contact area in six plantar zones. The results indicate that males had higher peak pressure and peak force in the medial toe and forefoot, as well as greater contact area in the central forefoot and heel areas. Females had greater contact area in the midfoot. Increased walking speed caused a significant increase in most of the response measures and the increase became more obvious when the speed was higher than 120% PWS. Although there was no significant interaction between gender and PWS, some gender differences were found.

Practitioner Summary: Using percentage PWS provides a new perspective to discuss the effects of gender and walking speed on plantar pressure distribution. This study's findings can be very useful for footwear and orthotics design for different genders.

- **Keywords:** foot, gender, plantar pressure, walking speed

R. R. Habib, K. El Zein & S. Hojeij. *Hard work at home: musculoskeletal pain among female homemakers. Pages 201-211.*

This study explores the relationship between housework and musculoskeletal symptoms among homemakers, adjusting for social, demographic and economic factors. A cross-sectional survey was carried out on 435 women from Nabaa, a low-income community in Lebanon. In total, 77% of women reported having musculoskeletal pain in the previous 12 months. Both psychosocial and physical factors showed significant associations with musculoskeletal symptoms. Related psychosocial factors included feelings of stress associated with homemaking and homemakers' number of children and self-rated health. The physical factors associated with musculoskeletal pain were feeling fatigued at the end of a housework day, working long hours and working in awkward postures or frequently engaging in repetitive hand movements. Ergonomic stressors were also associated with pain in the back and upper and lower extremities. Women from this community engage in a large number of hours of housework that, alongside other factors, were associated with high prevalence of musculoskeletal pain.

Practitioner Summary: This study contributes to the literature by studying women's housework activities in association with musculoskeletal pain. The role of women in homemaking activities is explored together with physical exposures leading to reported symptoms. This study adds a perspective of a Middle Eastern context to the literature of women's musculoskeletal health.

- **Keywords:** ergonomics, homemakers, housework, musculoskeletal pain, women

Christina Ahlgren, Eva-Britt Malmgren Olsson & Christine Brulin. *Gender analysis of musculoskeletal disorders and emotional exhaustion: interactive effects from physical and psychosocial work exposures and engagement in domestic work. Pages 212-228.*

The objective of this study was to assess the relationships between physical and psychosocial work exposures, engagement in domestic work and work-home imbalance in relation to symptoms of musculoskeletal disorders and emotional exhaustion in white- and blue-collar men and women. Three thousand employees from 21 companies were asked to answer a questionnaire on family structure, household and child care tasks, work exposure, work-home imbalance and symptoms of neck/shoulder disorders, low back disorders and emotional exhaustion. Women reported more musculoskeletal disorders and engagement in domestic work. Adverse at-work exposures were highest in blue-collar women. High engagement in domestic work was not separately associated with symptoms but paid work exposure factors were associated. High engagement in domestic work interacted with adverse work exposure and increased risk estimates for low back disorders and emotional exhaustion. Reported work-home imbalance was associated with neck/shoulder disorders in women and with emotional exhaustion in both women and men.

Practitioner Summary. The current article adds to earlier research by showing that high engagement in domestic work is not separately associated with increased symptoms, but interacts with psychosocial work exposure variables to produce emotional exhaustion in both women and men and low back disorders in women.

- **Keywords:** physical work load, psychosocial factors, domestic workload, work-home imbalance, musculoskeletal disorders, emotional exhaustion, gender

Majid Motamedzade & Abbas Moghimbeigi. *Musculoskeletal disorders among female carpet weavers in Iran. Pages 229-236.*

The aim of this study was to determine factors associated with self-reported upper extremity musculoskeletal disorders (UEMSDs) among female carpet weavers. Data on demographic characteristics and workplace factors were collected from 626 female carpet weavers. Type of carpet weaving looms, weaving style (Persian vs. Turkish), daily working hours and work experience as well as personal factors including age and marital status were significantly and independently associated with self-reported UEMSDs ($p < 0.05$), while education, handedness and weight of weaving comb were not. A major finding of this study was the significant association between weaving style and UEMSDs. Better measures of the biomechanical requirements of carpet weaving tasks in Persian and Turkish weaving types are required to understand better their influences on the health of weavers and on UEMSDs in particular. Poor workstation design, in particular, design inappropriate for the anthropometric dimensions of weavers, was a major risk factor for musculoskeletal symptoms in carpet weaving. Therefore, this industry should develop equipment adapted to women's sizes and shapes.

Practitioner Summary: This article provides an insight into the risk factors associated with self-reported UEMSDs among female carpet weavers, identifying major factors

associated with upper extremity musculoskeletal symptoms and exploring guidelines for designing weaving workstations.

- **Keywords:** carpet weaving, musculoskeletal disorders, women's health, workstation design

Alison F. Bell & Julie R. Steele. *Risk of musculoskeletal injury among cleaners during vacuuming. Pages 237-247.*

This study aimed to examine the risk of work-related upper-limb musculoskeletal disorders in cleaning workers during the work task of vacuuming. In total, 24 cleaning workers were observed while they performed vacuum cleaning tasks in the normal course of their employment in government schools, hospitality and commercial office space sectors. Risk of upper-limb musculoskeletal disorders were rated using three observational assessment tools: Manual Task Risk Assessment (ManTRA); Quick Exposure Check (QEC); the Rapid Upper Limb Assessment (RULA). Mean results (e.g. ManTRA wrist/hand cumulative wrist score 18.67 ± 1.27 , QEC neck score 13 ± 1.77 , RULA score 6.54 ± 0.509) demonstrated that cleaning workers who perform the task of vacuum cleaning are at risk of work-related upper-limb musculoskeletal injury, regardless of whether they use a back-pack or canister machine. Government school cleaners experienced greater risk of work-related upper-limb musculoskeletal disorders than workers in either the hospitality or commercial office space sectors.

Practitioner Summary: Cleaning workers in Australia are mostly female, ageing and of non-English-speaking backgrounds and involved in repetitive manual tasks. Their occupation is low status. This research confirms that vacuuming tasks are a risk for cleaning workers and highlights the need for further research to improve conditions for these workers.

- **Keywords:** cleaning, disorder, female workers, upper-limb work-related musculoskeletal observational assessment tools

Jens Wahlström, Christina Östman & Ola Leijon. *The effect of flooring on musculoskeletal symptoms in the lower extremities and low back among female nursing assistants. Pages 248-255.*

This study examines the effect of changing the floor from a 2-mm homogenous vinyl floor to a 4-mm heterogeneous vinyl floor (1.5-mm wear layer and 2.5-mm foam layer) on musculoskeletal symptoms in the lower extremities and low back among nursing assistants in a geriatric care centre. A pre-post design with a reference group consisting of nursing assistants from a similar geriatric care centre was used. Follow-up measurements were carried out 12 and 24 months after the intervention by means of questionnaires. At the 1-year follow-up, the pain intensity score in the feet of the intervention group had decreased compared with the baseline value and remained statistically significant at the 2-year follow-up. The decrease in pain intensity score of the feet in the intervention group was statistically significantly different from the reference group, both after 1 and 2 years.

Practitioner Summary: The results show the importance of flooring in the workplace with regard to reducing musculoskeletal symptoms. Appropriate flooring is especially important in the female-dominated health care sector, where workers must stand or walk for long periods.

- **Keywords:** feet, intervention, lower limbs, musculoskeletal symptoms

Charlotte D.N. Rasmussen, Marie B. Jørgensen, Isabella G. Carneiro, Mari-Ann Flyvholm, Kasper Olesen, Karen Søgaard & Andreas

Holtermann. *Participation of Danish and immigrant cleaners in a 1-year worksite intervention preventing physical deterioration.* Pages 256-264.

Worksite health promotion is seldom offered to workers who are low-educated and multi-ethnic, possibly due to an assumption that they are more reluctant to participate. Furthermore, little has been done to promote health at female-dominated workplaces. The main aim of this study was to investigate differences in participation among immigrant and Danish cleaners throughout a 1-year randomised controlled study tailored to cleaners and carried out in predominantly female workplaces. No significant differences in ethnicity were found in consent and participation throughout the 1-year intervention. Dropout was equally distributed among Danish and immigrant cleaners. This study indicates that a worksite health promotion intervention among a female-dominated, high-risk occupation such as cleaning can be equally appealing for Danes and immigrants.

Practitioner Summary: This study provides insight about participation of Danish and immigrant cleaners in a worksite health promotion intervention in a predominantly female occupation. For attaining high participation and low dropout in future worksite health promotion interventions among cleaners, the intervention ought to not only target the ethnic background of the workers, but also to be specifically tailored to the job group.

- **Keywords:** ethnicity, females, health promotion, musculoskeletal disorders, workplace intervention