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Journal articles marked with an asterisk indicate an IWH scientist or adjunct scientist is included in the list of authors.

***Biswas A, Harbin S, Irvin E, Johnston H, Begum M, Tiong M, Apedaile D, Koehoorn M, and Smith P. Sex and gender differences in occupational hazard exposures: a scoping review of the recent literature. *Current Environmental Health Reports*. 2021; [epub ahead of print].**

<https://doi.org/10.1007/s40572-021-00330-8> [open access]

Abstract: PURPOSE OF REVIEW: Comparative research on sex and/or gender differences in occupational hazard exposures is necessary for effective work injury and illness prevention strategies. This scoping review summarizes the peer-reviewed literature from 2009 to 2019 on exposure differences to occupational hazards between men and women, across occupations, and within the same occupation. RECENT FINDINGS: Fifty-eight studies retrieved from eight databases met our inclusion criteria. Of these, 30 studies were found on physical hazards, 38 studies on psychological/psychosocial hazards, 5 studies on biological hazards, and 17 studies on chemical hazards. The majority of studies reported that men were exposed to noise, vibration, medical radiation, physically demanding work, solar radiation, falls, biomechanical risks, chemical hazards, and blood contamination; while women were exposed to wet work, bullying and discrimination, work stress, and biological agents. Within the same occupations, men were more likely to be exposed to physical hazards, with the exception of women in health care occupations and exposure to prolonged standing. Women compared to men in the same occupations were more likely to experience harassment, while men compared to women in the same occupations reported higher work stress. Men reported more exposure to hazardous chemicals in the same occupations as women. The review suggests that men and

women have different exposures to occupational hazards and that these differences are not solely due to a gendered distribution of the labor force by occupation. Findings may inform prevention efforts seeking to reduce gender inequalities in occupational health. Future research is needed to explain the reasons for sex/gender inequality differences in exposures within the same occupation

***Hitzig SL, Jeyathevan G, Farahani F, Noonan VK, Linassi G, Routhier F, Jetha A, et al. Development of community participation indicators to advance the quality of spinal cord injury rehabilitation: SCI-High Project. Journal of Spinal Cord Medicine. 2021; 44(sup1):S79-S93.**

<https://doi.org/10.1080/10790268.2021.1955204>

Abstract: Community participation following spinal cord injury/disease (SCI/D) can be challenging due to associated primary impairments and secondary health conditions as well as difficulties navigating both the built and social-emotional environment. To improve the quality of SCI/D rehabilitation care to optimize community participation, the SCI-High Project developed a set of structure, process and outcome indicators for adults with SCI/D in the first 18 months after rehabilitation admission. A pan-Canadian Working Group of diverse stakeholders: (1) defined the community participation construct; (2) conducted a systematic review of available outcomes and their psychometric properties; (3) constructed a Driver diagram summarizing available evidence associated with community participation; and (4) prepared a process map. Facilitated meetings allowed selection and review of a set of structure, process and outcome indicators. The structure indicator is the proportion of SCI/D rehabilitation programs with availability of transition living setting/independent living unit. The process indicators are the proportion of SCI/D rehabilitation inpatients who experienced: (a) a therapeutic community outing prior to rehabilitation discharge; and, (b) those who received a pass to go home for the weekend. The intermediary and final outcome measures are the Moorong Self-Efficacy Scale and the Reintegration to Normal Living Index. The proposed indicators have the potential to inform whether inpatient rehabilitation for persons with SCI/D can improve self-efficacy and lead to high levels of community participation post-rehabilitation discharge

Alkaissy M, Arashpour M, Wakefield R, Hosseini R, and Gill P. The cost burden of safety risk incidents on construction: a probabilistic quantification method. Risk Analysis. 2021; [epub ahead of print].

<https://doi.org/10.1111/risa.13865>

Abstract: The construction sector is vulnerable to safety risk incidents due to its dynamic nature. Although numerous research efforts and technological advancements have focused on addressing workplace injuries, most of the studies perform empirical and deterministic postimpact evaluations on construction project performance. The effective modeling of the safety risk impacts on project performance provides decisionmakers with a valuable tool toward incidents prevention and proper safety risk management. Therefore, this study collected Australian incident records

from the construction industry from 2016 onwards and conducted discrete event simulation to quantitatively measure the impact of safety risk incidents on project cost performance. Moreover, this study investigated the correlation between safety risk incidents and the age of injured workers. The findings show a strong correlation between the middle-aged workforce and the severity of incidents on project cost overruns. The ex-ante, nondeterministic analysis of safety risk impacts on project performance provides insightful results that will advance safety management theory in the direction of achieving zero harm workplace environments

Bahadir-Yilmaz E and Kursun A. Opinions of staff working in workplace-violence-related units on violence against nurses: a qualitative study. Archives of Environmental & Occupational Health. 2021; 76(7):424-432.

<https://doi.org/10.1080/19338244.2020.1832035>

Abstract: The aim of this study was to assess the opinions of staff working in workplace-violence related units on violence against nurses. A qualitative and descriptive design was used. The participants were seven nurses, one biologist, and one social worker who agreed to attend an interview and worked in employee rights unit or occupational health and safety unit. Data were collected from June to December 2017. The interviews were analyzed with content analysis. Four main themes were identified, and the themes were the following: (1) risk factors; (2) reporting of violence; (3) consequences of violence; and (4) prevention and control. In summary, factors related to the patient, the nurse, and the physical structure of the hospital were determined

Black NL, Tremblay M, and Ranaivosoa F. Different sit:stand time ratios within a 30-minute cycle change perceptions related to musculoskeletal disorders. Applied Ergonomics. 2022; 99:103605.

<https://doi.org/10.1016/j.apergo.2021.103605> [open access]

Abstract: Regular standing interruptions to sedentary work are recommended, but their dosage is understudied. To measure perception variations associated with different sit:stand ratios, 16 people used six ratios (30:0, 27:3, 24:6, 21:9, 18:12 and 15:15) within 30-min cycles in their normal office environment. At start and end of each workday, study participants recorded their perception of 11 factors on a 10-point scale. Musculoskeletal discomfort in 10 body regions was measured before and after exposure to sit-stand ratios. Overall preferred ratios were recorded. Sit:stand ratio affected all perceived factors, with impact varying. Standing at least 6 min improved results most overall; however, individual perceived factors were least impacted by any of 30:0, 27:3, 24:6 or 21:9. Preferred sit:stand ratios were 15:15, 18:12 and 21:9. Typically, least liked ratios involved briefest standing (30:0, 27:3, 24:6) although two participants least liked 15:15. Understanding these variations contributes to appropriate standing dosage recommendations

Ebrahimi H, Jafarjalal E, Lotfolahzadeh A, and Kharghani Moghadam SM. The effect of workload on nurses' quality of life with moderating perceived social support during the COVID-19 pandemic. *Work*. 2021; 70(2):347-354.

<https://doi.org/10.3233/WOR-210559>

Abstract: Background: Due to the COVID-19 pandemic in Iran, the number of patients admitted to hospitals and the workload of nurses has increased. High workload can reduce efficiency and quality of life. In the meantime the perceived social support may had a moderating role. Objective: The aim of the study was to investigate the effect of workload and perceived social support on quality of life in nurses who work in COVID-19 inpatient wards. Methods: This was a cross-sectional descriptive-analytic study. 336 nurses who worked in inpatient wards with COVID-19 patients were randomly selected and studied. NASA-TLX Workload Questionnaire, WHO Quality of Life Questionnaire and Multidimensional Social Support Perception Scale were used to data collection. Structural equation modelling in PLS software was used to modelling. Results: The results showed that the average score of workload, perceived social support and quality of life were 80.87 ± 20.17 , 56.23 ± 11.46 and 55.87 ± 13.74 , respectively. A significant inverse relationship was observed between workload and quality of life ($P < 0.05$). Also, perceived social support had a moderator effect on relationship between workload and quality of life ($P < 0.05$). Conclusions: High workload can upset the balance between work and life that leads to decrease the quality of life. Perceived social support as a moderator can reduce the negative impact of workload on quality of life. In the COVID-19 pandemic where nurses' workload have increased, by increasing the perceived social support can manage the negative effect of workload.

Eddy EZ, Tickle-Degnen L, and Evenson ME. Occupational therapy fieldwork educators: examining professional quality of life. *Work*. 2021; 70(2):479-491.

<https://doi.org/10.3233/WOR-213586>

Abstract: BACKGROUND: Occupational therapy practitioners with the simultaneous working role of fieldwork educator support the growth of the profession by supervising students, but little is known about their reported burnout, compassion fatigue, and compassion satisfaction levels, and if specific work characteristics predict those levels. OBJECTIVE: The purpose of this research was to: 1) assess the current levels of compassion fatigue, compassion satisfaction, and burnout in occupational therapy fieldwork educators through The Professional Quality of Life Scale (ProQOL), and 2) to explore how professional characteristic variables correlate and predict the measured constructs of compassion fatigue, burnout, and compassion satisfaction. METHODS: A cross-sectional design was used, and participants were recruited from a convenience sample to complete the ProQOL and a work characteristic questionnaire. RESULTS: On the average, 117 fieldwork educators scored higher on the subscale of compassion satisfaction when compared to those of the normed group. Linear regression analyses revealed that a higher number of roles and greater years working predicted higher compassion satisfaction. CONCLUSIONS: This study

contributes to understanding the experiences of fieldwork educators in multiple roles, their reported levels of compassion fatigue, compassion satisfaction, and burnout, and the potential for development of personal, educational and organizational resources to support professional quality of life indicators within the role of fieldwork educator

Guimaraes RM, Muzi CD, Meira KC, Dos Santos RD, Saraiva MM, and Rohlfs DB. Occupational exposure to carcinogens in Brazil: an approach. Archives of Environmental & Occupational Health. 2021; 76(7):414-423.

<https://doi.org/10.1080/19338244.2021.1900044>

Abstract: This study aims to estimate the prevalence of the primary occupational exposures, considered risk factors for Cancer in Brazil. We elaborated two exposure scenarios considering the agents' classification and the intensity of exposure, stratified by Brazilian regions and sex. Two pairs of specialists performed the classification of economic activities and occupations due to exposure. There was an excellent overall agreement (94%) and acceptable overall reliability (kappa 0.92, 95% CI 0.89-0.95). There is a notable difference (595%) in occupational exposure between the north (with a higher concentration of rural areas and extractivism) and southeast (with a higher level of industrial activities). There is a difference in prevalence from 833% for solvents to 1170% for inorganic dust between the two scenarios. There is a heterogeneity of exposures according to location, sex, circumstance, and sensitiveness of classification

Kuper H, Hameed S, Reichenberger V, Scherer N, Wilbur J, Zuurmond M, et al. Participatory research in disability in low-and middle-income countries: what have we learnt and what should we do? Scandinavian Journal of Disability Research. 2021; 23(1):328-337.

<https://doi.org/10.16993/sjdr.814> [open access]

Abstract: Disability scholarship has embraced participatory research methods to support the collection of more relevant, ethical and potentially higher quality data. However, most of the relevant literature focusses on high-income settings. Discussions on the challenges and opportunities in using these approaches in low-and middle-income countries (LMICs) is sparse. The aim of this paper is to critically reflect on the participatory approaches used in disability research in LMIC contexts by the International Centre for Evidence in Disability to learn lessons for future research. Studies were selected from ICED's portfolio to consider participation at different stages in the research cycle and to critique the extent to which this was achieved. Studies set in the Gaza Strip and Malawi demonstrated the potential for involving people with disabilities in research planning through collaborative workshops and steering groups. Studies highlighted the opportunities and practical strategies for including disabled researchers in quantitative (India) and qualitative (Nepal) research. In Colombia, the use of participatory video enriched the interview data collected concurrently. Experiences in Malawi highlighted challenges of participatory analysis and how these could be addressed. In Vanuatu, PhotoVoice was used in

dissemination, which helped in conveying lived experiences behind data. Similarly, in Brazil, involving caregivers of disabled children in dissemination workshops and publications provided important insight and potential for impact. Inclusion in analysis steps is potentially more challenging. In conclusion, meaningful participation of people with disabilities throughout the research cycle is achievable in LMICs and can potentially improve research quality and lead to more relevant programmes.

Ochoa-Leite C, Bento J, Rocha DR, Vasques I, Cunha R, Oliveira A, et al. Occupational management of healthcare workers exposed to COVID-19. *Occupational Medicine*. 2021; 71(8):359-365.

<https://doi.org/10.1093/occmed/kgab117> [open access]

Abstract: BACKGROUND: The year 2020 was marked by the new coronavirus pandemic, resulting in millions of cases and deaths, placing healthcare workers at high risk of infection. AIMS: The aim of this study was to describe the role of an occupational health service during coronavirus disease 2019 pandemic in an oncologic hospital and characterize the most likely sources of viral infection. METHODS: The information of all healthcare workers with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection from 11 March to 15 December 2020 was collected through an epidemiological survey conducted during contact tracing. The data extracted included gender, age, comorbidities, occupational group, source of infection, clinical presentation, duration of the disease, need for hospitalization and persistent or late symptoms after disease or upon returning to work. RESULTS: Out of a total of 2300 workers, 157 were infected, consisting of nurses (36%), nurse assistants (33%) and diagnostic and therapeutic professionals (10%). Physicians and administrative staff accounted for 8% each. The most frequently reported source of infection was occupational (43%), owing to worker-to-worker transmission (45%) and patient-to-worker transmission (36%). The most frequent moments of infection perceived corresponded to the removal of protective equipment during meals and moments of rest in the staff and changing rooms. CONCLUSIONS: The study revealed that occupational transmission from patients and colleagues might be an important source of SARS-CoV-2 infection in healthcare workers. Spread between colleagues accounted for 45% of the occupational source infections reported. Implementing physical distancing measures and limiting the number of people in changing and rest rooms could significantly reduce infection and related absenteeism

Rashid M, Kristofferzon ML, and Nilsson A. Predictors of return to work among women with long-term neck/shoulder and/or back pain: a 1-year prospective study. *PLoS ONE*. 2021; 16(11):e0260490.

<https://doi.org/10.1371/journal.pone.0260490> [open access]

Abstract: Background: Sick leave due to musculoskeletal pain, particularly in the neck/shoulders and back, is one of the major public health problems in Western countries such as Sweden. The aim of this study was to identify predictors of return to

work (RTW) among women on sick leave due to long-term neck/shoulder and/or back pain. Methods: This was a prospective cohort study with a 1-year follow-up. The study participants were recruited from a local Swedish Social Insurance Agency register and had all been on sick leave for = 1 month due to long-term (= 3 months) neck/shoulder and/or back pain. Data on predictors and outcome were collected using a self-administered questionnaire. A total of 208 women aged 23-64 years were included at baseline, and 141 responded at the 1-year follow-up. Cluster analyses were performed to identify one predictor from each cluster for use in the regression model. Results: At the 1-year follow-up, 94 of the 141 women had RTW and 47 had not. Women who engaged in more coping through increasing behavioral activities (OR: 1.14, 95% CI: 1.03-1.25) and those who more strongly believed they would return to the same work within 6 months (OR: 1.22, 95% CI: 1.10-1.37) had an increased probability of RTW. Receiving more social support outside work (OR: 0.50, 95% CI: 0.28-0.92) decreased the odds of RTW at the 1-year follow-up. Conclusions: Behavioral activities, beliefs about returning to the same work, and social support outside work were predictors of RTW at the 1-year follow-up. Healthcare professionals should consider these predictors in their efforts to prevent prolonged sick leave and to promote RTW in this population.

Senthanar S, Koehoorn M, Tamburic L, Premji S, Bultmann U, and McLeod CB. Differences in work disability duration for immigrants and Canadian-born workers in British Columbia, Canada. *International Journal of Environmental Research and Public Health*. 2021; 18(22):1794.

<https://doi.org/10.3390/ijerph182211794> [open access]

Abstract: This study aimed to investigate differences in work disability duration among immigrants (categorized as economic, family member or refugee/other classification upon arrival to Canada) compared to Canadian-born workers with a work-related injury in British Columbia. Immigrants and Canadian-born workers were identified from linked immigration records with workers' compensation claims for work-related back strain, connective tissue, concussion and fracture injuries requiring at least one paid day of work disability benefits between 2009 to 2015. Quantile regression investigated the relationship between immigration classification and predicted work disability days (defined from injury date to end of compensation claim, up to 365 days) and modeled at the 25th, 50th and 75th percentile of the distribution of the disability days. With a few exceptions, immigrants experienced greater predicted disability days compared to Canadian-born workers within the same injury cohort. The largest differences were observed for family and refugee/other immigrant classification workers, and, in particular, for women within these classifications, compared to Canadian-born workers. For example, at the 50th percentile of the distribution of disability days, we observed a difference of 34.1 days longer for refugee/other women in the concussion cohort and a difference of 27.5 days longer for family classification women in the fracture cohort. Economic immigrants had comparable disability days with Canadian-born workers, especially at the 25th and 50th percentiles of the

distribution. Immigrant workers' longer disability durations may be a result of more severe injuries or challenges navigating the workers' compensation system with delays in seeking disability benefits and rehabilitation services. Differences by immigrant classification speak to vulnerabilities or inequities upon arrival in Canada that persist after entry to the workforce and warrant further investigation for early mitigation strategies

Siu OL and Ng TK. Family-to-work interface and workplace injuries: the mediating roles of burnout, work engagement, and safety violations. *International Journal of Environmental Research and Public Health*. 2021; 18(22):11760-

<https://doi.org/10.3390/ijerph182211760> [open access]

Abstract: Past research has primarily investigated the role of the negative side (family-to-work conflict; FWC) of the family-to-work interface in workplace safety outcomes and neglected the positive side (family-to-work enrichment; FWE). Moreover, the mechanism underlying the relation between the family-to-work interface and workplace safety has not been well studied. From the perspectives of the job demands-resources model as well as conservation of resources theory, this study endeavors to extend the current literature on workplace safety by evaluating the mediating roles of burnout, work engagement, and safety violations in the associations of FWC and FWE with workplace injuries. Two-wave longitudinal survey data were obtained from 233 Chinese employees in two high-risk industries (nursing and railways). The hypothesized longitudinal mediation model was analyzed with the structural equation modeling technique. It was revealed that the association of FWE with workplace injuries was mediated by work engagement and then safety violations. Burnout was found to mediate the association of FWC with workplace injuries. Safety violations were also found to mediate the association of FWC with workplace injuries. The present findings offer insights into the underlying mechanisms by which the family-to-work interface influences workplace injuries

Sun C, Hon CKH, Way KA, Jimmieson NL, and Xia B. The relationship between psychosocial hazards and mental health in the construction industry: a meta-analysis. *Safety Science*. 2022; 145:105485.

<https://doi.org/10.1016/j.ssci.2021.105485>

Tseng LP, Chuang MT, and Liu YC. Effects of noise and music on situation awareness, anxiety, and the mental workload of nurses during operations. *Applied Ergonomics*. 2022; 99:103633.

<https://doi.org/10.1016/j.apergo.2021.103633>

Abstract: This study aims to explore the effects of noise and music types on nurses' anxiety, mental workload and situation awareness during an operation. Participants included 20 circulating nurses (CNs) and 16 nurse anesthetists (NAs) who completed a total of 70 operations in which each operation required one CN and one NA. The

experiment was separated into a control group (operating noise only) vs. an experimental group (3 different music types-between subjects and 2 music volume levels-within-subjects). Results showed that all participants had excellent situation awareness performance despite their mental workload showing significant differences in various phases of the surgery. Music at 55-60 dB caused lower mental workloads and anxiousness for nurses than those exposed to levels of 75-80 dB. When Mozart's music was played, the participants' mental workload and situation anxiety were lower than when exposed to other music types. Music played at 60 dB during an operation may be a feasible solution to mitigate the negative effects of extra noise and thus improve the nurses' performance.

De Wind, A, Beckers DG, Nijp HH, Hooftman W, De Boer AG, and Geurts SA. Working from home: mismatch between access and need in relation to work-home interference and fatigue. *Scandinavian Journal of Work, Environment & Health*. 2021; 47(8):619-627.

<https://doi.org/10.5271/sjweh.3983>

Abstract: OBJECTIVES: Working from home (WfH) is a promising practice that may enable employees to successfully and sustainably combine work and private life. Yet, not every employer facilitates WfH and not every employee has similar needs concerning the practice. The current study aims to examine the association of a WfH mismatch with work-home interference (WHI) and fatigue. METHODS: Data on WfH, WHI, and fatigue of a quasi-representative sample of 2374 Dutch employees in 2012/13 and a follow-up measurement one year later were used. Cross-sectional and longitudinal regression analyses were conducted to investigate the cross-sectional and temporal associations between WfH mismatch on the one hand and (changes in) time-based and strain-based WHI and fatigue on the other hand. RESULTS: In the cross-sectional analyses, WfH mismatch was significantly associated with higher time-based WHI ($B=0.13$), strain-based WHI ($B=0.17$) and more fatigue ($B=0.32$). WfH mismatch was not associated with changes in these outcomes after one year of follow-up. CONCLUSIONS: A tailored WfH organizational policy, in which employees' need for working from home is taken into account, may be a fruitful approach to utilize WfH as a way for employees to successfully and sustainably combine work and private life to its full potential

Zlatar T, Junior BB, Bezerra LM, Araujo Brito MM, Costa JT, Vaz M, et al. Safety and health risks for workers exposed to cold thermal environments: a frozen food processing industry perspective. *Work*. 2021; 70(2):645-655.

<https://doi.org/10.3233/WOR-213600>

Abstract: Background: Environmental temperatures in the fresh food industry vary from 0°C to 10°C, and go below -20°C for the frozen food industry, representing risk for the health and safety of workers involved. Objective: The aim of this work was to evaluate the cold thermal stress risks for workers working in a frozen food industry. Methods: A total of 27 acclimatized workers (13 male and 14 female) participated in a

study which was conducted during 11 working days. The thermal sensation questionnaire and the cold work health questionnaire (CWHQ) were applied to all participants. Additionally, 4 workers were chosen to be fully monitored with a thermometer telemetry capsule for measuring the intra-abdominal temperature and 8 skin temperature sensors. Results: The lowest recorded hand temperature was 14.09°C, lowest forehead 18.55°C, mean skin temperature had variations of 1.10 to 3.20°C along the working period. Highest and most frequent fluctuations were found in the hand and forehead skin temperatures, small changes were found in mean skin temperature. Conclusions: Answers to the CWHQ increase concern on clinical forms of "a frigore", and in two cases the mean body temperature decreased below 35.0°C, which is defined in the current literature as a mild form of hypothermia.

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