research alert

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

***Sears JM, Victoroff TM, Bowman SM, Marsh SM, Borjan M, Reilly A, et al. Using a severity threshold to improve occupational injury surveillance: assessment of a severe traumatic injury-based occupational health indicator across the International Classification of Diseases lexicon transition. American Journal of Industrial Medicine. 2023; [epub ahead of print].**

https://doi.org/10.1002/ajim.23545

Abstract: Background: Traumatic injury is a leading cause of death and disability among US workers. Severe injuries are less subject to systematic ascertainment bias related to factors such as reporting barriers, inpatient admission criteria, and workers' compensation coverage. A state-based occupational health indicator (OHI #22) was initiated in 2012 to track work-related severe traumatic injury hospitalizations. After 2015, OHI #22 was reformulated to account for the transition from the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) to ICD-10-CM. This study describes rates and trends in OHI #22, alongside corresponding metrics for all work-related hospitalizations. Methods: Seventeen states used hospital discharge data to calculate estimates for calendar years 2012-2019. State-panel fixed-effects regression was used to model linear trends in annual work-related hospitalization rates, OHI #22 rates, and the proportion of work-related hospitalizations resulting from severe injuries. Models included calendar year and pre- to post-ICD-10-CM transition. Results: Work-related hospitalization rates showed a decreasing monotonic trend, with no significant change associated with the ICD-10-CM transition. In contrast, OHI #22 rates showed a monotonic increasing trend from 2012 to 2014, then a

significant 50% drop, returning to a near-monotonic increasing trend from 2016 to 2019. On average, OHI #22 accounted for 12.9% of work-related hospitalizations before the ICD-10-CM transition, versus 9.1% post-transition. Conclusions: Although hospital discharge data suggest decreasing work-related hospitalizations over time, work-related severe traumatic injury hospitalizations are apparently increasing. OHI #22 contributes meaningfully to state occupational health surveillance efforts by reducing the impact of factors that differentially obscure minor injuries; however, OHI #22 trend estimates must account for the ICD-10-CM transition-associated structural break in 2015.

Akkarakittichoke N, Waongenngarm P, and Janwantanakul P. Effects of postural shifting frequency on perceived musculoskeletal discomfort during 1-hour sitting in office workers. Journal of Manual & Manipulative Therapy. 2023; 46(2):76-85.
https://doi.org/10.1016/j.jmpt.2023.06.003 **[open access]**
Abstract: OBJECTIVE: The purpose of this study was to evaluate the effects of postural shifting frequency on perceived musculoskeletal discomfort during 1 hour of sitting in healthy office workers. METHODS: An experimental study comparing 3 different postural shifting frequencies was conducted on 60 healthy office workers who were asked to sit for an hour. The effects of 3 postural shifts (ie, 10, 20, and 30 times/h) on discomfort, measured by Borg's CR-10 scale, were compared. A seat pressure mat was used to confirm an individual's postural shift. RESULTS: Postural shifting frequency of 10 to 30 times/h had significant effects on perceived discomfort in the neck, shoulder, and upper and lower back during 1-hour sitting. At the neck and shoulder, a postural shifting frequency of 30 times/h significantly reduced perceived discomfort compared to a postural shifting frequency of 10 times/h during 1-hour sitting. At the upper and lower back, a postural shifting frequency of 20 to 30 times/h significantly reduced perceived discomfort compared to a postural shifting frequency of 10 times/h. CONCLUSION: Postural shifts of 30 times/h provided buffering effects on perceived musculoskeletal discomfort at the neck, shoulder, and upper and lower back

Bertrais S, Pineau E, and Niedhammer I. Prospective associations of psychosocial work factors with sickness absence spells and duration: results from the French national working conditions survey. American Journal of Industrial Medicine. 2023; 66(11):938-951.
https://doi.org/10.1002/ajim.23526
Abstract: BACKGROUND: Some psychosocial work factors are associated with sickness absence, however little information is available on the associations of various psychosocial work factors and multiple exposures with sickness absence spells and duration, and gender differences. METHODS: Data were from the French working conditions survey conducted on a nationally representative sample of the working population. The study sample included 17,437 employees (7292 men, 10,145 women) followed from 2013 to 2016 and/or from 2016 to 2019. Occupational exposures (20 psychosocial work factors, 4 working time/hours factors, 4 physical work exposures) were measured at the beginning of each follow-up period. Hurdle and multinomial models were used to study the associations with the number of days and

spells of sickness absence. RESULTS: Most of the psychosocial work factors predicted the risk of at least 1 day of sickness absence. Stronger associations were found among women than men for some factors. Psychosocial work factors were more likely to predict the number of spells than the number of days of sickness absence. Some physical work exposures predicted sickness absence spells and days, whereas shift work in women predicted the risk of at least 1 day of sickness absence. Dose-response associations were found between multiple psychosocial work exposures and sickness absence spells, and between multiple physical exposures and sickness absence spells and days. CONCLUSION: Comprehensive prevention policies oriented toward the whole psychosocial and physical work environment should be useful to reduce sickness absence among men and women

Blafoss R, Aagaard P, Clausen T, and Andersen LL. Effects of consecutive workdays and days off on low back pain, fatigue and stress: prospective cohort study among warehouse and construction workers. Occupational & Environmental Medicine. 2023; 80(11):650-658. https://doi.org/10.1136/oemed-2023-109043 [open access]
Abstract: Objectives: Limited knowledge exists about day-to-day changes in physical and mental symptoms in warehouse and construction workers. This study investigated the associations between consecutive workdays and days off with low back pain (LBP) intensity, bodily fatigue and mental stress. Methods: Participants (n=224) received daily questions for 21 days about LBP, fatigue, stress (outcome, 0-10 scales), and workdays and days off (exposure). We tested associations between 1-3 workdays (n=148) and 1-2 days off (n=158) with LBP intensity, bodily fatigue and mental stress after work and the following morning using linear mixed models with repeated measures controlling for relevant confounders. Results: Consecutive workdays led to progressively increased LBP intensity, with three workdays increasing LBP intensity by 1.76 (95% CI 1.48 to 2.03) points. Bodily fatigue and mental stress increased after one workday (2.06 (95% CI 1.80 to 2.32) and 0.97 (95% CI 0.77 to 1.17) points, respectively) and remained stable for three workdays. After 1 day off, bodily fatigue and mental stress decreased -1.82 (95% CI -2.03 to -1.61) and -0.88 (95% CI -1.05 to -0.71) points, respectively, without decreasing further. In contrast, LBP intensity decreased progressively -1.09 (95% CI -1.27 to -0.91) and -1.45 (95% CI -1.67 to -1.24) points after 1 and 2 days off, respectively. Conclusions: Workdays and days off affected the outcome variables differently. LBP intensity progressively increased with consecutive workdays, while workers needed 2 days off to recover. This study provides valuable knowledge about how to organise the workweek to prevent LBP, fatigue and stress, potentially reducing labour market withdrawal.

Cavalcanti M, Lessa L, and Vasconcelos BM. Construction accident prevention: a systematic review of machine learning approaches. Work. 2023; 76(2):507-519. https://doi.org/10.3233/WOR-220533
Abstract: BACKGROUND: The construction industry is an important productive sector worldwide. However, the industry is also responsible for high numbers of work-related

accidents, which highlights the necessity for improving safety management on construction sites. In parallel, technological applications such as machine learning (ML) are used in many productive sectors, including construction, and have proved significant in process optimizations and decision-making. Thus, advanced studies are required to comprehend the best way of using this technology to enhance construction site safety. OBJECTIVE: This research developed a systematic literature review using ten scientific databases to retrieve relevant publications and fill the knowledge gaps regarding ML applications in construction accident prevention. METHODS: This study examined 73 scientific articles through bibliometric research and descriptive analysis. RESULTS: The results showed the publications timeline and the most recurrent journals, authors, institutions, and countries-regions. In addition, the review discovered information about the developed models, such as the research goals, the ML methods used, and the data features. The research findings revealed that USA and China are the leading countries regarding publications. Also, Support Vector Machine - SVM was the most used ML method. Furthermore, most models used textual data as a source, generally related to inspection reports and accident narratives. The data approach was usually related to facts before an accident (proactive data). CONCLUSION: The review highlighted improvement proposals for future works and provided insights into the application of ML in construction safety management

Counson I, Sanatkar S, Knight A, Lawrence D, and Harvey SB. Comparing post-traumatic stress severity in professional and volunteer Australian firefighters. Occupational Medicine. 2023; 73(7):410-418.
https://doi.org/10.1093/occmed/kqad088
Abstract: Background: While extensive research has highlighted increased risk for post-traumatic stress disorder (PTSD) in firefighters, previous research has yielded mixed results regarding the role of work status (professional versus volunteer) in the development of psychopathological symptoms. Aims: To explore the predictive strength of work status on PTSD or post-traumatic stress symptom severity in a large sample of professional (PFFs) and volunteer (VFFs) Australian firefighters exposed to operational work-related trauma. Methods: The stratified random sample comprised 1317 PFFs (n = 1148 (87%) males and 13%, n = 169 (13%) females) and 898 VFFs (n = 744 (83%) males and n = 154 (17%) females) who reported having experienced trauma while working or volunteering. Participants completed demographic, health and work-related questions and mental health measures of stress, trauma, PTSD, social support and use of mental health prevention programmes. Results: The results revealed a significant relationship between work status and PTSD, with PFFs reporting higher levels of PTSD symptom severity compared to VFFs. This association persisted after controlling for demographics, health, stress away from work, social support and use of organizational mental health support programmes (debriefing and face-to-face training for mental and physical self-care). Conclusions: This study suggests the importance of work status in PTSD amongst Australian firefighters exposed to operational trauma. Future research is needed to substantiate our findings and examine why PFFs may be more prone to

developing PTSD. Implications for the provision of mental health programmes offered by fire organizations to their members are discussed.

Giallanza A, La Scalia G, Micale R, and La Fata CM. Occupational health and safety issues in human-robot collaboration: state of the art and open challenges. Safety Science. 2024; 169:106313.
https://doi.org/10.1016/j.ssci.2023.106313 [open access]
Abstract: Human-Robot Collaboration (HRC) refers to the interaction of workers and robots in a shared workspace. Owing to the integration of the industrial automation strengths with the inimitable cognitive capabilities of humans, HRC is paramount to move towards advanced and sustainable production systems. Although the overall safety of collaborative robotics has increased over time, further research efforts are needed to allow humans to operate alongside robots, with awareness and trust. Numerous safety concerns are open, and either new or enhanced technical, procedural and organizational measures have to be investigated to design and implement inherently safe and ergonomic automation solutions, aligning the systems performance and the human safety. Therefore, a bibliometric analysis and a literature review are carried out in the present paper to provide a comprehensive overview of Occupational Health and Safety (OHS) issues in HRC. As a result, the most researched topics and application areas, and the possible future lines of research are identified. Reviewed articles stress the central role played by humans during collaboration, underlining the need to integrate the human factor in the hazard analysis and risk assessment. Human-centered design and cognitive engineering principles also require further investigations to increase the worker acceptance and trust during collaboration. Deepened studies are compulsory in the healthcare sector, to investigate the social and ethical implications of HRC. Whatever the application context is, the implementation of more and more advanced technologies is fundamental to overcome the current HRC safety concerns, designing low-risk HRC systems while ensuring the system productivity.

Ikeda H, Kubo T, Nishimura Y, and Izawa S. Effects of work-related electronic communication during non-working hours after work from home and office on fatigue, psychomotor vigilance performance and actigraphic sleep: observational study on information technology workers. Occupational & Environmental Medicine. 2023; 80(11):627-634.
https://doi.org/10.1136/oemed-2023-108962 [open access]
Abstract: Objectives: This study examined the effects of work-related electronic communication (WREC) during non-working hours in the work from home or office setting on health. Methods: The study recruited 98 information technology workers in a 9-day observational study. They recorded work-life events (eg, work style (working mostly from home or the office) and duration of WREC during non-working hours) and subjective ratings (eg, current fatigue, sleepiness and depression) and wore a sleep actigraph to measure objective sleep variables before bedtime every day. They completed the Brief Psychomotor

Vigilance Test (PVT-B) before bedtime for 4 days. Results: The frequency of WREC was significantly higher when working mostly from home than in the office (p<0.01). In addition, the duration of WREC was longer when working mostly from home than in the office (p<0.001). Linear or generalised linear mixed model analysis for fatigue, depression and PVT lapse revealed significant interaction effects between work style and WREC (all p<0.05). Post hoc analysis showed that the longer the WREC, the worse the fatigue and depression and the lower the lapse on working mostly from the office (all p<0.05). Conclusions: Longer WREC is associated with worse fatigue and depression and lower lapse of PVT (higher alertness) before bedtime for working mostly from the office. Workers, especially those working from the office, should minimise WREC during non-working hours to maintain good health. Therefore, companies, managers and other relevant stakeholders should refrain from contacting workers during non-working hours.

Marinaccio A, Di Marzio D, Mensi C, Consonni D, Gioscia C, Migliore E, et al. Incidence of mesothelioma in young people and causal exposure to asbestos in the Italian national mesothelioma registry (ReNaM). Occupational & Environmental Medicine. 2023; 80(11):603-609.
https://doi.org/10.1136/oemed-2023-108983
Abstract: Introduction The epidemiological surveillance of mesothelioma incidence is a crucial key for investigating the occupational and environmental sources of asbestos exposure. The median age at diagnosis is generally high, according to the long latency of the disease. The purposes of this study are to analyse the incidence of mesothelioma in young people and to evaluate the modalities of asbestos exposure. Methods Incident malignant mesothelioma (MM) cases in the period 1993–2018 were retrieved from Italian national mesothelioma registry and analysed for gender, incidence period, morphology and exposure. Age-standardised rates have been calculated and the multiple correspondence analysis has been performed. The association between age and asbestos exposure has been tested by $\chi 2$ test. Results From 1993 to 2018, 30 828 incident MM cases have been collected and 1278 (4.1%) presented diagnosis at early age ($\leqslant$50 years). There is a substantial association between age at diagnosis and the type of asbestos exposure and a significantly lower frequency of cases with occupational exposure to asbestos (497 cases vs 701 expected) in young people has been documented. Paraoccupational and environmental exposure to asbestos have been found more frequent in young MM cases (85 and 93 observed cases vs 52 and 44 expected cases, respectively). Conclusions Mesothelioma incidence surveillance at population level and the anamnestic individual research of asbestos exposure is a fundamental tool for monitoring asbestos exposure health effects, supporting the exposure risks prevention policies. Clusters of mesothelioma incident cases in young people are a significant signal of a potential non-occupational exposure to asbestos.

Matilla-Santander N, Matthews AA, Gunn V, Muntaner C, Kreshpaj B, Wegman DH, et al. Causal effect of shifting from precarious to standard employment on all-cause mortality in Sweden: an emulation of a target trial. Journal of Epidemiology & Community Health. 2023; 77(11):736-743.

https://doi.org/10.1136/jech-2023-220734 **[open access]**

Abstract: BACKGROUND: We aimed at estimating the causal effect of switching from precarious to standard employment on the 6-year and 12-year risk of all-cause mortality among workers aged 20-55 years in Sweden. METHODS: We emulated a series of 12 target trials starting every year between 2005 and 2016 using Swedish register data (n=251 273). We classified precariously employed individuals using a multidimensional approach at baseline as (1) remaining in precarious employment (PE) (73.8%) and (2) shifting to standard employment (26.2%). All-cause mortality was measured from 2006 to 2017. We pooled data for all 12 emulated trials and used covariate-adjusted pooled logistic regression to estimate intention-to-treat and per-protocol effects via risk ratios (RRs) and standardised risk curves (the parametric g-formula). RESULTS: Shifting from precarious to standard employment decreases the 12-year risk of death by 20% on the relative scale (RR: 0.82, 95% CI: 0.73; 0.93), regardless of what happens after the initial shift. However, we estimated a 12-year risk reduction of 30% on the relative scale for workers shifting from precarious to standard employment and staying within this employment category for the full 12 years (RR: 0.71, 95% CI: 0.54; 0.95). CONCLUSIONS: This study finds that shifting from low to higher-quality employment conditions (ie, stable employment, sufficient income levels and high coverage by collective agreements) decreases the risk of death. Remaining in PE increases the risk of premature mortality. Our results emphasise the necessity of ensuring decent work for the entire working population to accomplish the 2030 Agenda for Sustainable Development

Metri KG, Raghuram N, Narayan M, Sravan K, Sekar S, Bhargav H, et al. Impact of workplace yoga on pain measures, mental health, sleep quality, and quality of life in female teachers with chronic musculoskeletal pain: a randomized controlled study. Work. 2023; 76(2):521-531.

https://doi.org/10.3233/WOR-210269

Abstract: Background: Chronic pain conditions such as low back pain, knee pain and cervical pain are highly prevalent among female teachers. Chronic pain significantly affects the mental health, sleep and quality of life among teachers. Objective: This study is intended to investigate the impact of a workplace yoga intervention on musculoskeletal pain, anxiety, depression, sleep, and quality of life (QoL) among female teachers who had chronic musculoskeletal pain. Method: Fifty female teachers aged between 25-55 years with chronic musculoskeletal pain were randomized to either the yoga group (n = 25) or the control group (n = 25). The yoga group received a 60-minute structured Integrated Yoga intervention (IY) four days a week for six consecutive weeks at school. The control group received no intervention. Outcome measures: Pain intensity, anxiety, depression, stress, fatigue, self-compassion, sleep quality, and quality of life were assessed at the baseline and six weeks.

Results: A significant ($p < 0.05$) reduction in pain intensity and pain disability in the yoga group was observed after 6-week compared to baseline. Anxiety, depression, stress, sleep scores and fatigues also improved in the yoga group after six weeks. The control group showed no change. Post score comparison showed a significant difference between the groups for all the measures. Conclusion: Workplace yoga intervention is found to be effective in improving pain, pain disability, mental health, sleep quality among female teachers with chronic musculoskeletal pain. This study strongly recommends yoga for the prevention of work-related health issues and for the promotion of wellbeing among teachers.

Parkes KR, Fruhen LS, and Parker SK. Direct, indirect, and moderated paths linking work schedules to psychological distress among fly-in, fly-out workers. Work and Stress. 2023; 37(4):466-486.
https://doi.org/10.1080/02678373.2022.2142988

Rugulies R, Aust B, Greiner BA, Arensman E, Kawakami N, LaMontagne AD, et al. Work-related causes of mental health conditions and interventions for their improvement in workplaces. Lancet. 2023; 402(10410):1368-1381.
https://doi.org/10.1016/S0140-6736(23)00869-3
Abstract: Mental health problems and disorders are common among working people and are costly for the affected individuals, employers, and whole of society. This discussion paper provides an overview of the current state of knowledge on the relationship between work and mental health to inform research, policy, and practice. We synthesise available evidence, examining both the role of working conditions in the development of mental disorders, and what can be done to protect and promote mental health in the workplace. We show that exposure to some working conditions is associated with an increased risk of the onset of depressive disorders, the most studied mental disorders. The causality of the association, however, is still debated. Causal inference should be supported by more research with stronger linkage to theory, better exposure assessment, better understanding of biopsychosocial mechanisms, use of innovative analytical methods, a life-course perspective, and better understanding of the role of context, including the role of societal structures in the development of mental disorders. There is growing evidence for the effectiveness of interventions to protect and promote mental health and wellbeing in the workplace; however, there is a disproportionate focus on interventions directed towards individual workers and illnesses, compared with interventions for improving working conditions and enhancing mental health. Moreover, research on work and mental health is mainly done in high-income countries, and often does not address workers in lower socioeconomic positions. Flexible and innovative approaches tailored to local conditions are needed in implementation research on workplace mental health to complement experimental studies. Improvements in translating workplace mental health research to policy and practice, such as through workplace-oriented concrete guidance for interventions, and by national policies and programmes focusing on the people most in need, could capitalise on the growing interest in

workplace mental health, possibly yielding important mental health gains in working populations

Saksvik-Lehouillier I and Sorengaard TA. Comparing shift work tolerance across occupations, work arrangements, and gender. Occupational Medicine. 2023; 73(7):427-433. https://doi.org/10.1093/occmed/kqad090 [open access]
Abstract: BACKGROUND: There are individual differences in shift work tolerance; however, we lack knowledge about how this is experienced across different occupations, sex and shift types. AIMS: The aim was to describe and investigate shift work tolerance, and individual differences in shift work tolerance, in two occupations, between men and women and between day/evening workers and rotating shift workers. METHODS: Cross-sectional questionnaire study. The sample was comprised of 315 retail workers and 410 police employees. RESULTS: Shift work tolerance was higher among police employees compared to retail workers, among men compared to women, and among day workers compared to evening/rotating shift workers. The difference was larger between occupations than between sex and shift type. Evening workers had more symptoms of shift work intolerance than rotating shift workers. Neuroticism and autonomy were related to all symptoms of shift work tolerance among retail workers, but not police employees. CONCLUSIONS: It is important to consider the type of occupation and the work context when tailoring work arrangements to the individual

Singh N. Occupational safety and multiple management systems certifications: the influence of internationalisation of the firm. Safety Science. 2024; 169:106324. https://doi.org/10.1016/j.ssci.2023.106324

Taylor K, Ratcliffe J, Bessarab D, and Smith K. Valuing indigenous quality of life: a review of preference-based quality of life instruments and elicitation techniques with global older indigenous populations. Social Science & Medicine. 2023; 336:116271. https://doi.org/10.1016/j.socscimed.2023.116271 [open access]
Abstract: Indigenous perspectives of quality of life (QoL) are different to that of non-Indigenous populations. Determining how to identify and value what is important to QoL for people from diverse cultural backgrounds is crucial for assessing effective outcomes for quality assessment and health economic evaluation to guide evidence-based decision making. This is particularly important for older Indigenous people who have complex care and support needs within health and aged-care systems. This scoping review aims to assess the existing literature in this field by firstly identifying preference based instruments that have been applied with older Indigenous peoples and secondly, exploring the extent to which existing preference based instruments applied with older Indigenous peoples encompass older Indigenous peoples QoL perspectives in their design and application. The inclusion criteria for the review were studies using preference based QoL instruments with an Indigenous population where the cohort was aged 50 years or over. This resulted in the

critical analysis of 12 studies. The review identified that preference based QoL instruments have rarely been applied to date with older Indigenous populations with most instruments found to be designed for non-Indigenous adults. Typically, instruments have not incorporated Indigenous worldviews of QoL into either the content of the descriptive system or the elicitation techniques and corresponding value sets generated. To encapsulate Indigenous cultural perspectives accurately in economic evaluation, further research is required as to how QoL domains in preference based instruments for Indigenous peoples can be reflective of Indigenous perspectives. It is imperative that the QoL preferences of older Indigenous peoples are adequately captured within preference based QoL instruments applied with this population

Webber BJ, Soto GW, Smith A, and Whitfield GP. Changes in teleworking and physical activity behaviors in the United States before and after emergence of COVID-19. Journal of Occupational & Environmental Medicine. 2023; 65(10):826-831.
https://doi.org/10.1097/JOM.0000000000002897
Abstract: Objective: The aim of the study is to determine the prevalence of perceived decreases in three physical activity (PA) behaviors and meeting the PA guideline, by changes in telework. Methods: US workers (N = 2393) reported teleworking and PA behaviors before and after COVID-19 emergence. Those reporting more and less telework were compared with those reporting stable telework on prevalence of (1) decreasing behaviors and (2) meeting the aerobic guideline (=150 min/wk of moderate-intensity PA). Results: Compared with workers with stable telework, those with increased telework were more likely to report decreases in any PA (by 61%), active transportation (65%), and park use (52%). Workers who deceased telework were also more likely to report decreases in these behaviors. Groups were equally likely to meet the guideline. Conclusions: Changes in teleworking status-either more or less-may be associated with decreased participation in PA behaviors.

Wuytack F, Evanoff B, Dale AM, Gilbert F, Fadel M, Leclerc A, et al. Comparing physical work exposures between men and women: findings from 65 281 workers in France. Occupational & Environmental Medicine. 2023; 80(10):558-563.
https://doi.org/10.1136/oemed-2023-108839
Abstract: OBJECTIVES: Musculoskeletal disorders (MSDs) are a leading cause of disability and sick leave among workers. Although MSDs are associated with physical exposures, there are gender differences in the prevalence and related disability. This study aimed to compare self-reported physical work exposures by gender for people within the same occupational group. METHODS: We used cross-sectional data from 65 281 asymptomatic workers aged 18-69 years from the CONSTANCES cohort study (France). We compared 27 physical exposures between men and women in the same occupational groups ('Profession et Categorie Sociale' group) using Mann-Whitney U tests. RESULTS: Men and women performing the same job often reported different levels of exposure. 38 of 365 occupational groups had a gender difference in reported exposure for 10 or more of 27 physical exposures, with men reporting

higher exposures in 79% of these jobs. Women reported higher exposures in nursing and other healthcare professions. The probability that a random man had an exposure value higher than a random woman varied widely, from 8% to 92%, and was highly dependent on occupational groups and the specific exposure. CONCLUSIONS: Men and women working in the same jobs reported different physical exposures for some jobs and some exposures. Further research should further define and explore these reported differences to improve prevention and research

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