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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, Chen C, Prince SA, Smith P, and Mustard C. Daily accelerometer-measured physical activity patterns and associations with cardiometabolic health among Canadian working adults. *Health Reports*. 2023; 34(3):15-29.**

<https://doi.org/10.25318/82-003-x202300300002-eng> [open access]

**Abstract:** Background Previous studies examining the cardiometabolic risks associated with physical activity (PA) in workers have predominantly used self-reported measures. Little is known about workers' distinct daily PA patterns and whether these are linked with cardiometabolic risks. This study examined associations between patterns of workers' accelerometer-measured daily PA and four markers of cardiometabolic health. Data and methods Working adults (N=8,229; 47% women; average age: 42 years; standard deviation = 0.3) were sampled from the Canadian Health Measures Survey (five cycles: 2007 to 2017). Accelerometer devices measured daily PA, and hierarchical cluster analysis identified distinct activity patterns. Multiple linear regression analyses examined associations between activity patterns and cardiometabolic risk markers (waist circumference, systolic and diastolic blood pressure, and non-high-density lipoprotein [HDL] cholesterol). Results Workers were classified into six distinct activity patterns. On average, compared with workers classified in the "lowest activity" pattern, workers with the "moderate consistent activity," "fluctuating moderate activity," "high daytime activity" and "highest activity" patterns were associated with lower waist circumferences; workers with the "fluctuating moderate activity" and "highest activity" patterns were associated with lower systolic blood pressure; the "moderate evening activity" pattern was associated lower diastolic blood pressure; and workers with the

"fluctuating moderate activity," "high daytime activity" and "highest activity" patterns were associated with lower non-HDL cholesterol. "High daytime activity" was associated with lower waist circumference in women, compared with men, and the "moderate consistent activity" and "fluctuating moderate activity" patterns were associated with lower diastolic blood pressure in younger workers (40 years or younger). Interpretation Workers with high daily PA levels tended to have the most optimal cardiometabolic health. Some evidence suggested that there are benefits to moderate levels of PA, particularly for lowering waist circumference and non-HDL cholesterol. Findings may assist in identifying workers for PA initiatives to promote cardiometabolic health benefits.

**\*Bondebjerg A, Filges T, Pejtersen JH, Viinholt BCA, Burr H, Hasle P, Tompa E, et al. Protocol: occupational health and safety regulatory interventions to improve the work environment: an evidence and gap map of effectiveness studies. Campbell Systematic Reviews. 2022; 18(2):e1231**

<https://doi.org/10.1002/cl2.1231> [open access]

Abstract: This is the protocol for a Campbell systematic review. The objectives are as follows: provide an overview of the existing evidence base by identifying available systematic reviews and primary effectiveness studies, identify clusters of evidence suitable for a systematic review and identify gaps in evidence where primary research is needed

**Alkhaledi KA, Bendak S, and Dashti FA. Assessing safety culture in public sector organisations: a cross-national study. International Journal of Industrial Ergonomics. 2023; 94:103425.**

<https://doi.org/10.1016/j.ergon.2023.103425>

**Bentley TA, Caponecchia C, Onnis LA, Brunetto Y, Farr-Wharton B, Cattani M, et al. A systems model for the design of occupational health and safety management systems inclusive of work-from-home arrangements. Applied Ergonomics. 2023; 109:103966.**

<https://doi.org/10.1016/j.apergo.2023.103966>

Abstract: The study addressed an important knowledge gap in the literature by co-designing a model for OHS management systems inclusive of workers who work-from-home, with a focus on psychosocial risks. This qualitative research study utilised a series of co-design focus groups involving Australian regulators, health and safety managers and practitioners, senior managers, middle managers and workers who work-from-home, to better understand the types of measures that organisations can apply to improve their health and safety management systems. Using a systems approach, consideration was given to the organisation of the remote working system, the home-work interface for remote workers, the competencies of managers and employees in regard to their occupation health and safety (OHS) responsibilities, and the complexity of identifying, reporting and monitoring psychosocial hazards for employees working from home. The study identified a need for tools

designed to support both managers and workers in promoting psychologically safe working from home

**Chaudhry ZS, Widarma C, Cadet L, Das R, and Sharip A. A cross-sectional descriptive analysis of diversity, equity, and inclusion presence among United States occupational and environmental medicine residency program websites. *Journal of Occupational & Environmental Medicine*. 2023; 65(3):224-227.**

<https://doi.org/10.1097/JOM.0000000000002714>

Abstract: OBJECTIVE: To evaluate the presence of diversity, equity, and inclusion (DEI) among US occupational and environmental medicine (OEM) residency program websites. METHODS: In January to February 2022, two independent reviewers evaluated the websites of all 24 US accredited OEM residency programs and documented the presence of 10 predetermined DEI metrics and resident/faculty photographs and biographies. RESULTS: Program websites included a median of 1 (0-3) DEI element with 46% of websites containing none of the DEI metrics. Faculty photographs and biographies were included in 83% and 75% of websites, respectively. Resident photographs and biographies were included in 50% and 25% of websites, respectively. CONCLUSIONS: Many OEM residency program websites lack DEI presence. Programs should consider presenting information relevant to DEI on their websites to help attract more diverse applicant pools

**Haile GA. Precarious employment and workplace health outcomes in Britain. *Social Science & Medicine*. 2023; 320:115694.**

<https://doi.org/10.1016/j.socscimed.2023.115694> [open access]

Abstract: Rationale: The world of work is changing rapidly, and precarious employment is becoming more prevalent in Britain and elsewhere, particularly since the 2008 financial crisis. This is despite the evidence linking employment precarity to adverse health outcomes, and the policy discourses advocating for high-quality jobs. Objective: I seek to establish empirically the extent and nature of the potential link between employment precarity and health outcomes, which is done chiefly at the workplace level. The research can be vital from the perspective of informing policy, given that the workplace represents the level where key policy levers operate. Methods: I use nationally representative data from the British Workplace Employment Relations Survey. Four workplace health outcomes (WHOs; viz., injuries, illnesses, job satisfaction, and job anxiety) have been used to examine if organizations with precarious employment arrangements are likely to experience adverse health outcomes. I use alternative econometric approaches to compare organizations that reported to have three types of precarious employment arrangements, viz., shift working, annualised hours, and zero-hours contracts (ZHCs), vis-à-vis their counterparts without such arrangements. Results: The results obtained reveal that workplaces with precarious employment arrangements are significantly unhealthier, and those with the most insecure form of precarious employment perform particularly worst in this respect. Conclusions: Precarious employment may become ever more prevalent as organizations contend with

economic fallouts from shocks such as Brexit or Covid-19. This may lead to sub-standard health outcomes. The positive influence of trade unions on working conditions has largely been decimated and the workforce in Britain is ageing. These combinations may pose significant challenges to public health including mental health crises. Public policy ought to help minimise adverse health outcomes linked to employment precarity.

**Hunt T and Connolly H. COVID-19 and the work of trade unions: adaptation, transition and renewal. *Industrial Relations Journal*. 2023; 54(2):150-166.**

<https://doi.org/10.1111/irj.12395> [open access]

Abstract: Trade unions face long-term challenges including declining memberships that threaten their influence. COVID-19 created new challenges and possibilities for renewal. This article presents findings from a study conducted during the pandemic, comprising a large survey and interviews that investigated how unions adapted to the changes to working life they and their members faced. Evidence from UK unions shows unions rapidly changing how they worked, particularly in adopting and investing in new technologies. COVID-19 became a trigger for adaptation for unions which helped to meet the challenges created by the pandemic and demonstrated unions' creative ability to adapt and maintain relevance. The article contributes new insights about union renewal and argues that renewal should be understood as a continuous and evolving process of adaptation and transition, shaped as much by internal strategy as external shocks. It argues that confidence within unions about their ability to reform is important for understanding renewal.

**Ji X, Hettiarachchige RO, Littman ALE, and Piovesan D. Using digital human modelling to evaluate the risk of musculoskeletal injury for workers in the healthcare industry. *Sensors (Basel)*. 2023; 23(5):2781.**

<https://doi.org/10.3390/s23052781> [open access]

Abstract: BACKGROUND: Hospital nurses and caregivers are reported to have the highest number of workplace injuries every year, which directly leads to missed days of work, a large amount of compensation costs, and staff shortage issues in the healthcare industry. Hence, this research study provides a new technique to evaluate the risk of injuries for healthcare workers using a combination of unobtrusive wearable devices and digital human technology. The seamless integration of JACK Siemens software and the Xsens motion tracking system was used to determine awkward postures adopted for patient transfer tasks. This technique allows for continuous monitoring of the healthcare worker's movement which can be obtained in the field. METHODS: Thirty-three participants underwent two common tasks: moving a patient manikin from a lying position to a sitting position in bed and transferring the manikin from a bed to a wheelchair. By identifying, in these daily repetitive patient-transfer tasks, potential inappropriate postures that can be conducive to excessive load on the lumbar spine, a real-time monitoring process can be devised to adjust them, accounting for the effect of fatigue. Experimental Result: From the results, we identified a significant difference in spinal forces exerted on the lower back between genders at different operational heights.

Additionally, we revealed the main anthropometric variables (e.g., trunk and hip motions) that are having a large impact on potential lower back injury. **CONCLUSIONS:** These results will lead to implementation of training techniques and improvements in working environment design to effectively reduce the number of healthcare workers experiencing lower back pain, which can be conducive to fewer workers leaving the healthcare industry, better patient satisfaction and reduction of healthcare costs

**Kreshpaj B, Wegman DH, Burstrom B, Davis L, Hemmingsson T, Hakansta C, et al. Precarious employment and occupational injuries in Sweden between 2006 and 2014: a register-based study. Occupational and Environmental Medicine. 2023; 80(4):179-185.**

<https://doi.org/10.1136/oemed-2022-108604> [open access]

**Abstract:** Background: Precarious employment (PE) has been suggested as a risk factor for occupational injuries (OIs). However, several issues such as under-reporting and time at risk pose obstacles to obtaining unbiased estimates of risk **OBJECTIVE:** To investigate if PE is a risk factor for OIs in Sweden. **Methods:** This register-based study included employed workers aged 18-65, resident in Sweden between 2006 and 2014. PE was operationalised as a multidimensional construct (score) and by its five items (contract insecurity, contractual temporariness, multiple jobs/multiple sectors, income level, collective bargaining agreement). Our outcome was OI in the following year. Pooled ORs for OIs in relation to PE and PE items were calculated by means of multivariate logistic regression models for women and men separately. **Results:** Precarious workers were at lower risk of OIs as compared with non-precarious workers among both males and females (OR <1) also when applying weights for under-reporting and adjusting for time at risk (part-time work). Male agencies workers had a higher risk of OIs (OR 1.19, 95% CI 1.15 to 1.23), as did male and female workers in multiple jobs/sectors (OR 1.25, 95% CI 1.23 to 1.28 and OR 1.10, 95% CI 1.07 to 1.13 respectively), and female workers in the low-income groups (OR 1.11, 95% CI 1.09 to 1.12). Low coverage of collective bargaining agreements was associated with a lower risk of OIs for both men and women (OR 0.30, 95% CI 0.29 to 0.31 and OR 0.26, 95% CI 0.24 to 0.27, respectively). **Conclusions:** While several mechanisms may explain why precarious workers in Sweden present lower risks of OIs, several dimensions of PE such as temp agency work and multiple job-holding could be important risk factors for OIs and merit further research.

**MacLean CL and Dror IE. Measuring base-rate bias error in workplace safety investigators. Journal of Safety Research. 2023; 84:108-116.**

<https://doi.org/10.1016/j.jsr.2022.10.012>

**Abstract:** Introduction: This study explored the magnitude of professional industrial investigators' bias to attribute cause to a person more readily than to situational factors (i.e., human error bias). Such biased opinions may relieve companies from responsibilities and liability, as well as compromise efficacy of suggested preventative measures. **Method:** Professional investigators and undergraduate participants were given a summary of a workplace event and asked to allocate cause to the factors they found causal for the event.

The summary was crafted to be objectively balanced in its implication of cause equally between two factors: a worker and a tire. Participants then rated their confidence and the objectivity of their judgment. We then conducted an effect size analysis, which supplemented the findings from our experiment with two previously published research studies that used the same event summary. Results: Professionals exhibited a human error bias, but nevertheless believed that they were objective and confident in their conclusions. The lay control group also showed this human error bias. These data, along with previous research data, revealed that, given the equivalent investigative circumstances, this bias was significantly larger with the professional investigators, with an effect size of  $d_{\text{unb}} = 0.97$ , than the control group with an effect size of only  $d_{\text{unb}} = 0.32$ . Conclusions: The direction and strength of the human error bias can be quantified, and is shown to be larger in professional investigators compared to lay people. Practical applications: Understanding the strength and direction of bias is a crucial step in mitigating the effects of the bias. The results of the current research demonstrate that mitigation strategies such as proper investigator training, a strong investigation culture, and standardized techniques, are potentially promising interventions to mitigate human error bias.

**Mathieu C and Gilbreath B. Measuring presenteeism from work stress: the job stress-related presenteeism scale. Journal of Occupational & Environmental Medicine. 2023; 65(3):210-216.**

<https://doi.org/10.1097/JOM.0000000000002753>

Abstract: OBJECTIVE: Presenteeism can result from a variety of causes, one of which is job stress. This study examined the factor structure and validity of the Job Stress-Related Presenteeism Scale (JSRPS). METHODS: Using three organizational samples, the study aimed to determine the factor structure of the JSRPS, its relationship to a sickness presenteeism scale, and the association between the JSRPS and associated concepts. RESULTS: Exploratory and confirmatory factor analyses supported a reliable 6-item, 2-factor model for the JSRPS. JSRPS scores were associated with higher levels of psychological distress, workplace harassment, and turnover intentions and lower levels of job satisfaction, and work engagement. The JSRPS had stronger associations with psychological distress and workplace harassment than did the Stanford Presenteeism Scale. CONCLUSIONS: Results suggest that the JSRPS provides a valid measure of presenteeism resulting from job stress

**Plener J, Csiernik B, To D, da Silva-Oolup S, Hofkirchner C, Cox J, et al. Conservative management of cervical radiculopathy: a systematic review. Clinical Journal of Pain. 2023; 39(3):138-146.**

<https://doi.org/10.1097/AJP.0000000000001092>

Abstract: OBJECTIVE: The purpose of this systematic review was to assess the effectiveness and safety of conservative interventions compared with other interventions, placebo/sham interventions, or no intervention on disability, pain, function, quality of life, and psychological impact in adults with cervical radiculopathy (CR). METHODS: We searched MEDLINE,

CENTRAL, CINAHL, Embase, and PsycINFO from inception to June 15, 2022 to identify studies that were randomized controlled trials, had at least one conservative treatment arm, and diagnosed participants with CR through confirmatory clinical examination and/or diagnostic tests. Studies were appraised using the Cochrane Risk of Bias 2 tool and the quality of the evidence was rated using the Grades of Recommendations, Assessment, Development, and Evaluation approach. RESULTS: Of the 2561 records identified, 59 trials met our inclusion criteria (n = 4108 participants). Due to clinical and statistical heterogeneity, the findings were synthesized narratively. There is very-low certainty evidence supporting the use of acupuncture, prednisolone, cervical manipulation, and low-level laser therapy for pain and disability in the immediate to short-term, and thoracic manipulation and low-level laser therapy for improvements in cervical range of motion in the immediate term. There is low to very-low certainty evidence for multimodal interventions, providing inconclusive evidence for pain, disability, and range of motion. There is inconclusive evidence for pain reduction after conservative management compared with surgery, rated as very-low certainty. DISCUSSION: There is a lack of high-quality evidence, limiting our ability to make any meaningful conclusions. As the number of people with CR is expected to increase, there is an urgent need for future research to help address these gaps

**Rumchev K, Van Hoang D, and Lee AH. Exposure to dust and respiratory health among Australian miners. *International Archives of Occupational & Environmental Health*. 2023; 96(3):355-363.**

<https://doi.org/10.1007/s00420-022-01922-z> [open access]

Abstract: Purpose: Occupational exposure to dust has been recognised as a significant health hazard to mine workers. This study aimed to investigate the association between exposure to inhalable (INH) and respirable (RES) dust and respiratory health among mine workers in Western Australia using an industry-wide exposure database. Methods: The database comprised cross-sectional surveys conducted by mining companies for the period 2001-2012. The study population consisted of 12,797 workers who were monitored for exposure to INH and RES dust and undertook health assessments including a respiratory questionnaire and spirometry test. Results: Despite the general trend of declining exposure to both INH and RES dust observed over the 12 years period, mine workers reported a higher prevalence of phlegm and cough when exposed to elevated concentrations of INH and RES dust. Logistic regression analysis further confirmed the positive association between INH dust exposure and the prevalence of phlegm with an adjusted odds ratio of 1.033 (95% CI 1.012-1.052). Overall, 6.3% of miners might have potential airway obstruction, and exposure to INH dust was associated with impaired lung function parameters. Conclusion: Exposure levels of INH and RES dust particles among mine workers have reduced considerably and were well below currently legislated occupational exposure limits. However, given the reported higher prevalence of phlegm and cough among those with elevated dust concentrations, there is a

continued need for effective dust exposure monitoring and control in the mineral mining industry.

**Slavik CE, Demers PA, Tamburic L, Warden H, and McLeod C. Do patterns of past asbestos use and production reflect current geographic variations of cancer risk? Mesothelioma in Ontario and British Columbia, Canada. *Cancer Causes and Control*. 2023; 34(4):349-360. <https://doi.org/10.1007/s10552-023-01672-4> [open access]**

**Abstract:** PURPOSE: Canada was a major global asbestos producer and consumer. Geographic patterns of Canadian asbestos use and mesothelioma, a highly fatal cancer linked to asbestos exposure, have not been previously reported. This study summarized key trends in mesothelioma incidence by geography and time in two Canadian provinces, Ontario and British Columbia (BC), and explored how past workforce characteristics and geographic trends in asbestos production and use may shape variations in regional rates of mesothelioma. METHODS: We report trends in mesothelioma incidence (1993-2016) for Ontario and British Columbia using population-based incidence data that were age-standardized to the 2011 Canadian population. Historical records of asbestos production and use were analyzed to geo-locate industrial point sources of asbestos in Ontario and BC. The prevalence of occupations in regions with the highest and lowest rates of mesothelioma in Ontario and BC were calculated using labor force statistics from the 1981 Canadian Census. RESULTS: Regional mesothelioma rates varied in both provinces over time; more census divisions in both Ontario and BC registered mesothelioma rates in the highest quintile of incidences during the period 2009 to 2016 than in any prior period examined. Certain occupations such as construction trades workers were more likely to be overrepresented in regions with high mesothelioma rates. CONCLUSION: This work explored how studying asbestos exposure and mesothelioma incidence at small-scale geographies could direct cancer surveillance and research to more targeted areas. Findings indicated that regional variations in mesothelioma could signal important differences in past occupational and potentially environmental exposures

**Tiesman HM, Hendricks SA, Wiegand DM, Lopes-Cardozo B, Rao CY, Horter L, et al. Workplace violence and the mental health of public health workers during COVID-19. *American Journal of Preventive Medicine*. 2023; 64(3):315-325. <https://doi.org/10.1016/j.amepre.2022.10.004> [open access]**

**Abstract:** Introduction: During the COVID-19 pandemic, public health workers were at an increased risk for violence and harassment due to their public health work and experienced adverse mental health conditions. This article quantifies the prevalence of job-related threats, harassment, and discrimination against public health workers and measures the association of these incidents with mental health symptoms during the COVID-19 pandemic. Methods: A nonprobability convenience sample of state, local, and tribal public health workers completed a self-administered, online survey in April 2021. The survey link was emailed to members of national public health associations and included questions on



workplace violence, demographics, workplace factors, and mental health symptoms. Mental health symptoms were measured using standardized, validated tools to assess depression, anxiety, post-traumatic stress disorder, and suicidal ideation. Multivariable Poisson models calculated adjusted prevalence ratios of mental health symptoms, with workplace violence as the primary risk factor. Analyses were conducted in 2021-2022. Results: Experiencing any type or combination of workplace violence was significantly associated with an increased likelihood of reporting depression symptoms (prevalence ratio=1.21, 95% CI=1.15, 1.27), anxiety (prevalence ratio=1.21, 95% CI=1.15, 1.27), post-traumatic stress disorder (prevalence ratio=1.31, 95% CI=1.25, 1.37), and suicidal ideation (prevalence ratio=1.26, 95% CI=1.14, 1.38), after adjusting for confounders. A dose-response relationship was found between the number of workplace violence events experienced by a public health worker and the likelihood of reporting mental health symptoms. Conclusions: Violence targeted at the public health workforce is detrimental to workers and their communities. Ongoing training, workplace support, and increased communication after a workplace violence incident may be helpful. Efforts to strengthen public health capacities and support the public health workforce are also needed.

**Weaver B, Kirk-Brown A, Goodwin D, and Oxley J. Psychosocial safety behavior: a scoping review of behavior-based approaches to workplace psychosocial safety. *Journal of Safety Research*. 2023; 84:33-40.**

<https://doi.org/10.1016/j.jsr.2022.10.006>

Abstract: INTRODUCTION: In an era of workplace safety where psychosocial risks are widely recognized as occupational hazards, emerging research has sought to clarify the impact of these risks and the requisite interventions for improving psychosocial safety climate and reducing psychological injury risk. METHOD: The construct of psychosocial safety behavior (PSB) provides a novel framework for emerging research that seeks to apply a behavior-based safety approach to workplace psychosocial risks across several high-risk industries. This scoping review aims to provide a synthesis of existing literature on PSB, including its development as a construct and application in workplace safety interventions to date. RESULTS: Although a limited number of studies of PSB were identified, the findings of this review provide evidence for growing cross-sector applications of behaviorally-focused approaches to improving workplace psychosocial safety. In addition, the identification of a broad spectrum of terminology surrounding the construct of PSB provides evidence of key theoretical and empirical gaps, with implications for future intervention-based research to address emerging areas of focus

Xie W, Ng SM, Wang M, Li HY, Emery C, Lo HHM, et al. What could highly engaged workers gain from mental health promotion programs? An exploratory analysis of secondary outcomes of brief daily workplace well-being programs. *Journal of Occupational & Environmental Medicine*. 2023; 65(3):e119-e127.

<https://doi.org/10.1097/JOM.0000000000002768>

Abstract: OBJECTIVE: The current study aims to examine the effects of mental health programs on well-being among highly engaged workers. METHODS: Participants were randomly allocated to body-mind-spiritual or peer support program. Of the whole sample, we examined participants' work engagement and positive affect from the highest quarter and the lowest quarter of work engagement at baseline. Measures were taken at baseline and 1-month intervals during 3-month programs and 3-month follow-up. RESULTS: The programs had decreasing effects on work engagement in the HWE subgroup. There is an increasing trend of positive affect on the HWE group only in the body-mind-spiritual program. The trajectories of work engagement in the HWE group moved toward a moderate level. CONCLUSION: Our results suggest that the work engagement's decrease in the HWE group could be a sign of recovery and relaxation

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