### research alert

September 23, 2022

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

\*Gignac MAM, Bowring J, Shahidi FV, Kristman V, Cameron JI, and Jetha A. Workplace disclosure decisions of older workers wanting to remain employed: a qualitative study of factors considered when contemplating revealing or concealing support needs. Work, Aging and Retirement. 2022; [epub ahead of print].

### https://doi.org/10.1093/workar/waac029 [open access]

Abstract: Many older workers want to work longer. However, we understand little about the different workplace support needs they may have and whether workers choose to share their needs with others. The objective of this research was to qualitatively examine workplace disclosure-support decisions among workers aged 50 years and older. Sixty-eight participants from diverse employment sectors and with a range of personal experiences and circumstances (e.g., health conditions, caregiving responsibilities, job experiences) participated in 1 of 10 focus groups within the greater Toronto area. Recruitment drew on an existing cohort of Canadians from a survey research firm. Participants were asked about their work experiences, age-related changes, and disclosure decisions and experiences. Focus group discussions were audio-taped and transcribed. Qualitative content analysis was used analyze the data and identify emerging themes. There was variability in disclosure decisions with many participants being reluctant to share their needs at work. Four inter-related themes guided participants' communication decisions: the need to communicate information; the desire to maintain one's reputation; trust in others and perceived support; and perceived job insecurity. In discussing job insecurity, participants noted challenges in finding a new job, perceptions held by others of the cost-benefits of employing older



workers, and labor market insecurity. The findings highlight challenges experienced by older adults in remaining employed and barriers to communicating their needs. Results underscore the importance of greater attention to ageism within organizations, the need for ageinclusive policies, and workplace flexibility to promote job sustainability across the life course.

## Algranti E, Santana VS, Campos F, Salvi L, Saito CA, Cavalcante F, et al. Analysis of mortality from asbestos-related diseases in Brazil using multiple health information systems, 1996-2017. Safety and Health at Work. 2022; 13(3):302-307.

### https://doi.org/10.1016/j.shaw.2022.04.006 [open access]

Abstract: Background In Brazil, asbestos was intensively used from the 1960s until its ban in 2017. Mesothelioma, asbestosis, and pleural plaques are typical asbestos-related diseases (ARD-T). To create an ARD-T national database, death records from 1996–2017 were retrieved from several health information systems (HIS). Methods All national HIS containing coded diagnoses (ICD-10) and death information were obtained. Linkage was performed to create a single database of ARD-T death records, either as underlying or contributory causes, in adults aged 30 years and older. Results A total of 3,057 ARD-T death records were found, 2,405 (76.4%) of which being malignant mesotheliomas (MM). Pleural MM (n = 1,006; 41.8%) and unspecified MM (n = 792; 32.9%) prevailed. Male to female MM ratio (M:F) was 1.4:1, and higher ratios were found for non-malignant ARD-T: 3.5:1 for asbestosis and 2.4:1 for pleural plaques. Male crude annual mesothelioma mortality (CMmm x1,000,000) was 0.98 in 1996 and 2.26 in 2017, a 131.1% increment, while for females it was 1.04 and 1.25, a 20.2% increase, correspondingly. The small number of deaths with asbestosis and pleural plaques records precluded conclusive interpretations. Conclusions Even with the linkage of several HIS, ARD-T in death records remained in low numbers. MM mortality in men was higher and showed a rapid increase and, along with non-malignant ARD-T, higher M:F ratios suggested a predominant pattern of work-related exposure. The monitoring of workplace and environmental asbestos exposure needs to be improved, as well as the workers surveillance, following the recent Brazilian ban.

### Brochu P and Crechet J. Survey non-response in COVID-19 times: the case of the labour force survey. Canadian Public Policy. 2022; 48(3):451-472.

### https://doi.org/10.3138/cpp.2021-069 [open access]

Abstract: During the COVID-19 pandemic, labour-force survey non-response rates have surged in many countries. We show that in the case of the Canadian Labour Force Survey (LFS), the bulk of this increase is due to the suspension of in-person interviews following the adoption of telework within Federal agencies, including Statistics Canada. Individuals with vulnerabilities to the COVID-19 economic shock have been harder to reach and have been gradually less and less represented in the LFS during the pandemic. We present evidence suggesting that the decline in employment and labour-force participation have been underestimated over the March–July 2020 period. We argue that these non-response issues

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| Research Excellence | Safe Work | Healthy Workers are moderate when analyzing aggregate outcomes, but that researchers should exert caution when gauging the robustness of estimates for subgroups. We discuss practical implications for research based on the LFS, such as the consequences for panels and the choice of public-use versus master files of the LFS.

## Claxton G, Hosie P, and Sharma P. Toward an effective occupational health and safety culture: a multiple stakeholder perspective. Journal of Safety Research. 2022; 82(57-67. https://doi.org/10.1016/j.jsr.2022.04.006

Abstract: INTRODUCTION: This paper uses an extensive review of the safety culture literature to identify three key themes (a) role of new employees, (b) absence of a pro-active approach, and (c) need for a 'No-blame' culture, and explores their impact on the occupational health and safety culture (OHS). METHOD: We use a qualitative study with a constructivist phenomenological approach consisting of 55 in-depth interviews with a diverse range of participants, including business owners, line managers and supervisors, OHS advisors, workers, and union representatives in Western Australia. A workplace vignette was used to elicit cultural norms derived from the participants' attitudes and beliefs, which were analyzed using NVivo software to conduct a thematic analysis to classify the interview text into specific concepts and phrases. RESULTS: Findings confirm the three themes identified from our literature review and provide useful insights into the challenges faced by the participants in the implementation of safety policies. PRACTICAL APPLICATIONS: Besides extending the occupational health and safety literature, these findings have important managerial implications in view of the evolving nature of work and workplaces

# Dalboge A, Frost P, Andersen JH, and Svendsen SW. Associations between single and combined occupational mechanical exposures and surgery for subacromial impingement syndrome: a nationwide Danish cohort study. Scandinavian Journal of Work, Environment & Health. 2022; 48(6):490-497.

### https://doi.org/10.5271/sjweh.4032 [open access]

Abstract: Objective: This study aimed to evaluate whether the risk of surgery for subacromial impingement syndrome (SIS) increases with the number of combined occupational mechanical exposures compared with single exposure. Methods: We reanalyzed data from a register-based cohort study of the entire Danish working population (N=2 374 403) with 14 118 events of surgery for SIS (2003-2008). Exposure information in 10-year windows was obtained by combining occupational codes with a job exposure matrix. For single and combined mechanical exposures, we created three exposure variables of the number of years with specific exposure intensities with or without co-existing mechanical exposures. We used logistic regression as survival analysis. Results: We found exposure-response relations for duration and intensity of each single mechanical exposure except for repetition. The single effect of arm elevation >90° reached a maximum adjusted odds ratio (ORadj) of 1.7 [95% confidence interval (CI) 1.5-2.0], which increased to 1.8 (95% CI 1.5-2.0), 2.0 (95% CI 1.9-2.2), and 2.2 (95% CI 2.0-2.5) when combined with repetition, force, and both. When combining

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repetition with arm elevation >90°, force, and both, ORadj increased from 1.5 (95% Cl 1.3-1.8) to 2.1 (95% Cl 1.8-2.4), 2.5 (95% Cl 2.4-2.9), and 2.7 (95% Cl 2.4-3.0). For force, ORadj increased from 2.5 (95% Cl 2.1-2.9) to 2.6 (95% Cl 2.3-2.8), 2.8 (95% Cl 2.4-3.2), and 3.0 (95% Cl 2.6-3.4). Conclusion: We found an increased risk of surgery for SIS with the number of combined exposures; the risk was especially pronounced when the combined exposures included force.

### Halicka M, Duarte R, Catherall S, Maden M, Coetsee M, Wilby M, et al. Systematic review and meta-analysis of predictors of return to work after spinal surgery for chronic low back and leg pain. Journal of Pain. 2022; 23(8):1318-1342.

### https://doi.org/10.1016/j.jpain.2022.02.003 [open access]

Abstract: Spinal surgeries to treat chronic low back pain (CLBP) have variable success rates, and despite the significant personal and socioeconomic implications, we lack consensus for prognostic factors. This systematic review and meta-analysis evaluated the evidence for preoperative predictors of return to work (RTW) after spinal surgery for CLBP. We searched electronic databases and references (January 1984 to March 2021), screened 2,622 unique citations, and included 8 reports (5 low and 3 high risk-of-bias) which involved adults with >=3 months duration of CLBP with/without leg pain undergoing first elective lumbar surgery with RTW assessed >=3 months later. Narrative synthesis and meta-analysis where possible found that individuals less likely to RTW were older (odds ratio [OR] = .58; 95% confidence interval [CI]: 0.46-0.72), not working before surgery, had longer sick leave (OR = .95; 95% CI: 0.93-0.97), higher physical workload, legal representation (OR = .61; 95% CI: 0.53-0.71), psychiatric comorbidities and depression (moderate quality-of-evidence, QoE), and longer CLBP duration and opioid use (low QoE), independent of potential confounders. Low quality and small number of studies limit our confidence in other associations. In conclusion, RTW after spinal surgery for CLBP likely depends on sociodemographic and affective psychological factors, and potentially also on symptom duration and opioid use. PERSPECTIVE: This systematic review and meta-analysis synthesizes and evaluates existing evidence for preoperative predictors of return to work after spinal surgery for chronic low back pain. Demonstrated associations between return to work and sociodemographic, health-related, and psychological factors can inform clinical decision-making and guide further research.

### Hulls PM, de Vocht F, Martin RM, and Langford RM. "We are our own worst enemy": a qualitative exploration of work-related stress in the construction industry. International Journal of Workplace Health Management. 2022; 15(5):609-622. <u>https://doi.org/10.1108/IJWHM-11-2021-0213</u> [open access]

Abstract: Purpose Around 400,000 working days per year are lost in the construction industry due to stress, depression or anxiety, but a large proportion of the industry – those primarily not based "on-site" – is not included in these statistics. Little research has been conducted in this group about their experiences of occupational stress. The authors explored how stress was experienced and managed by construction professionals and its perceived impact on



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health. Design/methodology/approach The authors interviewed 32 construction professionals in a British construction company, with varying levels of seniority and years in the industry. Interviews were transcribed, coded and analysed thematically. Findings Stress was viewed an inevitable and increasing part of the construction industry, exacerbated by recent economic challenges. Participants talked about a culture of stress and overwork but often felt unable to challenge it due to job insecurity. Senior management acknowledged stress was a problem within the industry and something that potentially threatened company productivity. Company-wide initiatives had been implemented to address stress levels (e.g. Mental Health First Aiders), but were criticised for ignoring underlying issues. Informal means of managing stress were identified, such as careful consideration of team dynamics, which allowed employees to form close bonds and using "banter" and camaraderie to relieve stress. However, the persistence of a macho male image meant some participants were reluctant to talk about their feelings at work. Participants described individual coping strategies, such as exercise, but these were hard to prioritise in challenging times. Originality/value There is growing recognition that health and well-being must be given greater priority in the construction industry. Industry pressures and competitive practices undermine efforts to improve staff well-being. Action must be taken at senior levels to address this conflict, while building on existing informal mechanisms of support and stress relief.

## Jackson JA, Liv P, Sayed-Noor AS, Punnett L, and Wahlstrom J. Risk factors for surgically treated cervical spondylosis in male construction workers: a 20-year prospective study. Spine Journal. 2022; [epub ahead of print].

### https://doi.org/10.1016/j.spinee.2022.08.009 [open access]

Abstract: BACKGROUND CONTEXT: Degenerative changes due to cervical spondylosis (CS) can detrimentally affect work ability and quality of life yet understanding of how physical exposure affects disease progression is limited. PURPOSE: To assess the associations between occupational physical exposures and occurrence of surgically treated cervical spondylosis (ST-CS) and early exit from the labour market via disability pension. STUDY DESIGN/SETTING: Prospective register study with 20 year follow-up period. PATIENT SAMPLE: Swedish construction workers participating in a national health surveillance project conducted between 1971-1993. OUTCOME MEASURES: Surgically treated cervical spondylosis (ST-CS) and early labour market exit at a minimum rate of 25% time on disability pension. METHODS: Associations between occupational physical exposures (job exposure matrix) and subsequent ST-CS (National Hospital in-patient register) and early labour market exit via disability pension (Swedish Social Insurance Agency register) were assessed in a cohort of male construction workers (n=237,699). RESULTS: A total of 1381 ST-CS cases were present and a 20-year incidence rate of 35.1 cases per 100,000 person years (95% confidence interval (CI) 33.2-36.9). Increased relative risk (RR) for ST-CS was found for workers exposed to non-neutral (RR 1.40, 95% CI 1.15-1.69) and awkward neck postures (1.52, 1.19-1.95), working with the hands above shoulder height (1.30, 1.06-1.60), and high upper extremity loading (1.35, 1.15-1.59). Increased risk was also present for workers who reported frequent neck (3.06, 2.18-4.30) and

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upper back (3.84, 2.57-5.73) pain in the 12 months prior to survey. Among workers with elevated arm exposure, higher risk was seen in those who also had more frequent neck pain. ST-CS cases took early retirement more often (41.3%) and at a younger age (53 years) than the total study cohort (14.8% and 56 years of age, respectively). CONCLUSIONS: Occupational exposure to non-neutral neck postures, work with hands above shoulders and high loads born through the upper extremities increased the risk for ST-CS and early retirement due to disability. Decreasing postural and load exposure is salient for primary, secondary, and tertiary prevention of CS. Neck pain was shown to be a prognostic factor for ST-CS, which stresses the importance of acting early and taking preventative action to reduce workplace exposure, and the need for systematic medical check-ups within primary or occupational care to mitigate disease progression and early labour market exit due to disability

## Laaksonen M, Ilmakunnas I, and Tuominen S. The impact of vocational rehabilitation on employment outcomes: a regression discontinuity approach. Scandinavian Journal of Work, Environment & Health. 2022; 48(6):498-506.

### https://doi.org/10.5271/sjweh.4038 [open access]

Abstract: Objectives: Since 2015, Finnish disability pension applicants who are rejected or receive a short-term temporary pension have, under certain conditions, also received a preliminary decision for vocational rehabilitation (VR). A key requirement for eligibility is a certain amount of earnings during the previous five years (€34 910.29 in 2017). We exploit this discontinuity to examine the impact of assignment to VR on labor market outcomes. Methods: All new disability pension applicants from 2015 to 2017 were included. Fuzzy regression discontinuity design was used to evaluate the impact of assignment to VR on employment, unemployment and earned income two years later among those close to the threshold (+/- €20 000) providing eligibility for the preliminary decision. Arguably, those just below and just above the earnings limit are similar to each other, allowing causal interpretation of the estimates. Results: For each of the employment outcomes, we found a modest effect in the expected direction at the income threshold, but there is considerable uncertainty in these findings. On average, exceeding the income limit increased the probability of employment by 7.6 percentage points, but the estimate was far from statistical significance. Unemployment became slightly less common and earned income slightly increased, but the estimates were also clearly statistically non-significant. Conclusions: We found no consistent evidence of the impact of assignment to VR on employment outcomes among low-income disability pension applicants. However, given the narrow and specific study population, this should not be taken as evidence of ineffectiveness of VR more generally.

Liu B, Guo Y, and Fu Y. The impact of occupational stigma on gig workers' workplace wellbeing: a cross-sectional study based on the platform-based food-delivery sector in China. Journal of Occupational and Environmental Medicine. 2022; 64(9):e527-e534. <u>https://doi.org/10.1097/JOM.00000000002604</u>

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Research Excellence Safe Work Healthy Workers Abstract: OBJECTIVE: In this article, the influence of occupational stigma on workplace wellbeing of platform-based food-delivery workers is examined. The mediation effect of workcontingent self-esteem and the moderating effect of job control are also assessed. METHODS: Questionnaire data from 362 platform-based food-delivery workers were gathered at three time points, and multiple regression analyses were used to test each hypothesis. RESULTS: Occupational stigma reduces workplace well-being of platform-based food-delivery workers, and this relationship is mediated by work-contingent self-esteem. Job control exerts a negative moderating effect on the relationship between occupational stigma and platform-based food-delivery workers' work-contingent self-esteem. CONCLUSIONS: Strategies for reducing occupational stigma should be prioritized to increase workplace wellbeing in gig workers. Giving them more control over their work will likely alleviate the detrimental effect of occupational stigma on work-contingent self-esteem

## Ose SO, Færevik H, Hapnes T, and Oyum L. Perceived causes of work-related sick leave among hospital nurses in Norway: a prepandemic study. Safety and Health at Work. 2022; 13(3):350-356.

### https://doi.org/10.1016/j.shaw.2022.04.002 [open access]

Abstract: Background Although sick leave is a complex phenomenon, it is believed that there is potential for prevention at the workplace. However, little is known about this potential and what specific measures should be implemented. The purpose of the study was to identify perceived reasons to take work-related sick leave and to suggest preventive measures. The study was completed before the COVID-19 pandemic emerged, and the risk factors identified may have been amplified during the pandemic. Methods An in-depth cross-sectional survey was conducted across a randomly selected sample of hospital nurses in Norway. The national sample comprised 1,297 nurses who participated in a survey about their sick leave during the previous 6 months. An open-ended question about perceived reasons for work-related sick leave was included to gather qualitative information. Results Among hospital nurses, 27% of the last occurring sick leave incidents were perceived to be work-related. The most common reasons were high physical workload, high work pace, sleep problems, catching a viral or bacterial infection from patients or colleagues, and low staffing. Conclusions Over a quarter of the last occurring sick leave incidents among Norwegian hospital nurses are potentially preventable. To retain and optimize scarce hospital nursing resources, strategies to reduce work-related sick leave may provide human and financial benefits. Preventive measures may include careful monitoring of nurses' workload and pace, optimizing work schedules to reduce the risk of sleep problems, and increasing staffing to prevent stress and work overload.

Qi G, Yuan P, Qi M, Hu X, Shi S, and Shi X. Influencing factors of high PTSD among medical staff during COVID-19: evidences from both meta-analysis and subgroup analysis. Safety and Health at Work. 2022; 13(3):269-278. https://doi.org/10.1016/j.shaw.2022.06.003 [open access]

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Abstract: Background PTSD (Post-traumatic stress disorder, PTSD) had a great impact on health care workers during the COVID-19 (Corona Virus Disease 2019, COVID-19). Better knowledge of the prevalence of PTSD and its risk factors is a major public health problem. This study was conducted to assess the prevalence and important risk factors of PTSD among medical staff during the COVID-19. Methods The databases were searched for studies published during the COVID-19, and a PRISMA (preferred reporting items for systematic review and meta-analysis) compliant systematic review (PROSPERO-CRD 42021278970) was carried out to identify articles from multiple databases reporting the prevalence of PTSD outcomes among medical staff. Proportion random effect analysis, I2 statistic, quality assessment, subgroup analysis, and sensitivity analysis were carried out. Results A total of 28 cross-sectional studies and the PTSD results of doctors and nurses were summarized from 14 and 27 studies: the prevalences were 31% (95% CI [confidence interval, CI]: 21%–40%) and 38% (95% CI: 30%–45%) in doctors and nurses, respectively. The results also showed seven risks (p < 0.05): long working hours, isolation wards, COVID-19 symptoms, nurses, women, fear of infection, and pre-existing mental illness. Two factors were of borderline significance: higher professional titles and married. Conclusion Health care workers have a higher prevalence of PTSD during COVID-19. Health departments should provide targeted preventive measures for medical staff away from PTSD.

### Rehfuess EA, Burns JB, Pfadenhauer LM, Krishnaratne S, Littlecott H, Meerpohl JJ, et al. Lessons learnt: undertaking rapid reviews on public health and social measures during a global pandemic. Research Synthesis Methods. 2022; 13(5):558-572. https://doi.org/10.1002/jrsm.1580 [open access]

Abstract: Public health and social measures (PHSM) have been central to the COVID-19 response. Consequently, there has been much pressure on decision-makers to make evidence-informed decisions and on researchers to synthesize the evidence regarding these measures. This article describes our experiences, responses and lessons learnt regarding key challenges when planning and conducting rapid reviews of PHSM during the COVID-19 pandemic. Stakeholder consultations and scoping reviews to obtain an overview of the evidence inform the scope of reviews that are policy-relevant and feasible. Multiple complementary reviews serve to examine the benefits and harms of PHSM across different populations and contexts. Conceiving reviews of effectiveness as adaptable living reviews helps to respond to evolving evidence needs and an expanding evidence base. An appropriately skilled review team and good planning, coordination and communication ensures smooth and rigorous processes and efficient use of resources. Scientific rigor, the practical implications of PHSM-related complexity and likely time savings should be carefully weighed in deciding on methodological shortcuts. Making the best possible use of modeling studies represents a particular challenge, and methods should be carefully chosen, piloted and implemented. Our experience raises questions regarding the nature of rapid reviews and regarding how different types of evidence should be considered in making decisions about PHSM during a global pandemic. We highlight the need for readily available protocols for

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k Research Excellence Safe Work Healthy Workers conducting studies on the effectiveness, unintended consequences and implementation of PHSM in a timely manner, as well as the need for rapid review standards tailored to "rapid" versus "emergency" mode reviewing

### Reuter M, Rigo M, Formazin M, Liebers F, Latza U, Castell S, et al. Occupation and SARS-CoV-2 infection risk among 108 960 workers during the first pandemic wave in Germany. Scandinavian Journal of Work, Environment & Health. 2022; 48(6):446-456. https://doi.org/10.5271/sjweh.4037 [open access]

Abstract: OBJECTIVE: The aim of this study was to identify the occupational risk for a SARS-CoV-2 infection in a nationwide sample of German workers during the first wave of the COVID-19 pandemic (1 February-31 August 2020). METHODS: We used the data of 108 960 workers who participated in a COVID follow-up survey of the German National Cohort (NAKO). Occupational characteristics were derived from the German Classification of Occupations 2010 (Klassifikation der Berufe 2010). PCR-confirmed SARS-CoV-2 infections were assessed from self-reports. Incidence rates (IR) and incidence rate ratios (IRR) were estimated using robust Poisson regression, adjusted for person-time at risk, age, sex, migration background, study center, working hours, and employment relationship. RESULTS: The IR was 3.7 infections per 1000 workers [95% confidence interval (CI) 3.3-4.1]. IR differed by occupational sector, with the highest rates observed in personal (IR 4.8, 95% CI 4.0-5.6) and business administration (IR 3.4, 95% CI 2.8-3.9) services and the lowest rates in occupations related to the production of goods (IR 2.0, 95% CI 1.5-2.6). Infections were more frequent among essential workers compared with workers in non-essential occupations (IRR 1.95, 95% CI 1.59-2.40) and among highly skilled compared with skilled professions (IRR 1.36, 95% CI 1.07-1.72). CONCLUSIONS: The results emphasize higher infection risks in essential occupations and personal-related services, especially in the healthcare sector. Additionally, we found evidence that infections were more common in higher occupational status positions at the beginning of the pandemic

## Thacher JD, Roswall N, Lissaker C, Aasvang GM, Albin M, Andersson EM, et al. Occupational noise exposure and risk of incident stroke: a pooled study of five Scandinavian cohorts. Occupational & Environmental Medicine. 2022; 79(9):594-601.

### https://doi.org/10.1136/oemed-2021-108053 [open access]

Abstract: Objectives: To investigate the association between occupational noise exposure and stroke incidence in a pooled study of five Scandinavian cohorts (NordSOUND). Methods: We pooled and harmonised data from five Scandinavian cohorts resulting in 78 389 participants. We obtained job data from national registries or questionnaires and recoded these to match a job-exposure matrix developed in Sweden, which specified the annual average daily noise exposure in five exposure classes (LAeq8h): <70, 70-74, 75-79, 80-84, =85 dB(A). We identified residential address history and estimated 1-year average road traffic noise at baseline. Using national patient and mortality registers, we identified 7777 stroke cases with a median follow-up of 20.2 years. Analyses were conducted using Cox proportional hazards

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| Research Excellence | Safe Work | Healthy Workers models adjusting for individual and area-level potential confounders. Results: Exposure to occupational noise at baseline was not associated with overall stroke in the fully adjusted models. For ischaemic stroke, occupational noise was associated with HRs (95% CI) of 1.08 (0.98 to 1.20), 1.09 (0.97 to 1.24) and 1.06 (0.92 to 1.21) in the 75-79, 80-84 and =85 dB(A) exposure groups, compared with <70 dB(A), respectively. In subanalyses using time-varying occupational noise exposure, we observed an indication of higher stroke risk among the most exposed (=85 dB(A)), particularly when restricting analyses to people exposed to occupational noise within the last year (HR: 1.27; 95% CI: 0.99 to 1.63). Conclusions: We found no association between occupational noise and risk of overall stroke after adjustment for confounders. However, the non-significantly increased risk of ischaemic stroke warrants further investigation.

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