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

***Makuto N, Kristman V, Bigelow P, and Bedard M. Factors associated with depressive symptoms in long-haul truck drivers. *Transportation Research Interdisciplinary Perspectives*. 2023; 21:100851.**

<https://doi.org/10.1016/j.trip.2023.100851> [open access]

Abstract: Long-haul truckers have a much higher prevalence of depression compared to the general public. However, little is known on the factors which explain their high prevalence of depression. We distributed an online, cross-sectional survey to Canadian and U.S. long-haul truck drivers to determine which factors could be associated with depression. Multiple linear regression across our sample (N = 303) revealed that good health was negatively associated with depressive symptoms (standardized β = -0.22, 95% CI: -0.30, -0.13 respectively). High stress due to being away from social relationships and tight delivery deadlines both had positive associations with depressive symptoms (standardized β = 0.38, 95% CI: 0.29, 0.46 and standardized β = 0.19, 95% CI: 0.10, 0.28 respectively). High job stress, in general, was positively associated with depressive symptoms across all truckers. It may be helpful for truckers in poor health and with high stress at work to use available mental health services. In addition, peer support groups may help truckers to prevent loneliness at work; further research evaluating these resources is necessary.

Aoshima M, Shi X, Iida T, Hiruta S, Ono Y, and Ota A. Persistence of low back pain and predictive ability of pain intensity and disability in daily life among nursery school workers in Japan: a five-year panel study. *Healthcare*. 2024; 12(2):128.

<https://doi.org/10.3390/healthcare12020128> [open access]

Abstract: Nursery school workers are known for having a high prevalence of low back pain (LBP). The natural history of LBP and the determinants of persistent LBP remain unclear. We examined the prevalence of persistent LBP and whether pain intensity and disability in daily life due to LBP affected the persistence of LBP among these workers. A five-year panel study was conducted for 446 nursery school workers in Japan. LBP, pain intensity, and disability in daily life due to LBP were assessed with a self-administered questionnaire survey. Pain intensity was assessed using the numerical rating scale (NRS). The Roland-Morris Disability Questionnaire (RDQ) was used to assess disability in daily life due to LBP. At baseline, 270 nursery school workers (60.5%) suffered from LBP. The estimated prevalence of persistent LBP was 84.6% (80.3-88.9%), 82.2% (77.7-86.8%), and 82.0% (77.4-86.5%) at 1, 3, and 5 years after the initial study, respectively. NRS scores of 5 or greater predicted the persistence of LBP at 1 and 3 years after the initial survey (adjusted odds ratios: 4.01 (1.27-12.6) and 8.51 (1.87-38.7), respectively), while RDQ scores did not. In conclusion, LBP highly persisted for a long time and pain intensity predicted persistent LBP among nursery school workers in Japan

Brehon K, Nagra G, Miciak M, Niemelainen R, and Gross DP. Evaluating effectiveness of telerehabilitation services among injured workers treated in a Canadian workers' compensation system: a population-based study. *Journal of Occupational Rehabilitation*. 2024; [epub ahead of print].

<https://doi.org/10.1007/s10926-023-10165-9>

Abstract: **PURPOSE:** To evaluate the effectiveness of telerehabilitation for promoting return-to-work (RTW) among injured workers. **METHODS:** We conducted a pragmatic, quasi-experimental study comparing telerehabilitation, in-person, or hybrid services. Descriptive statistics analyzed demographics, occupational factors, and patient-reported outcome measures (PROMs). Kruskal-Wallis tests investigated differences between mode of delivery and changes in PROM scores. Logistic and Cox-proportional hazard regression examined associations between mode of delivery and RTW status or days receiving wage replacement benefits in the first-year post-discharge, respectively, while controlling for potential confounders. **RESULTS:** A slightly higher percentage of the 3,708 worker sample were male (52.8%). Mean (standard deviation (SD)) age across all delivery formats was 45.5 (12.5) years. Edmonton zone had the highest amount of telerehabilitation delivery (53.5%). The majority of workers had their program delivered in a hybrid format (54.1%) and returned to work (74.4%) at discharge. All PROMs showed improvement although differences across delivery formats were not clinically meaningful. Delivery via telerehabilitation had significantly lower odds of RTW at discharge (Odds Ratio: 0.82, 95% Confidence Interval: 0.70-0.97) and a significantly lower risk of experiencing suspension of wage replacement benefits in the first year following discharge (Hazard Ratio: 0.92, 95% Confidence Interval: 0.84-0.99).

Associations were no longer significant when confounders were controlled for. **CONCLUSION:** RTW outcomes were not statistically different across delivery formats, suggesting that telerehabilitation is a novel strategy that may improve equitable access and earlier engagement in occupational rehabilitation. Factors such as gender and geographic location should be considered when deciding on service delivery format

Domenech-Garcia V, Skovlund SV, Bellosta-Lopez P, Calatayud J, Lopez-Bueno R, and Andersen LL. Does the distribution of musculoskeletal pain shape the fate of long-term sick leave? A prospective cohort study with register follow-up. Pain. 2024; [epub ahead of print].

<https://doi.org/10.1097/j.pain.0000000000003176> [open access]

Abstract: Although multisite pain can markedly reduce work ability, the relevance of the bodily pain distribution as a predictor of long-term sick leave is still unknown. This study aimed to investigate the association between musculoskeletal pain distributions and long-term sick leave in the general working population of Denmark and included 66,177 currently employed wage earners without long-term sick leave during the prior 52 weeks. Participants reported whether they had pain in the lower extremity (hips/knees), upper extremity (neck/shoulders), or the low back. The analysis controlled for age, sex, year of survey reply, educational level, occupational group, psychosocial work factors, body mass index, smoking, leisure-time physical activity, and mental health confounders. The results demonstrated that the risk of long-term sick leave increased with the number of pain sites. Compared with no pain, localized pain in any body region increased the risk/hazard by 25% to 29% (HR [95% CI]: 1.29 [1.07-1.54] for pain only in the low back), whereas pain in 2 regions increased the risk by 39% to 44% (HR [95% CI]: 1.41 [1.18-1.69] for pain in the low back + hips/knees). Workers reporting pain in all 3 regions experienced a 72% increased risk (HR [95% CI]: 1.72 [1.55-1.91]). Thus, the number of pain regions seems to matter more than the exact pain location. The spatial extension of musculoskeletal pain in workers functions as a gradient system, where pain spread throughout the body is an independent indicator of the high risk of long-term sick leave

Galliker S, Igc I, Semmer NK, and Elfering A. Stress at work and well-being before and during the COVID-19 pandemic: a 1-year longitudinal study in Switzerland. Journal of Occupational & Environmental Medicine. 2024; 66(1):56-70.

<https://doi.org/10.1097/JOM.0000000000002995>

Abstract: **OBJECTIVE:** The aim of the study is to analyze the development of conditions at work and health-related variables (notably exhaustion) in Switzerland longitudinally before and during the COVID-19 pandemic. **METHODS:** Questionnaire data were collected from a population-based sample of 1,553 employees in February 2020 and 1 year later. Health and well-being associated with (a) working conditions in general and (b) COVID-19-specific predictors such as worries about being infected and conditions for working at home were analyzed using analysis of (co)variance and multiple regression. **RESULTS:** Conditions at work

and well-being were stable overall, even indicating slight improvements, notably for men compared with women. Both an index representing stressors and resources at work in general (Job Stress Index) and a COVID-19-related demand index showed consistent effects on health and the effect of COVID-19-related demands was stronger if the Job Stress Index deteriorated than when it improved

Gerlich J, Ohlander J, Kromhout H, Vermeulen R, Sohler S, Radon K, et al. Cumulative occupational exposure to gases and fumes is associated with impairment in lung function and disease-related quality of life in a German COPD patient cohort. Occupational & Environmental Medicine. 2024; 81(1):26-33.

<https://doi.org/10.1136/oemed-2023-108908> [open access]

Abstract: OBJECTIVES: The impact of occupational exposures on lung function impairments and quality of life (QoL) in patients with chronic obstructive pulmonary disease (COPD) was analysed and compared with that of smoking. METHODS: Data from 1283 men and 759 women (Global Initiative for Chronic Obstructive Lung Disease (GOLD) grades 1-4 or former grade 0, without alpha-1-antitrypsin deficiency) of the COPD and Systemic Consequences Comorbidities Network cohort were analysed. Cumulative exposure to gases/fumes, biological dust, mineral dust or the combination vapours/gases/dusts/fumes was assessed using the ALOHA job exposure matrix. The effect of both occupational and smoking exposure on lung function and disease-specific QoL (St George's Respiratory Questionnaire) was analysed using linear regression analysis adjusting for age, body mass index, diabetes, hypertension and coronary artery disease, stratified by sex. RESULTS: In men, exposure to gases/fumes showed the strongest effects among occupational exposures, being significantly associated with all lung function parameters and QoL; the effects were partially stronger than of smoking. Smoking had a larger effect than occupational exposure on lung diffusing capacity (transfer factor for carbon monoxide) but not on air trapping (residual volume/total lung capacity). In women, occupational exposures were not significantly associated with QoL or lung function, while the relationships between lung function parameters and smoking were comparable to men. CONCLUSIONS: In patients with COPD, cumulative occupational exposure, particularly to gases/fumes, showed effects on airway obstruction, air trapping, gas uptake capacity and disease-related QoL, some of which were larger than those of smoking. These findings suggest that lung air trapping and QoL should be considered as outcomes of occupational exposure to gases and fumes in patients with COPD. TRIAL REGISTRATION NUMBER: NCT01245933

Gigot C, Lowman A, Ceryes CA, Hall DJ, and Heaney CD. Industrial hog operation workers' perspectives on occupational exposure to zoonotic pathogens: a qualitative pilot study in North Carolina, USA. New Solutions. 2024; 33(4):209-219.

<https://doi.org/10.1177/10482911231217055>

Abstract: Industrial hog operation (IHO) workers face a range of occupational hazards, including exposure to zoonotic pathogens such as livestock-associated antimicrobial-resistant

Staphylococcus aureus and swine-origin influenza viruses with epidemic or pandemic potential. To better understand this population's occupational exposure to zoonotic pathogens, we conducted a community-driven qualitative research study in eastern North Carolina. We completed in-depth interviews with ten IHO workers and used thematic analysis to identify and analyze patterns of responses. Workers described direct and indirect occupational contact with hogs, with accompanying potential for dermal, ingestion, and inhalation exposures to zoonotic pathogens. Workers also described potential take-home pathways, wherein they could transfer livestock-associated pathogens and other contaminants from IHOs to their families and communities. Findings warrant future research, and suggest that more restrictive policies on antimicrobials, stronger health and safety regulations, and better policies and practices across all IHOs could afford greater protection against worker and take-home zoonotic pathogen exposures

Johnson CY, Grajewski B, Lawson CC, MacDonald LA, Rocheleau CM, and Whelan EA. Occupational physical demands and menstrual cycle irregularities in flight attendants and teachers. *Occupational & Environmental Medicine*. 2024; 81(1):3-8.

<https://doi.org/10.1136/oemed-2023-109099>

Abstract: OBJECTIVES: Flight attendants perform physically demanding work such as lifting baggage, pushing service carts and spending the workday on their feet. We examined if more frequent exposure to occupational physical demands could explain why previous studies have found that flight attendants have a higher reported prevalence of menstrual cycle irregularities than other workers. METHODS: We conducted a cross-sectional analysis of 694 flight attendants and 120 teachers aged 18-44 years from three US cities. Eligible participants were married, had not had a hysterectomy or tubal ligation, were not using hormonal contraception and were not recently pregnant. Participants reported menstrual cycle characteristics (cramps, pain, irregular cycles, flow, bleed length, cycle length) and occupational physical demands (standing, lifting, pushing/pulling, bending/twisting, overall effort). We used modified Poisson regression to examine associations between occupation (flight attendant, teacher) and menstrual irregularities; among flight attendants, we further examined associations between occupational physical demands and menstrual irregularities. RESULTS: All occupational physical demands were more commonly reported by flight attendants than teachers. Flight attendants reported more frequent menstrual cramps than teachers, and most occupational physical demands were associated with more frequent or painful menstrual cramps. Lifting heavy loads was also associated with irregular cycles. CONCLUSIONS: Occupational physical demands were associated with more frequent and worse menstrual pain among flight attendants. The physical demands experienced by these workers may contribute to the high burden of menstrual irregularities reported by flight attendants compared with other occupational groups, such as teachers

Porath J, Schmidt LI, Mockel J, Dold C, Hennerkes L, and Haussmann A. What it takes to reduce sitting at work: a pilot study on the effectiveness and correlates of a multicomponent intervention. *International Archives of Occupational & Environmental Health*. 2024; 97(1):9-21.

<https://doi.org/10.1007/s00420-023-02020-4> [open access]

Abstract: Objective: This study aimed to assess the feasibility and effects of a simple-to-implement multicomponent intervention to reduce sedentary time of office workers. **Methods:** Six groups of eight to ten office workers took part in the two-week Leicht Bewegt intervention. Participants completed questionnaires at baseline (T0, n = 52), after 2 weeks (T1, n = 46), and after 5 weeks (T2, n = 38), including subjective sedentary measures and social-cognitive variables based on the health action process approach (HAPA). Objective sedentary measures were obtained using activPAL trackers. **Results:** The intention to reduce sedentary behavior during work increased significantly from T0 to T1. Participants' objective and subjective sitting time decreased significantly from T0 to T1, corresponding to an average decrease per 8-h-workday of 55 min (d = -.66) or 74 min (d = -1.14), respectively. This reduction persisted (for subjective sitting time) at T2 (d = -1.08). Participants indicated a high satisfaction with the intervention. **Conclusions:** The Leicht Bewegt intervention offers a feasible and effective opportunity to reduce sedentary behavior at work. Randomized controlled trials including longer follow-up time periods are needed to validate its benefits in different workplaces.

Sanchez Rico M, Plessz M, Airagnes G, Wiernik E, Hoertel N, Goldberg M, et al. Lifetime exposure to unemployment and prior working conditions are associated with retiree's health: a retrospective study in a large population-based French cohort. *Social Science & Medicine*. 2024; 341:116550.

<https://doi.org/10.1016/j.socscimed.2023.116550>

Abstract: It is unclear whether unemployment exposure, as well as working conditions, can have sustained effects on the health of retirees who are no longer exposed. The aim of the present study is to investigate this issue in 29,281 French retirees from the CONSTANCES cohort in whom the prevalence of suboptimal self-rated health, disability for routine tasks, cardiovascular diseases and cancers is assessed according to lifetime exposure to unemployment and prior working conditions. The analyses are performed retrospectively using multivariable logistic regression models with adjustment for potential confounders such as sex, birth year, parental histories of cardiovascular disease and cancer, social position, retirement age and duration. High lifetime exposure to unemployment is associated with an increased prevalence of suboptimal self-rated health (adjusted odds ratio (95% CI), 1.39 (1.23-1.57)), disability for routine tasks (1.41 (1.26-1.57)) and several cardiovascular diseases including stroke (1.66 (1.19-2.31)), myocardial infarction (1.65 (1.18-2.31)) and peripheral arterial disease (2.38 (1.46-3.90)). Bad prior working conditions are associated with an increased prevalence of disability for routine tasks (1.17 (1.04-1.33)) and cancers (1.27 (1.04-1.54)), notably prostate cancer (1.60 (1.01-2.64)). These findings suggest that

unemployment and working conditions have long-term health effects that may cumulate over lifetime, emphasizing that risk evaluation and preventive strategies in retirees, as in workers, should take into account the life-course of individuals in addition to traditional risk factors

Scorgie D, Feng Z, Paes D, Parisi F, Yiu TW, and Lovreglio R. Virtual reality for safety training: a systematic literature review and meta-analysis. *Safety Science*. 2024; 171:106372.

<https://doi.org/10.1016/j.ssci.2023.106372> [open access]

Abstract: Unsafe behaviour in the workplace and disaster events can lead to serious harm and damage. Safety training has been a widely studied topic over the past two decades. Its primary aim is to save lives and minimise damage but requires regular refreshers. New digital technologies are helping in the process of enhancing safety training for better knowledge acquisition and retention. Among them, Virtual Reality (VR) can provide an engaging and exciting training experience, and there is a need to evaluate its application and effectiveness in safety training. This study aims to investigate VR safety training solutions applied to various industries (excluding medical and military applications), such as construction, fire, aviation, and mining. This was achieved by systematically reviewing 52 articles published between 2013 and 2021 to answer nine research questions. Fourteen domains were examined, with construction and fire safety training being the most prevalent since 2018. Findings reveal that only a small percentage (9.6%) of the studies explicitly adopted theories while developing and testing VR applications. Additionally, this review highlights a critical need for long-term retention measurements, as only 36% of studies provided such data. Finally, the two meta-analyses proposed in this work demonstrate that VR safety training outperforms traditional training in terms of knowledge acquisition and retention.

Seol JH, Sohn YW, Yoo M, and Park Y. Decent work, posttraumatic stress disorder, and posttraumatic growth from the psychology of working perspective: a three-wave study of military personnel. *Journal of Career Assessment*. 2024; 32(1):26-47.

<https://doi.org/10.1177/1069072723116332>

Weir J, Fary R, Gibson M, Mitchell T, Johnston V, Wyatt M, et al. Wellbeing after finalization of a workers' compensation claim: a systematic scoping review. *Journal of Occupational Rehabilitation*. 2024; [epub ahead of print].

<https://doi.org/10.1007/s10926-023-10168-6>

Abstract: OBJECTIVE: A workers' compensation claim may have significant negative impacts on an injured worker's wellbeing. Wellbeing provides a good global measure of potential effects of a claim on an individual, and is important for contemporary economic modelling. The purpose of this study was to synthesize knowledge about the wellbeing of injured workers after the finalization of a workers' compensation claim and identify gaps in the current literature. METHODS: A systematic scoping review was conducted. RESULTS: 71 full-

text articles were screened for inclusion, with 32 articles eligible for this review. None of the included articles evaluated overall wellbeing. Included articles did evaluate a variety of constructs inherent in wellbeing. Injured workers were generally disadvantaged in some manner following claim finalization. The literature recommends a focus on reducing negative impacts on injured workers after finalization of a compensation claim, with a need for regulatory bodies to review policy in this area. CONCLUSION: There appears to be potential for ongoing burden for individuals, employers, and society after finalization of a workers' compensation claim. A gap in knowledge exists regarding the specific evaluation of wellbeing of injured workers following finalization of a workers' compensation claim

Wibowo R, Do V, Quartucci C, Koller D, Daanen HAM, Nowak D, et al. Effects of heat and personal protective equipment on thermal strain in healthcare workers: part B: application of wearable sensors to observe heat strain among healthcare workers under controlled conditions. *International Archives of Occupational & Environmental Health*. 2024; 97(1):35-43.

<https://doi.org/10.1007/s00420-023-02022-2> [open access]

Abstract: Purpose: As climate change accelerates, healthcare workers (HCW) are expected to be more frequently exposed to heat at work. Heat stress can be exacerbated by physical activity and unfavorable working requirements, such as wearing personal protective equipment (PPE). Thus, understanding its potential negative effects on HCW's health and working performance is becoming crucial. Using wearable sensors, this study investigated the physiological effects of heat stress due to HCW-related activities. Methods: Eighteen participants performed four experimental sessions in a controlled climatic environment following a standardized protocol. The conditions were (a) 22 °C, (b) 22 °C and PPE, (c) 27 °C and (d) 27 °C and PPE. An ear sensor (body temperature, heart rate) and a skin sensor (skin temperature) were used to record the participants' physiological parameters. Results: Heat and PPE had a significant effect on the measured physiological parameters. When wearing PPE, the median participants' body temperature was 0.1 °C higher compared to not wearing PPE. At 27 °C, the median body temperature was 0.5 °C higher than at 22 °C. For median skin temperature, wearing PPE resulted in a 0.4 °C increase and higher temperatures in a 1.0 °C increase. An increase in median heart rate was also observed for PPE (+ 2/min) and heat (+ 3/min). Conclusion: Long-term health and productivity risks can be further aggravated by the predicted temperature rise due to climate change. Further physiological studies with a well-designed intervention are needed to strengthen the evidence for developing comprehensive policies to protect workers in the healthcare sector.

Wu Y, Dai Z, Jing S, Liu X, Zhang L, Liu X, et al. Prevalence and influencing factors of PTSD symptoms among healthcare workers: a multicenter cross-sectional study during the surge period of the COVID-19 pandemic since December 2022 in the Chinese mainland. *Journal of Affective Disorders*. 2024; 348:70-77.

<https://doi.org/10.1016/j.jad.2023.12.008>

Abstract: Background: China has experienced a surge period of COVID-19 pandemic since December 2022. Healthcare workers (HCWs) were exposed to huge workload under high risk of being infected, and significant levels of trauma, which might cause Post-traumatic Stress Disorders (PTSD) symptoms in HCWs. Objectives: To identify the prevalence of PTSD symptoms among HCWs in the Chinese mainland during the surge period of the COVID-19 pandemic; to explore their psycho-social factors of PTSD symptoms. Methods: A multicenter cross-sectional study was conducted among HCWs in Chinese mainland from January 5 to February 9, 2023, covering seven geographical regions. 6552 participants were recruited by convenience sampling. Data were collected on demographic characteristics, work-related factors, and psychological factors by online questionnaires. Univariate analysis and binary logistic regression were used to determine the influencing factors of PTSD symptoms. Results: The prevalence of PTSD symptoms among HCWs was 37.49 %. A higher level of mindfulness, resilience, and perceived social support were protective factors. Female gender, nurses, higher educational attainment, married status, more working years, higher perceived risk of contracting COVID-19 due to work, and higher perceived work intensity were risk factors. Conclusion: High prevalence of PTSD symptoms among HCWs necessitates psychological interventions. Tailored interventions, designed by professional psychiatrists, should be tailored to address the stressors. A comprehensive approach, incorporating mindfulness, resilience-building, and perceived social support enhancement, is vital to bolster the mental well-being of HCWs exposed to traumatic events, thus mitigating the impact of PTSD effectively. Additionally, it is essential to provide support to HCWs with other potential risk factors.

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