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

Baker LD and Smith AJ. Adapting the Primary Care PTSD Screener for firefighters. Occupational Medicine. 2023; 73(3):142-147.

<https://doi.org/10.1093/occmed/kqad019>

Abstract: BACKGROUND: By the nature of their work, first responders are at risk for post-traumatic stress disorder (PTSD). Efficient screening instruments are useful to identify at-risk first responders and connect them to services. AIMS: The current study aimed to (i) evaluate the diagnostic properties of the Primary Care PTSD for DSM-5 (PC-PTSD-5) scale among firefighters, (ii) explore the use of an adapted PC-PTSD-5 on a five-point Likert-type scale and (iii) examine sensitivity and specificity of the adapted instrument in this population. METHODS: Pooled data were analysed among firefighters (N = 92) from a treatment-seeking sample (n = 36) and a population health screening sample (n = 56). Participants completed an adapted version of the PC-PTSD-5 and the Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5). Receiver operating characteristic curve analyses were performed, referencing PCL-5 cut-off/probable diagnostic threshold scores. RESULTS: The PC-PTSD-5 demonstrated excellent operating characteristics overall. A threshold of 3 was optimal for discriminating probable PTSD using a proxy for the original PC-PTSD-5 (range: 0-5), whereas a score of 9 was identified for the PC-PTSD-5 permutation that allowed for more response variability (range: 0-20). CONCLUSIONS: Our preliminary data suggest the PC-PTSD-5 may be a useful tool for brief firefighter screening, with suggested cut-offs that require further replication and expanded investigation

Chaudhari N, Strutton PH, Wickham AJ, McGregor AH, and Mullington CJ. Heat stress associated with aerosol PPE and its impact. *Occupational Medicine*. 2023; 73(3):120-127. <https://doi.org/10.1093/occmed/kgac114>

Abstract: Background: Aerosol personal protective equipment (PPE) is subjectively reported to negatively impact healthcare workers' performance and well-being, but this has not been assessed objectively. Aims: This randomized controlled crossover study aimed to quantify the heat stress associated with aerosol PPE and to investigate its impact upon mood, cognitive and motor function, and task performance. Methods: Sixteen healthy, young, lean participants (eight males) undertook an exercise protocol, which simulated the metabolic expenditure of hospital work: once wearing aerosol PPE (PPE visit) and once wearing standard surgical attire (control visit). Participants walked on a treadmill for 2 h followed by 30-min rest. Core temperature, heart rate, urine specific gravity, weight, grip strength, mood (Bond-Lader scale) and task performance (Intubation of a Manikin) were recorded. Values are between-visit mean (standard deviation) differences. Results: On the PPE visit core temperature (+0.2 (0.3)°C; $P < 0.01$), heart rate (+12 (13) bpm; $P < 0.001$), urine specific gravity (+0.003 (0.005); $P < 0.05$) and intubation task time (+50 (81) s; $P < 0.01$) were greater than on the control visit; and alertness (-14 (21) mm; $P < 0.001$), contentment (-14 (15) mm; $P < 0.001$) and grip strength (-4 (4) N; $P < 0.01$) were less. Conclusions: This study demonstrates that wearing aerosol PPE in a simulated hospital environment results in heat exhaustion and has a negative impact upon mood, motor function, and task performance. Whilst wearing PPE is important to prevent disease transmission, strategies should be developed to limit its impact upon healthcare workers' performance and well-being.

Friedman LS, Shannon B, Go LHT, Shao Y, Almberg KS, and Cohen RA. Poor adherence to dust, noise and safety regulations predict injury rates in underground coal mines. *Occupational and Environmental Medicine*. 2023; 80(5):254-259. <https://doi.org/10.1136/oemed-2022-108650>

Abstract: BACKGROUND: While safety in US coal mining has improved over the past two decades, general occupational health research shows that risk of injury varies across individual worksites and is influenced by worksite safety cultures and practices. METHODS: In this longitudinal study, we evaluated whether mine-level characteristics reflecting poor adherence to health and safety regulations in underground coal mines are associated with higher acute injury rates. We aggregated Mine Safety and Health Administration (MSHA) data by year for each underground coal mine for the period 2000-2019. Data included part-50 injuries, mine characteristics, employment and production, dust sampling, noise sampling, and violations. Multivariable hierarchical generalised estimating equations (GEE) models were developed. RESULTS: Based on the final GEE model, despite an average annual decline in injury rates by 5.5%, the following indicators of inadequate adherence to health and safety regulations were associated with increased average annual injury rates: +2.9% for each 10% increase in dust samples exceeding the permissible exposure limit; +0.6% for each 10% increase of permitted 90 dBA 8-hour noise exposure dose; +2.0% for every 10 substantial-



significant MSHA violations in a year; +1.8% for each rescue/recovery procedure violation; +2.6% for each safeguard violation. If a fatality occurred in a mine, injury rates increased by 11.9% in the same year, but declined by 10.4% in the following year. The presence of safety committees was associated with a 14.5% decline in injury rates. DISCUSSION: In US underground coal mines, injury rates are associated with poor adherence to dust, noise and safety regulations

Frogner BK, Patterson DG, and Skillman SM. The workforce needed to address population health. *Milbank Quarterly*. 2023; 101(S1):841-865.

<https://doi.org/10.1111/1468-0009.12620>

Abstract: Policy Points Although a single definition of the population health workforce does not yet exist, this workforce needs to have the skills and competencies to address the social determinants of health, to understand intersectionality, and to coordinate and work in concert with an array of skilled providers in social and health care to address multiple health drivers. On-the-job training programs and employer support are needed for the current health workforce to gain skills and competencies to address population health. Funding and leadership combined are critical for developing the population health workforce with the goal of supporting a broad set of workers beyond health and social care to include, for example, those in urban planning, law enforcement, or transportation professions to address population health

Heimonen A, Nousiainen K, Lassila H, and Kaukiainen A. Work-related head injury and industry sectors in Finland: causes and circumstances. *International Archives of Occupational & Environmental Health*. 2023; 96(4):577-586.

<https://doi.org/10.1007/s00420-022-01950-9> [open access]

Abstract: OBJECTIVE: Despite the continuous development of occupational safety, the prevalence of work-related head injuries is excessive. To promote prevention, we conducted a study evaluating the risks and pathways that precede head injuries in different economic activity sectors. METHODS: In Finland, more than 90% of employees are covered by inclusive statutory workers' compensation. We obtained data on occupational head injuries in 2010-2017 from an insurance company database. The European Statistics on Accidents at Work (ESAW) variables represented the characteristics of the accidents and the injury. We analysed the risk factors, contributing events and injury mechanisms in 20 industry sectors, based on the Statistical Classification of Economic Activities in the European Community (NACE). RESULTS: In the 32,898 cases, the most commonly affected area was the eyes (49.6%). The highest incidence of head injuries was in construction (15.7 per 1000 insurance years). Construction, manufacturing, and human health and social work activities stood out due to their distinctive ESAW category counts. 'Working with hand-held tools' [risk ratio (RR) 2.23, 95% confidence interval (CI) 2.14-2.32] in construction and 'operating machines' (RR 3.32, 95% CI 3.01-3.66) and 'working with hand-held tools' (1.99, 1.91-2.07) in manufacturing predicted head injury. The risk related to parameters of violence and threats in health and

social work activities was nearly ninefold the risk of other sectors. **CONCLUSION:** The risks and pathways preceding head injuries varied considerably. The highest head injury rates were in construction and manufacturing. Violence emerged as a major risk factor in human health and social work activities

Kleine AK, Rudolph CW, Schmitt A, and Zacher H. Thriving at work: an investigation of the independent and joint effects of vitality and learning on employee health. *European Journal of Work and Organizational Psychology*. 2023; 32(1):95-106.

<https://doi.org/10.1080/1359432X.2022.2102485> [open access]

Abstract: Thriving at work has been defined as employees' joint sense of vitality and learning. Based on the socially embedded model of thriving at work, we examine several competing operationalizations of thriving at work. We hypothesize effects of (a) composite thriving, (b) separate vitality and learning scores, and (c) the interaction between vitality and learning, and we explore effects of (d) the congruence between vitality and learning on self-rated physical and mental health. Data came from $n = 1,064$ employees who participated in a four-wave study with one-month time lags. Results of multilevel linear and polynomial regression analyses showed that composite thriving was positively related to physical health, and composite thriving and vitality were positively related to mental health at the within-person level. We found no support for interaction or congruence effects. The findings provide limited support for the assumed beneficial health effects of thriving on employees' health. Implications for theory development include the need to revise the role of vitality and learning as predictors of physical and mental health in the model of thriving at work.

Los FS, Hulshof CTJ, de Boer AGEM, and van der Molen HF. A workers' health surveillance online training programme for occupational physicians. *Occupational Medicine*. 2023; 73(3):148-154.

<https://doi.org/10.1093/occmed/kqad024> [open access]

Abstract: **BACKGROUND:** To support occupational physicians (OPs) in the implementation of workers' health surveillance (WHS), a training programme was developed. **AIMS:** (i) To evaluate the effects of a WHS training programme for OPs on knowledge, self-efficacy and skills to implement WHS. (ii) To evaluate to what extent a WHS training programme is acceptable and feasible for implementation in practice. **METHODS:** A single-blinded randomized controlled trial with waiting-list control group was used. The WHS training programme consisted of an e-learning and a 4.5-h online training session. OPs completed a knowledge test (0-8), self-efficacy questionnaires on knowledge and skills (6-60), and vignette assignments (0-16) to measure skills. OPs completed the questionnaires, either before and after the WHS training programme (intervention group), or before the training programme (control group) while receiving the training programme after the waiting period. All OPs completed questionnaires about the training's acceptability, and feasibility for implementation in practice. ANCOVA and Poisson regression analyses were conducted. **RESULTS:** The self-efficacy score ($M = 44.1$ versus $M = 37.2$) ($P < 0.001$) and skills score ($M =$

9.6 versus $M = 8.3$) ($P < 0.05$) of OPs in the training group ($N = 16$) were higher than the control group ($N = 23$). No effect was found on knowledge. Evaluation of acceptability and feasibility showed that 21 (58%) OPs were very satisfied with the training part on initiating WHS, and 29 (85%) would recommend the WHS training programme to colleagues.

CONCLUSIONS: This WHS training programme has a positive effect on self-efficacy and skills of OPs to implement WHS, and may be acceptable and feasible to implement in practice

Nwaru C, Li H, Bonander C, Santosa A, Franzen S, Rosvall M, et al. Occupational role and COVID-19 among foreign-born healthcare workers in Sweden: a registry-based study. *European Journal of Public Health*. 2023; 33(2):202-208.

<https://doi.org/10.1093/eurpub/ckad016> [open access]

Abstract: Background: Many studies report that foreign-born healthcare workers (HCWs) in high-income countries have an elevated risk of COVID-19. However, research has not yet specifically evaluated the distribution of COVID-19 among foreign-born workers in different healthcare work groups. We examined the risk of COVID-19 infection and hospitalization among foreign-born HCWs in different occupational roles in Sweden. Methods: We linked occupational data (2019) of 783 950 employed foreign-born workers (20-65 years) to COVID-19 data registered between 1 January 2020 and 30 September 2021. We used Cox proportional hazards regression to estimate the hazard ratio (HR) with 95% confidence intervals (95% CIs) of COVID-19 infection and hospitalization in eight healthcare occupational groups vs. non-HCWs and assessed whether region of birth modified the association between healthcare occupations and COVID-19. Results: All HCWs had a higher risk of COVID-19 outcomes than non-HCWs, but the risk differed by occupational role. Hospital-based assistant nurses had the highest risk (infection: HR 1.78; 95% CI 1.72-1.85; hospitalization: HR 1.79; 95% CI 1.52-2.11); allied HCWs had the lowest risk (infection: HR 1.22; 95% CI 1.10-1.35; hospitalization: HR 0.98; 95% CI 0.59-1.63). The relative hazard of the outcomes varied across foreign-born workers from different regions. For example, the relative risk of COVID-19 infection associated with being a physician compared to a non-HCW was 31% higher for African-born than European-born workers. Conclusions: The risk of COVID-19 among foreign-born HCWs differed by occupational role and immigrant background. Public health efforts that target occupational exposures as well as incorporate culturally responsive measures may help reduce COVID-19 risk among foreign-born HCWs.

Poethke U, Klasmeier KN, Radaca E, and Diestel S. How modern working environments shape attendance behaviour: a longitudinal study on weekly flexibilization, boundaryless work and presenteeism. *Journal of Occupational and Organizational Psychology*. 2023; [epub ahead of print].

<https://doi.org/10.1111/joop.12437> [open access]

Abstract: In the face of technological advancements, flexibilization and boundaryless work have become integral parts of modern occupational settings. Simultaneously, current research indicates a considerable increase in presenteeism—the behaviour of working while

sick. Meta-analytic findings indicate two main drivers for presenteeism: a high work motivation and an impaired state of health and psychological well-being. Research on flexibilization and boundaryless work shows that these job conditions enhance employees' work motivation but also impair employees' health. Based on conservation of resources theory and Miraglia and John's (J Occupational Health Psychol, 21, 2016, 261) dual-path model on antecedents of presenteeism, we investigate how both job conditions affect attendance behaviour (absenteeism and presenteeism) via motivation and well-being by conducting a weekly diary study over the course of 9 weeks. In total, 284 people provided data on flexibilization, boundaryless work, flow experience, well-being, absenteeism and presenteeism (N = 2284 week-level). Multilevel mediational analyses revealed that flexibilization prevents presenteeism, whereas boundaryless work can increase presenteeism. The results further revealed support for the health impairment path at the within-person and between-person levels whereas the motivational path was not supported at the within-person level. Our results offer several theoretical and practical implications for how modern work shape attendance behaviour.

Reme-Harnay P. Precarity and subcontracting relationships: the case of parcel delivery drivers in France. Work, Employment and Society. 2023; [epub ahead of print].

<https://doi.org/10.1177/09500170221142721>

Rieker JA, Gajewski PD, Reales JM, Ballesteros S, Golka K, Hengstler JG, et al. The impact of physical fitness, social life, and cognitive functions on work ability in middle-aged and older adults. International Archives of Occupational & Environmental Health. 2023; 96(4):507-520.

<https://doi.org/10.1007/s00420-022-01943-8> [open access]

Abstract: OBJECTIVE: Demographic changes encompass societies to maintain the work ability (WA) of aging workforces. The present study explored the relationship between modifiable lifestyle factors, cognitive functions, and their influence on WA, using a multi-group structural equation approach. METHOD: Cross-sectional data from 247 middle-aged and 236 older employees from the Dortmund Vital Study were included in this analysis. We proposed a model with three exogenous variables (Physical Fitness, Cognitive Functions, and Social Life), and with WA as the endogenous variable. WA was measured with the Work Ability Index (WAI), which considers job demands and individual physical and mental resources. Multi-group analyses were based on the principles of invariance testing and conducted using robust estimation methods. RESULTS: Results revealed that Social Life outside work had significant positive effects on WA in both, middle-aged and older adults. Physical Fitness had a significant effect on WA only in middle-aged adult, and Cognitive Functions had no significant influence on WA in either group. In older adults, Physical Fitness correlated with Cognitive Functions, whereas in middle-aged adults, Cognitive Functions marginally correlated with Social Life. CONCLUSIONS: Our results underline the importance of an active social life outside the workplace for WA, regardless of the employees' age. The influence of Physical

Fitness on WA changes with increasing age, indicating the necessity to have a differentiated view of age effects and interacting influencing factors. Our research contributes to the knowledge of how WA could be most effectively promoted in different age groups.

CLINICALTRIALS: gov NCT05155397; <https://clinicaltrials.gov/ct2/show/NCT05155397>

Savic N, Urbanus J, Henschel O, Li Q, Marsh D, Money C, et al. ECETOC TRAv3: an in-depth comparison of publicly available measurement data sets with modelled estimates of occupational inhalation exposure to chemicals. *Annals of Work Exposures and Health*. 2023; 67(4):496-507.

<https://doi.org/10.1093/annweh/wxad001> [open access]

Abstract: In this study, 129 exposure situations (ESs) with six or more measured inhalation exposures to dust from solids or vapour from liquids in occupational settings were compared with modelled European Centre of Ecotoxicology and Toxicology of Chemicals (ECETOC) targeted risk assessment tool, version 3 (TRAv3) estimates. The measurement data were extracted from previously published studies examining TRAv3 performance and pooled into a curated database. The comparison exercise focussed on the vapour exposure scenarios, as there were too few dust scenarios for a meaningful analysis of any required model corrections. A group of experts in the exposure modelling field retrieved and reviewed the input parameters used in these ESs. Where considered appropriate, modifications were applied to better match the input parameter definitions and the scope of applicability of the TRAv3. Differences and mean absolute error (MAE) were calculated between the log-transformed modelled exposure value and the 75th percentile of each measured data set and regression analysis was performed. The results indicated that the TRAv3 overestimated 80% of the measured data sets. Both over- and underestimations were mostly by factors 1-5. The calculated MAE for liquids was 0.7, indicating that on average the difference between the 75th percentile and the TRAv3 estimate was less than one order of magnitude. A multiple linear regression showed that some input parameters such as medium volatility, certain process categories (PROC), industrial setting, and the presence of local exhaust ventilation are associated with underestimations. The results of the regression analysis can be used by TRAv3 users to review the degree of over- or underestimation in their current exposure assessments, compared to the curated database. Although multiple linear regression is an appropriate methodology to characterize the TRAv3's performance, more data sets are still needed in view of some remaining data gaps. Nevertheless, the results of the current analysis are being used by ECETOC to further develop the tool as a suitably conservative screening tool for use in REACH chemical safety assessment of occupational exposure to chemicals

Skogstad M, Aass HCD, Sirnes PA, Mamen A, Skare O, Matre D, et al. Influence of shift work on arterial stiffness and systemic inflammation: a 3-year follow-up study in industry.

Journal of Occupational & Environmental Medicine. 2023; 65(4):284-291.

<https://doi.org/10.1097/JOM.0000000000002779> [open access]

Abstract: OBJECTIVE: To assess changes in cardiovascular disease risk factors during a 3-year follow-up among 57 rotating shift workers and 29 day workers in industry. METHODS: We collected demographics by questionnaire, examined blood pressure, heart rate, pulse wave velocity, carotid media thickness, and maximal oxygen uptake. We assessed blood samples for determination of lipids, glycosylated hemoglobin, C-reactive protein, markers of inflammation, and particle concentrations/respirable dust. Baseline comparisons were analyzed using logistic regression (plaque) and linear regression for all other outcomes. We applied mixed models to assess differences in change in health outcomes between the shift workers and the day workers. RESULTS: At baseline, the adhesion molecules soluble vascular cell adhesion molecule 1 and soluble P-selectin were elevated among the shift workers compared with that of the day workers. There was a significant difference in change in pulse wave velocity between shift workers (1.29-m/s increase) and day workers (0.11-m/s increase) over the 3-year follow-up. Respirable dust levels were below the Norwegian occupational exposure limit. CONCLUSIONS: Shift work in industry is associated with arterial stiffening reflecting increased risk for future cardiovascular disease. More uncertainly, we found some support for systemic inflammation

Watson D, Benozzo A, and Fida R. Trans people in the workplace: possibilities for subverting heteronormativity. Work, Employment and Society. 2023; [epub ahead of print].

<https://doi.org/10.1177/09500170231155059> [open access]

Abstract: This article explores possible subversions of heteronormativity through transgender performativity in the workplace. Drawing on insights from Judith Butler we focus on how employees construct (un)intelligible subject positions that can create 'moments' of subversion, which go against the disciplinary, powerful and normative gender binary. We explore this possibility through an analysis of qualitative material generated through encounters with 11 Italian trans workers. Our analysis shows that subversion manifests in diverse ways according to how individual performativities combine with organisational context. Within this diversity we highlight three moments of subversion: subversion through intrigue; subversion through incongruence; and subversion through betrayal. We argue that where transgender identity contrasts strongly with gender norms, subversion is most intense. The subversion of strongly heteronormative working contexts is difficult as moments of subversion are unpredictable, varied and can come at personal cost, but are necessary in order to accommodate different gender identities.

Zhao X and Yan D. Incorporating technological acceptance model into safety compliance of construction workers in Australia. *Safety Science*. 2023; 163:106127.

<https://doi.org/10.1016/j.ssci.2023.106127> [open access]

Abstract: Safety compliance is the mandatory and core safety behavior that should be undertaken by employees to maintain safety in the workplace. This study aims to model the antecedents of safety compliance of construction workers in Australia, drawing on the technological acceptance model (TAM) and distinguishing between deep compliance and surface compliance. Through a questionnaire survey around Australia, this study collected data from 239 construction workers. The results indicated that perceived usefulness and perceived ease of use positively influenced deep compliance and negatively influenced surface compliance. The positive effect of management commitment to safety on deep compliance was mediated by perceived usefulness and perceived ease of use, while the negative effect of management commitment to safety on surface compliance was mediated by perceived ease of use only. This study extends TAM to safety compliance of construction workers and differentiates deep compliance from surface compliance, thus contributing to the body of knowledge relating to construction safety. This study also contributes to practice by providing safety managers with an understanding of the way to enhance deep compliance and reduce surface compliance.

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