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Emerging Evidence Alert June 2021

This Emerging Evidence Alert includes the latest peer-reviewed articles, reports and evidence on a range of workplace health and safety, prevention, recovery at work and return to work topics. It provides a review of recent journal articles and relevant content related to Comcare's five research themes: Fostering Work Participation; Building Employer Capability; Adapting to the Future of Work; Guiding and Supporting Mental Health and Wellbeing; and Enabling Healthy and Safe Workplaces. Collated articles were published in May 2021 only.

Contents

Monthly research highlight

Social stressors linked to worker health and wellbeing

Workplace social stressors, such as poor social interactions with managers, supervisors, co-workers, and others, can lead to negative health and wellbeing outcomes for employees.

Recent research explores the impact of workplace social stressors, in a review of 557 studies from across the USA, Canada, Europe and Asia. The focus of the research is on the link between social stressors and three main outcomes:

1. Wellbeing (emotional, physical, mental, general, burnout)
2. Attitudes (job commitment, job satisfaction)
3. Behaviours (turnover intention, absenteeism, organisational behaviour, performance, counterproductive work behaviour)

The research found the most significant impact of social stressors was on job satisfaction, burnout, commitment, and counterproductive work behaviour, such as absenteeism, withdrawing effort or leaving early.

For organisations, social stressors such as a lack of justice, supervisor mistreatment, and bullying behaviours show a high association with negative health and wellbeing outcomes — organisational policies can help with prevention and raising awareness. Measuring employee satisfaction through diagnostic tools and surveys also gives a good indicator of potential cultural problems.

For managers and supervisors, it is important to recognise breakdowns in social relationships at work in order to prevent negative outcomes for employees. The research highlights manager and supervisor training as a tool to improve leadership behaviour and to sensitise leaders to employee needs.

For more information about eliminating psychosocial hazards and training on psychological health and safety visit the Comcare website.

Subscriber survey

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Description of Evidence Levels Definitions Used in this Review

1. **Level of Evidence** – Certain study designs are scientifically stronger at answering a question. The scoring hierarchy we provided is presented below.

Level of Evidence	Description
Level 1	Evidence from a systematic review or meta-analysis of relevant studies.
Level 2	Evidence from a randomised controlled trial
Level 3	Evidence from a controlled intervention trial without randomisation (i.e. quasi-experimental).
Level 4	Evidence from a case-control or cohort study.
Level 5	Evidence from a single case study, a case series, or qualitative study.
Level 6	Evidence from opinion pieces, reports of expert committees and/or from literature reviews (scoping or narrative).

2. **Relevance** – Research carried out in Australia or similar countries is most relevant to Australian readers.

Level	Description
A	Study conducted in Australia or the study has been conducted outside Australia but confounders unlikely to affect relevance
B	Study conducted outside Australia and confounders likely to affect generalisability

Fostering Work Participation

Return to Work

Impact of anxiety and depression disorders on sustained return to work after work-related musculoskeletal strain or sprain: a gender stratified cohort study

Objective: The aim of this study was to examine the impact of anxiety and depression disorders on sustained return to work (RTW) for men and women with musculoskeletal strain or sprain.
Methods: Accepted lost-time claims for spine and upper-extremity strain or sprain were extracted for workers in the Canadian province of British Columbia from 2009 to 2013 (N=84 925). Pre-existing and new onset anxiety and depression disorders were identified using longitudinal health claims data. Probability of sustained RTW was analyzed using Cox proportional hazards models, stratified by gender and adjusted for potential confounders. **Results:** For pre-existing disorders, compared to men with no anxiety and no depression, men with anxiety only [hazard ratio (HR) 0.88, 95% confidence interval (CI) 0.84-0.93], depression only (HR 0.94, 95% CI 0.89-1.00), and anxiety and depression (HR 0.93, 95% CI 0.90-0.97) had lower probabilities of sustained RTW in adjusted models. The same direction of effect was found for women, but anxiety only had a smaller effect size among women compared to men (HR anxiety only 0.95, 95% CI 0.92-0.99; HR depression only 0.98, 95% CI 0.93-1.03, HR anxiety and depression 0.94, 95% CI 0.91-0.97). Among men and women, new onset disorders were associated with lower probability of sustained RTW and the effect estimates were larger than for pre-existing disorders. **Conclusions:** Findings suggest that workers' compensation benefits and programs intended to improve RTW after musculoskeletal injury should take pre-existing and new onset anxiety and depression disorders into consideration and that gender-sensitive work disability strategies may be warranted.
Jones et al. 2021.
Scandinavian Journal of Work and Environmental Health, vol. 47, no. 4.

Keywords: Anxiety; depression; return to work; musculoskeletal strain.
Evidence Level: 4A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3951

Risk factors for return to work in colorectal cancer survivors

Background: The increasing incidence of colorectal cancer among individuals in the productive age-group has adversely affected the labor force and increased healthcare expenses in recent years. Return to work (RTW) is an important issue for these patients. In this study, we explored the factors that influence RTW and investigated the influence of RTW on survival outcomes of patients with colorectal cancer.
Methods: Data of individuals (N = 4408) in active employment who were diagnosed with colorectal cancer between 2004 and 2010 were derived from 2 nationwide databases. Subjects were categorized into 2 groups according to their employment status at 5-year follow-up. Logistic regression analysis was performed to identify the factors associated with RTW. Survivors were further followed up for another 8 years. Propensity score matching was applied to ensure comparability between the two groups, and survival analysis was performed using the Kaplan-Meier method. **Results:** In multivariable regression analysis for 5-year RTW with different characteristics, older age (OR: 0.57 [95% CI, 0.48-0.69]; $p < 0.001$), treatment with radiotherapy (OR: 0.69 [95% CI, 0.57-0.83]; $p < 0.001$), higher income (OR: 0.39 [95% CI, 0.32-0.47]; $p < 0.001$), medium company size (OR: 0.78 [95% CI, 0.63-0.97]; $p = 0.022$), and advanced pathological staging (stage I, OR: 16.20 [95% CI, 12.48-21.03]; stage II, OR: 13.12 [95% CI, 10.43-16.50]; stage III, OR: 7.68 [95% CI, 6.17-9.56]; $p < 0.001$ for all) revealed negative correlations with RTW. In Cox proportional hazard regression for RTW and all-cause mortality, HR was 1.11 (95% CI, 0.80-1.54; $p = 0.543$) in fully adjusted model. **Conclusion:** Older age, treatment with radiotherapy, higher income, medium company size, and advanced pathological stage showed negative correlations with RTW. However, we observed no significant association between employment and all-cause mortality. Further studies should include participants from different countries, ethnic groups, and patients with other cancers.
Yuan et al. 2021.
Cancer Medicine, vol. 14.

Keywords: Colorectal cancer; prognostic factor; retrospective cohort study; return to work.
Evidence Level: 4A
Link: https://pubmed.ncbi.nlm.nih.gov/33991067/

Return to work of breast cancer survivors: toward an integrative and transactional conceptual model
Purpose: To propose a conceptual framework of the return to work (RTW) of breast cancer survivors (BCS) according to the transactional perspective. **Methods:** The Technique for Research of Information by Animation of a Group of Experts was implemented. For each determinant in an initial list established from the literature, experts selected for the consensus exercise were firstly asked to indicate their agreement level individually, via an online questionnaire. Determinants obtaining an agreement level of 80% or over during this first phase were retained. Determinants obtaining an agreement level below 80%, and additional determinants proposed by the experts, were then discussed collectively. After discussion, experts voted via a new online questionnaire to retain (or not) each determinant. Determinants obtaining an agreement level of 80% or over after this second phase were retained. Based on the determinants selected, a conceptual model was developed following the transactional approach. **Results:** Eleven experts participated in the study. Forty of the 51 determinants listed initially from the literature achieved an agreement level over 80%, and 20 were added after the individual consultation phase. Twenty-two of the 31 determinants discussed collectively were retained. In total, 62 determinants were selected to construct the conceptual model. **Conclusions:** This integrative, operational, and transactional conceptual model of the RTW of BCS, constructed following an expert consensus, will help to design more efficient patient-centered intervention studies. **Implications for cancer survivors:** Identification of the 62 determinants associated with the RTW of BCS will help design tools that are easily used by all stakeholders involved in the RTW process.
Porro et al. 2021.
Journal of Cancer Survivorship, vol. 5.

Keywords: Breast cancer survivors; conceptual model; determinants; expert consensus; return to work; TRIAGE method.
Evidence Level: 6A
Link: https://link.springer.com/article/10.1007%2Fs11764-021-01053-3

Changes to body mass index, work self-efficacy, health-related quality of life, and work participation in people with obesity after vocational rehabilitation: a prospective observational study
Background: People on or at risk of sick leave from work due to obesity or obesity-related problems participated in a new vocational rehabilitation (VR). The study aimed to examine the outcome changes in the participants' health-related quality of life (HRQoL), body mass index (BMI), return to work self-efficacy (RTWSE), work ability scale (WAS) and degree of work participation (DWP) after their participation in the 12-month VR programme. The secondary aim was to examine associations between the outcome changes and HRQoL at 12-month follow-up, measured with the HRQoL 15D instrument (15D). **Methods:** This prospective observational study included 95 participants. The one-year multidisciplinary VR programme with an integrated work and lifestyle intervention included 4 weeks of inpatient stay followed-up by 5 meetings. A paired sample t-test was used to examine changes in HRQoL, BMI, RTWSE, WAS, and DWP between baseline and the 12-month follow-up. Multiple linear regression analyses explored associations between changes in HRQoL and the outcome variables. **Results:** The participants achieved statistically significant changes in HRQoL (2.57, 95% CI: 1.35 to 3.79), BMI (- 2.33, 95% CI: - 3.10 to - 1.56), RTWSE (15.89, 95% CI: 4.07 to 27.71), WAS (1.51, 95% CI: 0.83 to 2.20) and DWP (18.69, 95% CI: 8.35 to 29.02). At 12 months, a significant association was found between HRQoL and BMI (B = - 0.34, 95% CI: - 0.65 to - 0.04), RTWSE (B = 0.02, 95% CI: 0.004 to 0.04), WAS (B = 0.91, 95% CI: 0.55 to 1.28), DWP (B = - 0.02, 95% CI: - 0.04 to 0.001) and work absence (B = - 0.01, 95% CI: - 0.02 to - 0.002). The regression model explained 71.8% of the HRQoL variance. **Conclusion:** The results indicated positive changes in HRQoL, BMI, RTWSE, WAS and DWP from baseline to the 12-month follow-up. Factors associated with HRQoL at the 12-month

follow-up were decreased BMI, increased RTWSE, improved WAS and reduced work absence. Future studies examining VR programmes with lifestyle interventions for people with obesity are recommended.
Linge et al. 2021.
BMC Public Health, vol. 17, no. 21.

Keywords: Health-related quality of life; obesity; return to work self-efficacy; vocational rehabilitation; work ability; work absence.
Evidence Level: 4A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10954-y

Presenteeism and Absenteeism

Efficacy of an indicated prevention strategy on sickness absence and termination of the employment contract: a 5-year follow-up study
Objective: It was shown that an indicated prevention strategy (IPS), based on screening and early intervention, can considerably decrease future risk of long-term sickness absence (LTSA>28 days) over one year. Given the nature of the interventions, the potential of an effect extending beyond the original one year of follow-up might be present. This study aims to determine the efficacy of this IPS on LTSA and termination of employment contract over five years by extended follow up of IPS trials. **Methods:** Company records on sickness absence and termination of employment contract over five years were used from two randomized controlled trials (RCT) on the efficacy of the IPS (RCT I employees at high-risk for LTSA: intervention: N=263; RCT II high-risk employees with concurrent mild depressive complaints: intervention: N=139). Survival analysis was used to model time until the first LTSA episode and termination of employment contract. **Results:** RCT I showed a decrease of 43.2 days of sickness absence (P=0.05) and a lower 5-year risk of LTSA in the intervention, as compared to the control group [hazard ratio (HR) 0.61, 95% confidence interval (CI) 0.41-0.90], however no considerable impact on employment contract (HR 0.85, 95% CI 0.54-1.35) (intention-to-treat, ITT). For RCT II, we found no large difference in days of SA and no difference in LTSA risk over five years (HR 1.31, 95% CI 0.70-2.47), whereas the risk of termination of the employment contract was lower (HR 0.62, 95% CI 0.39-0.99) (ITT). **Conclusion:** Effects of the IPS were observed over five years, albeit differential between the two approaches. A combination of elements of both interventions might lead to optimal results but needs further study.
Klasen et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 1, no. 47.

Keywords: Sickness; absence; employment termination; prevention; early intervention; screening.
Evidence Level: 2A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3945

Working Hours

The associations of working hour characteristics with short sickness absence among part- and full-time retail workers
Objective: This study aimed to determine the associations of working hour characteristics with short (1-3 days) sickness absence (SA) among retail workers. **Methods:** As part of "RetailHours-project", 4046 employees of 338 Finnish retail stores were included. Registry-based data on working hour characteristics and short SA were utilized. A case-crossover design was used and the odds ratios (OR) were controlled for the clustering effect and working hour characteristics. **Results:** There were strong dose-response relationships between percent of short (<11 hours) shift intervals and short SA among part- and full-time workers, men and women, and younger and older workers. Compared to workers without short shift intervals, the risk of SA was 1.47 times [95% confidence interval (CI) 1.29-1.68] higher among workers who had short shift intervals <10% of work times, 2.39 times (95% CI 2.03-2.82) higher among workers who had 10-25% of work times, and 4.03 times (CI 2.34-6.93) higher among workers who had short shift intervals

>25% of work times. Weekly working hours >40 hours were associated with SA among part-time workers [odds ratio (OR) 2.22, CI 1.65-2.98], women (OR 1.62, CI 1.27-2.07) and among workers <30 years of age (OR 1.68, CI 1.20-2.35) as well as among workers aged ≥30 years (OR 1.43, CI 1.07-1.92). Furthermore, working mainly night shifts was associated with SA among full-time workers (OR 2.41, 95% CI 0.99-5.86) and women (OR 1.72, CI 1.02-2.89). **Conclusions:** A short shift interval is an important risk factor for short SA. Improving intervals between shifts and shortening long weekly working hours could reduce the risk of short SA among retail workers.
Shiri et al. 2021.
Scandinavian Journal of Work Environment & Health, vol. 1, no. 47.

Keywords: Sickness; absence; full-time; retail; short-term sickness.
Evidence Level: 5A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3952

Long working hours and risk of nonalcoholic fatty liver disease: Korea National Health and Nutrition Examination Survey VII
Background: The global incidence of NAFLD is rising sharply due to various risk factors. As previous studies reported adverse health impact of long working hours on metabolic diseases, such as diabetes mellitus and obesity, it is plausible that NAFLD is also associated with working excessive hours. However, data regarding this issue is limited. **Methods:** In this cross-sectional study based on Korea National Health and Nutrition Examination Survey VII, 5,661 working adults without previous liver disease or heavy alcohol drinking habits were included. The subjects were categorized into three groups according to working hours: 36-42, 43-52, and 53-83 hours/week. NAFLD was defined using the hepatic steatosis index (HSI), which is a validated prediction model for determining NAFLD. **Results:** The prevalence of NAFLD (HSI ≥36) increased with longer working hours: 23.0%, 25.6%, and 30.6% in the 36-42, 43-52, and 53-83 hours/week group, respectively (p <0.001). Subjects who worked 53-83 hours/week had higher odds for NAFLD than those who worked the standard 36-42 hours/week (OR 1.23, 95% CI 1.02-1.50, p = 0.033) after adjusting for age, sex, body mass index, smoking, alcohol, exercise, diabetes mellitus, hypertension, serum triglyceride, and total cholesterol. This association was consistent across subgroups according to working schedule (daytime *vs.* shift workers) or occupation type (office *vs.* manual workers). In particular, the relationship between long working hours and NAFLD was pronounced in workers aged <60 years and in female workers. **Conclusions:** Long working hours was significantly associated with NAFLD. Further prospective studies are required to validate this finding with causal relationship.
Song et al. 2021.
Frontiers in Endocrinology, vol. 6, no. 12.

Keywords: Fatty liver disease; hepatic steatosis index; liver steatosis; metabolic diseases; occupational health.
Evidence Level: 4B
Link: https://www.frontiersin.org/articles/10.3389/fendo.2021.647459/full

Building Employer Capability

Wellness Programs

Workplace interventions that aim to improve employee health and well-being in male-dominated industries: A systematic review
The published evidence on whether workplace health and well-being interventions are as effective in male-dominated industries compared with mixed-gender environments has not been synthesised. We performed a systematic review of workplace interventions aimed at improving employee health and well-being in male-dominated industries. We searched Web of Knowledge, PubMed, Medline, Cochrane Database and Web of Science for articles describing workplace interventions in male-dominated industries that address employee health and well-being. The primary outcome was to determine the effectiveness of the

intervention and the process evaluation (intervention delivery and adherence). To assess the quality of evidence, Cochrane Collaboration's Risk of Bias Tool was used. Due to the heterogeneity of reported outcomes, meta-analysis was performed for only some outcomes and a narrative synthesis with albatross plots was presented. After full-text screening, 35 studies met the eligibility criteria. Thirty-two studies delivered the intervention face-to-face, while two were delivered via internet and one using postal mail. Intervention adherence ranged from 50% to 97%, dependent on mode of delivery and industry. 17 studies were considered low risk of bias. Albatross plots indicated some evidence of positive associations, particularly for interventions focusing on musculoskeletal disorders. There was little evidence of intervention effect on body mass index and systolic or diastolic blood pressure. Limited to moderate evidence of beneficial effects was found for workplace health and well-being interventions conducted within male-dominated industries. Such interventions in the workplace can be effective, despite a different culture in male-dominated compared with mixed industries, but are dependent on delivery, industry and outcome.
Hulls et al. 2021.
Systematic Reviews, vol. 9, no. 1.

Keywords: Employee health and wellbeing; male-dominated industries; occupational stress; systematic review; workplace interventions.
Evidence Level: 1A
Link: https://oem.bmj.com/content/early/2021/05/24/oemed-2020-107314.long

Organisational Issues

Effects of relocation to activity-based workplaces on perceived productivity: Importance of change-oriented leadership
Activity-based workplaces (ABWs) are becoming popular in Western countries and were implemented at four office sites of a large Swedish government agency. A fifth office was used as a control group. The study aim was to examine the effects of relocation to ABW on perceived productivity among employees and to determine if perceived change-oriented leadership behavior prior to relocation moderates potential effects. Data were collected three months prior to relocation, and three and 12 months after. 407 respondents were included in linear mixed regression models. Perceived productivity decreased significantly after relocation compared to the control group and these effects persisted 12 months after the relocation. However, the decrease in perceived productivity was significantly smaller among employees perceiving high change-oriented leadership before relocation. Our results point out the importance of a change-oriented leadership behavior during the implementation to avoid productivity loss among employees when implementing ABWs.
Bergsten et al. 2021.
Applied Ergonomics, vol. 93, no. 10.

Keywords: Flexible office; implementation process; organisational change.
Evidence Level: 5A
Link: https://www.sciencedirect.com/science/article/pii/S0003687020302969?via%3Dihub

Evaluating changes in workplace culture: Effectiveness of a caregiver-friendly workplace program in a public post-secondary educational institution
Background: Workplace experience, defined as the evaluation of the work environment and performance, and a characteristic of workplace culture, can influence an employee's work-life balance. Most carer-employees, who combine paid full-time work and informal caregiving responsibilities, struggle to maintain a healthy work-life balance. Caregiver-Friendly Workplace Programs are designed to improve the work experience, and ultimately, the work-life balance of carer-employees. The purpose of this study is to identify changes in workplace culture through the examination of the efficacy of a caregiver-friendly workplace program on workplace experience. First, we identify whether awareness of a caregiver-friendly

workplace program directly increases the amount of work support received and, in turn, improves workplace experience. Second, we will examine if significant differences in the amount of work support received translates into an improved workplace experience for carer-employees over time. **Methods:** Two university-wide online surveys were conducted separately; time 1 (T1) during the summer of 2015, and time 2 (T2), in the summer of 2017. In each survey, nearly 7000 employees received the invitation to participate with a response rate ranging 10% (T1) to 12% (T2). Respondents were asked about their sociodemographic characteristics, caregiving responsibilities (if applicable), awareness of caregiver-friendly workplace program, types of work support received, and work experience. Reliability analyses was conducted for three scales: awareness of caregiver-friendly workplace program; work support, and; workplace experience. Proportional T-tests were used to examine the difference amongst the intervention scales over time. Structural equation modeling (SEM), via path analysis, was used to investigate the causal indirect (awareness of caregiver-friendly workplace program to work support to workplace experience) relationship that define the workplace culture. **Results:** No significant changes in workplace culture were found over time. However, awareness of caregiver-friendly workplace programs is shown to positively impact the amount of support received, which sequentially improves workplace experience, and ultimately workplace culture. This therefore suggests that the implementation of caregiver-friendly workplace programs is potentially effective. **Conclusions:** Results suggest that amount of support received, and workplace experience would be better reassessed via a longer time period (i.e., 5 yr. window), and improved support for managers and supervisors is needed to supplement relationships with their employees.

Dardas et al. 2021.

PLoS One, vol. 16, no. 5.

Keywords: Culture; environment; performance; work-life balance.

Evidence Level: 3B

Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0250978

Job Design

Job strain and sense of coherence: Associations with stress-related outcomes

Background: Teachers constitute an occupational group experiencing high levels of stress and with high sick-leave rates. Therefore, examining potentially protective factors is important. While prior research has mainly focused on the link between teachers' own experiences of their work environment and stress-related outcomes, it is also possible that colleagues' perception of the work environment and their possibilities for dealing with work-related stress contribute to influencing individual teachers' stress. **Aim**: The aim of this study was to investigate how teachers' reports of high job strain (i.e. high demands and low control) and sense of coherence (SOC), as well as the concentration of colleagues reporting high strain and high SOC, were associated with perceived stress and depressed mood. **Methods**: The data were derived from the Stockholm Teacher Survey, with information from two cross-sectional web surveys performed in 2014 and in 2016 (N=2732 teachers in 205 school units). Two-level random intercept linear regression models were performed. **Results**: High job strain at the individual level was associated with higher levels of perceived stress and depressed mood, but less so for individuals with high SOC. Furthermore, a greater proportion of colleagues reporting high SOC was associated with lower levels of perceived stress and depressed mood at the individual level. **Conclusions**: High SOC may be protective against work-related stress among teachers. Additionally, the proportion of colleagues reporting high SOC was related to less individual stress, suggesting a protective effect of school-level collective SOC.

Ramberg et al. 2021.

Scandinavian Journal of Public Health, vol. 12.

Keywords: Teacher stress; contextual; depressed mood; job control; job strain; multilevel; psychological demands; sense of coherence.

Evidence Level: 4A
Link: https://journals.sagepub.com/doi/full/10.1177/14034948211011812

Shift Work

The acute effects of working time patterns on fatigue and sleep quality using daily measurements of 6195 observations among 223 shift workers
Objectives: This study aimed to estimate acute effects of roster characteristics on fatigue and sleep quality and investigated whether these effects differed by individual characteristics. **Methods**: Using an ecological measurement assessment survey, fatigue and sleep quality were daily measured among 223 shift workers for up to eight weeks. A questionnaire assessed baseline characteristics, and roster data were retrieved from the company registers to determine roster parameters. The effects between each shift parameter on fatigue and sleep quality were estimated with random- and fixed-effects models. **Results**: Compared to day shifts, night shifts were related to fatigue [β=0.22; 95% confidence interval (CI) 0.05-0.39] and poorer sleep quality (β=0.64; 95% CI 0.47-0.80), and more successive night shifts with more fatigue (up to β=0.68; 95% CI 0.49-0.87 for ≥2 nights). Fatigue was increased after a quick return (<11 hours) (β=1.94; 95% CI 1.57-2.31) or 11-16 hours (β=0.43; 95% CI 0.26-0.61) compared to >16 hours between shifts. Compared to forward rotation, stable (β=0.22; 95% CI 0.01-0.43) and backward rotation (β=0.49; 95% CI 0.23-0.74) were also associated with more fatigue. Workers with a morning or intermediate chronotype had poorer sleep quality after a night shift, while workers with poor health reported poor sleep quality as well as more fatigue after a night shift. **Conclusions**: To alleviate acute effects of shift work on fatigue, shift schedules should be optimized by ensuring more time to recover and rotate forwards.
van de Ven et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 24, no. 3964.

Keywords: Fatigue; sleep quality; shift work; working time patterns.
Evidence Level: 5A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3964

Association of sleep duration and working hours with suicidal ideation in shift workers: the Korean National Health and Nutrition Examination Survey 2007-2018
Objective: This study investigated whether sleep duration and working hours were associated with the risk of suicidal ideation. **Methods:** Data from 13,628 shift workers (age ≥19) were obtained from the nationwide cross-sectional Korea National Health and Nutrition Examination Surveys conducted in 2007-2018. We included healthy shift workers without depressive disorders and chronic medical illnesses. Sleep duration, working hours, and suicidal ideation were assessed using a self-reported questionnaire. Logistic regressions were used to examine the association of sleep duration and working hours with the risk of suicidal ideation. We examined interactions between sleep duration and working hours in association with suicidal ideation. In addition, interactions of sex or age were also analyzed. **Results:** Shift workers sleeping for <6 and ≥10 hours/day were associated with suicidal ideation compared with those sleeping for 7 to <9 hours/day. Individuals working >52 hours/week had a higher risk of suicidal ideation compared with those working ≤40 hours/week. In terms of interaction by sex or age groups in the association between working hours and the risk of suicidal ideation, the relationship was stronger for men than for women and for those aged <45 years than for those aged ≥45 years. **Conclusion:** Shorter or longer sleep durations, and long working hours were associated with a higher risk of suicidal ideation. Under long working hours, male shift workers or those aged <45 years were more vulnerable to suicidal ideation.
Kim et al. 2021.
Psychiatry Investigation, vol. 18, no. 5.

Keywords: Shift work; sleep duration; suicidal ideation; working hours.
Evidence Level: 4B
Link: https://www.psychiatryinvestigation.org/journal/view.php?doi=10.30773/pi.2020.0412

Management and Leadership

Investigating the effect of authentic leadership and employees' psychological capital on work engagement: evidence from Indonesia

This study aims at investigating the positive effect of Authentic Leadership on Work Engagement and the mediating role of Psychological Capital (PsyCap). This study employed the Jobs Demands Resource (JD-R) model theory to explain the contribution of Authentic Leadership and PsyCap on Work Engagement. Also, the direct effect of Authentic Leadership on employees' PsyCap was examined. This study randomly selected participants from 1,120 employees in one of the largest public service offices in Indonesia. 192 employees (male = 120 or 62.5%) fully participated in a three-wave data collection. By using a Structural Equation Modeling (SEM) technique, this study confirmed that the proposed theoretical model (χ^2/df = 2, $p < .05$, RMSEA = .07, SRMR = .07, CFI = .95) showed a better fit than the alternative model (χ^2/df = 3, $p < .05$, RMSEA = .09, SRMR = .09, CFI = .85). The results also confirmed that Authentic Leadership and PsyCap directly predicted Work Engagement. Furthermore, the indirect effect of Authentic Leadership on Work Engagement was positively mediated by employees' PsyCap. Authentic Leadership in Indonesian public organizations may provide a tremendous impact on employees' PsyCap and Work Engagement. This study has provided new insight into the application of the JD-R model in Indonesian public organizations. Discussion, implications, limitations, and future research directions are included.

Niswaty et al. 2021.

Heliyon, vol. 8, no. 7.

Keywords: Authentic leadership; human resources; PsyCap; work engagement.

Evidence Level: 5B

Link: https://pubmed.ncbi.nlm.nih.gov/34027188/

Work Ability

Self-reported work ability predicts health-related exit and absence from work, work participation, and death: longitudinal findings from a sample of German employees

Objective: The cohort study examined the performance of the Work Ability Index in predicting health-related exit and absence from work, work participation, and death among a sample of workers previously receiving sickness absence benefits. **Methods:** Workers aged 40-54 years who received sickness absence benefits in 2012 completed the Work Ability Index in 2013. Outcomes were extracted from administrative data records covering the period until the end of 2016. **Results:** Data for 2266 participants were included (mean age: 47.9 years; 54.4% women). Maximum follow-up was 43 months. In terms of work ability, 38.4% had good scores, 38.2% moderate scores, and 23.4% poor scores. Fully adjusted analyses showed an increased risk of a disability pension in workers with poor (HR = 12.98; 95% CI 5.81-28.99) and moderate Work Ability Index scores (HR = 3.17; 95% CI 1.36-7.38) compared to workers with good or excellent scores. The risk of a rehabilitation measure was also significantly increased for workers with poor and moderate scores. In addition, poor scores were prospectively associated with a longer duration of sickness absence and unemployment benefits, and fewer employment days and less income from regular employment. Those with poor Work Ability Index scores also had a significantly increased risk of premature death. **Conclusions:** The Work Ability Index is a potential tool to identify individuals with previous long-term sickness absence having an increased risk of health-related exit and absence from work and poor work participation outcomes.

Bethge et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 4.

Keywords: Cohort study; needs assessment; occupational health; pensions; rehabilitation.

Evidence Level: 4B

Link: https://link.springer.com/article/10.1007%2Fs00420-020-01608-4

Adapting to the Future of Work

Aging Workforce

Will working longer enhance the health of older adults? A pooled analysis of repeated cross-sectional data in Japan

Background: Encouraging older adults to continue working longer would be a realistic solution to the shrinking labor force, which is a result of the aging population. This study examined whether working longer improves the health of older adults. **Methods:** We used repeated cross-sectional data from 1,483,591 individuals aged 55-69 years collected from 11 waves of a nationwide population-based survey conducted in Japan from 1986 to 2016. We estimated pooled regression models to explain health outcomes by work status, controlling for potential endogeneity biases. Based on the estimation results, we conducted simulations to predict the health impact of policy measures that encourage older adults to participate in the labor force. **Results:** The regression analysis showed that work status had a mixed health impact. For example, work reduced the probability of poor self-rated health by 6.7 (95% confidence interval [CI]: 6.2-7.2) percentage points and increased that of psychological distress by 12.2 (95% CI: 11.3-13.1) percentage points. The simulation results showed that raising both the mandatory retirement age and eligibility age for claiming public pension benefits to 70 years would increase the employment rate by 27.8 (standard deviation [SD]: 4.2) percentage points among those aged 65-69 years, which would reduce their probability of poor self-rated health by 1.8 (SD: 0.4) percentage points and raise that of psychological distress by 4.1 (SD: 0.8) percentage points for that age group. **Conclusions:** The results suggest the need to pay attention to the health outcomes of policy measures that encourage older adults to work longer.

Oshio et al. 2021.
Journal of Epidemiology, vol. 15

Keywords: Labor force participation; mental health; older adults; pensionable age; self-rated health.
Evidence Level: 4B
Link: https://www.jstage.jst.go.jp/article/jea/advpub/0/advpub_JE20210030/_article

High physical work demands have worse consequences for older workers: prospective study of long-term sickness absence among 69 117 employees

Objective: This study investigates the role of age for the prospective association between physical work demands and long-term sickness absence (LTSA). **Methods:** We followed 69 117 employees of the general working population (Work Environment and Health in Denmark study 2012-2018), without LTSA during the past 52 weeks preceding initial interview, for up to 2 years in the Danish Register for Evaluation of Marginalisation. Self-reported physical work demands were based on a combined ergonomic index including seven different types of exposure during the working day. Using weighted Cox regression analyses controlling for years of age, gender, survey year, education, lifestyle, depressive symptoms and psychosocial work factors, we determined the interaction of age with physical work demands for the risk of LTSA. **Results:** During follow-up, 8.4% of the participants developed LTSA. Age and physical work demands interacted ($p<0.01$). In the fully adjusted model, very high physical work demands were associated with LTSA with HRs of 1.18 (95% CI 0.93 to 1.50), 1.57 (95% CI 1.41 to 1.75) and 2.09 (95% CI 1.81 to 2.41) for 20, 40 and 60 years old (point estimates), respectively. Results remained robust in subgroup analyses including only skilled and unskilled workers and stratified for gender. **Conclusion:** The health consequences of high physical work demands increase with age. Workplaces should consider adapting physical work demands to the capacity of workers in different age groups.

Andersen et al. 2021.
Occupational and Environmental Medicine.

Keywords: Aging; occupational health; physical exertion; sick leave; workload.
Evidence Level: 4A
Link: https://oem.bmj.com/content/early/2021/05/09/oemed-2020-107281.long

Employment and retirement impacts on health and wellbeing among a sample of rural Australians
Background: In Australia, it is projected that one in four individuals will be at the nominal retirement age of 65 or over by 2056; this effect is expected to be especially pronounced in rural areas. Previous findings on the effects of retirement on wellbeing have been mixed. The present study explores the effects of employment and retirement on health and wellbeing among a sample of rural Australians.
Methods: Australian Rural Mental Health Study participants who were aged 45 or over (N = 2013) were included in a series of analyses to compare the health and wellbeing of individuals with differing employment and retirement circumstances. Self-reported outcome variables included perceived physical health and everyday functioning, financial wellbeing, mental health, relationships, and satisfaction with life.
Results: Across the outcomes, participants who were employed or retired generally reported better health and wellbeing than those not in the workforce. Retired participants rated more highly than employed participants on mental health, relationships, and satisfaction with life. There was also a short-term benefit for perceived financial status for retired participants compared to employed participants, but this effect diminished over time. **Conclusions:** While retirement is a significant life transition that may affect multiple facets of an individual's life, the direction and magnitude of these effects vary depending on the retirement context, namely the pre-retirement and concurrent circumstances within which an individual is retiring. Personal perceptions of status changes may also contribute to an individual's wellbeing more so than objective factors such as income. Policies that promote rural work/retirement opportunities and diversity and address rural disadvantage are needed.
Handley et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Ageing; employment; mental health; retirement; rural; wellbeing.
Evidence Level: 5A
Link: https://pubmed.ncbi.nlm.nih.gov/33971829/

Occupation-related effects on motor cortex thickness among older, cognitive healthy individuals
Both, decline of sensorimotor functions and cortical thickness are known processes in healthy aging. Physical activity has been suggested to enhance the execution of daily routine activities and to extend the time of functional independence in advanced age. We hypothesized that cortical thickness of motor areas in retired individuals could be related to physical demands of the profession carried out during working life. Depending on their former occupations, 69 cognitively healthy individuals (range 70-85 years) were divided into higher and lower physically complex occupations (HPCO n = 27 and LPCO n = 42) according to the international standard classification of occupations (ISCO-08). Participants underwent a high-resolution 3T T1-weighted MRI scan. Surface-based analysis revealed higher cortical thickness in the left precentral ($P = 0.001$) and postcentral gyrus ($P < 0.001$) and right postcentral gyrus ($P = 0.001$) for the HPCO relative to the LPCO group (corrected for multiple comparisons, sex, age and leisure activities in the past 20 years). Physical leisure activities associated with exertion were positively correlated with cortical thickness in the left pre- and postcentral gyrus ($P = 0.037$) of the LPCO group. Time since retirement was negatively associated with cortical thickness in the left postcentral gyrus ($P = 0.004$) of the HPCO group. Executing a higher physically complex occupation before retirement was related to relative higher cortical thickness in the primary motor and somatosensory cortex in later life, supporting the hypothesis that physical activity contributes to neural reserve in these regions. However, these benefits appear to vanish when physical activity is reduced due to retirement.
Lenhart et al. 2021.
Brain Structure & Function, vol. 226, no. 4.

Keywords: Cortical thickness; neural reserve; occupation; physical activity.
Evidence Level: 5A
Link: https://link.springer.com/article/10.1007%2Fs00429-021-02223-w

Technology

A machine learning based sentient multimedia framework to increase safety at work
In the last few decades, we have witnessed an increasing focus on safety in the workplace. ICT has always played a leading role in this context. One ICT sector that is increasingly important in ensuring safety at work is the Internet of Things and, in particular, the new architectures referring to it, such as SIoT, MIoT and Sentient Multimedia Systems. All these architectures handle huge amounts of data to extract predictive and prescriptive information. For this purpose, they often make use of Machine Learning. In this paper, we propose a framework that uses both Sentient Multimedia Systems and Machine Learning to support safety in the workplace. After the general presentation of the framework, we describe its specialization to a particular case, i.e., fall detection. As for this application scenario, we describe a Machine Learning based wearable device for fall detection that we designed, built and tested. Moreover, we illustrate a safety coordination platform for monitoring the work environment, activating alarms in case of falls, and sending appropriate advices to help workers involved in falls.
Bonifazi et al. 2021.
Multimedia Tools and Applications, vol. 15.

Keywords: Decision trees; fall detection; industry 4.0; internet of things; machine learning; safety at work; sentient multimedia systems.
Evidence Level: 6B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8122213/

Drivers of automation and consequences for jobs in engineering services: an agent-based modelling approach
New technology is of little use if it is not adopted, and surveys show that less than 10% of firms use Artificial Intelligence. This paper studies the uptake of AI-driven automation and its impact on employment, using a dynamic agent-based model (ABM). It simulates the adoption of automation software as well as job destruction and job creation in its wake. There are two types of agents: manufacturing firms and engineering services firms. The agents choose between two business models: consulting or automated software. From the engineering firms' point of view, the model exhibits static economies of scale in the software model and dynamic (learning by doing) economies of scale in the consultancy model. From the manufacturing firms' point of view, switching to the software model requires restructuring of production and there are network effects in switching. The ABM matches engineering and manufacturing agents and derives employment of engineers and the tasks they perform, i.e. consultancy, software development, software maintenance, or employment in manufacturing. We find that the uptake of software is gradual; slow in the first few years and then accelerates. Software is fully adopted after about 18 years in the base line run. Employment of engineers shifts from consultancy to software development and to new jobs in manufacturing. Spells of unemployment may occur if skilled jobs creation in manufacturing is slow. Finally, the model generates boom and bust cycles in the software sector.
Kyvik Nordås et al. 2021.
Frontiers in Robotics and AI, vol. 10, no. 8.

Keywords: Agent-based simulation; automation; economic modelling; employment; technology uptake.
Evidence Level: 6B
Link: https://www.frontiersin.org/articles/10.3389/frobt.2021.637125/full

Guiding and Supporting Mental Health and Wellbeing

Mental Health

Stress, drink, leave: An examination of gender-specific risk factors for mental health problems and attrition among licensed attorneys

Rates of mental illness and heavy alcohol use are exceedingly high in the legal profession, while attrition among women has also been a longstanding problem. Work overcommitment, work-family conflict, permissiveness toward alcohol in the workplace, and the likelihood of promotion are all implicated but have yet to be systematically investigated. Data were collected from 2,863 lawyers randomly sampled from the California Lawyers Association and D.C. Bar to address this knowledge gap. Findings indicated that the prevalence and severity of depression, anxiety, stress, and risky/hazardous drinking were significantly higher among women. Further, one-quarter of all women contemplated leaving the profession due to mental health concerns, compared to 17% of men. Logistic models were conducted to identify workplace factors predictive of stress, risky drinking, and contemplating leaving the profession. Overcommitment and permissiveness toward alcohol at work were associated with the highest likelihood of stress and risky drinking (relative to all other predictors) for both men and women. However, women and men differed with respect to predictors of leaving the profession due to stress or mental health. For women, work-family conflict was associated with the highest likelihood of leaving, while overcommitment was the number one predictor of leaving for men. Mental health and gender disparities are significant problems in the legal profession, clearly requiring considerable and sustained attention.

Anker et al. 2021.

PLoS One, vol. 16, no. 5.

Keywords: Stress; gender-specific; mental health; alcohol use; legal; attorneys; law.

Evidence Level: 5A

Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0250563

Psychosocial Issues

Developing a cost-estimation model for work-related stress: An absence-based estimation using data from two Italian case studies

Objectives: This paper discusses the development of a cost-estimation model for work-related stress based on psychosocial risk exposure and absence from work. It presents findings from its implementation and evaluation in two organizations in Italy, using national-level tools developed by the Italian Workers' Compensation Authority (INAIL). It also provides recommendations for the development of similar cost-calculation methods in other countries. **Methods:** The cost-estimation model was based on the human capital approach using an indirect cost indicator: loss of productivity due to days of absence attributable to work-related stress. Furthermore, the population attributable fraction (PAF) epidemiological measure was used to calculate the impact of exposure to work-related stress on the basis of data collected through validated tools developed by INAIL and salary cost data. **Results:** The developed model was implemented and evaluated in two organizations, the first in healthcare (N=1014) and the second in public administration (N=534). In the first case, it was found that absence related to work-related stress cost the organization €445 000. In the second case, the cost was €360 000. **Conclusions:** The proposed model provides an example of how organizations can incorporate well-established indicators associated with work-related stress (eg, various types of absence, psychosocial risk perception, loss of productivity on the basis of salary costs) in a practical way in cost estimations of work-related stress. Such cost estimation can be applied in other countries and organizations to establish the economic and business case of managing work-related stress.

Russo et al. 2021.

Scandinavian Journal of Work, Environment & Health, vol. 1, no. 47.

Keywords: Work-related stress; cost-estimation model; psychosocial risk exposure; absence.

Evidence Level: 5B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3948

Association of work performance and interoceptive awareness of 'body trusting' in an occupational setting: a cross-sectional study
Objectives: Work performance has been known to be influenced by both psychological stress (mind) and physical conditions (body). The aim of this study was to investigate the association between work performance and 'body trusting', which is a dimension of interoceptive awareness representing mind-body interactions. **Methods:** A cross-sectional study was conducted among a sample of workers in an industrial manufacturing company in Japan. Participants were assessed with a self-reported questionnaire including evaluations of work performance, body trusting, psychological distress, pain persistence, workplace and home stressors, and workaholism. Participants' sociodemographic, health and lifestyle characteristics were collected from their annual health check data. The association between work performance and body trusting was examined using multivariable regression analyses in the overall sample and in a subsample of people with pain. **Results:** A total of 349 workers participated in the study. A significant association between work performance and body trusting was observed, with higher body trusting representing higher work performance. The association was significant after controlling for psychological distress, workplace and home stress, workaholism and participants' characteristics ($p<0.001$). Compared with people without pain (n=126, 36.1%), people with pain (n=223, 63.9%) showed less body trusting, which was associated with decreased work performance after controlling for pain-related variables ($p<0.001$). **Conclusions:** Workers with higher body trusting showed higher work performance, even after controlling for various influencing factors. Body trusting may be an important target to promote work performance and to prevent loss of performance induced by health problems.
Tanaka et al. 2021.
BMJ Open, vol. 11, no. 5.

Keywords: Adult psychiatry; mental health; pain management; preventive medicine; public health.
Evidence Level: 4B
Link: https://bmjopen.bmj.com/content/11/5/e044303.long

Resilience mechanisms at work: the psychological immunity-psychological elasticity (PI-PE) model of psychological resilience
Recently, scientists have shifted their focus from studying psychological resilience as a single, isolated construct (e.g. attribute or outcome) to studying it as a dynamic process encompassing a number of temporally related elements. Models depicting this process explain why some people adapt to stressor exposure, whereas others do not. To date, these process models did not sufficiently explain how people adapt *differently* to a stressor. To address this issue, we developed a new model of psychological resilience, called the Psychological Immunity-Psychological Elasticity (PI-PE) model. The aim of this article is to clarify this model and to discuss its added value. First, we explain how we derived the PI-PE model from the literature regarding both the crucial elements in any resilience process model and the (mal)adaptive outcomes following stressful events. Secondly, we describe the different elements that make up the model. Characteristic of the PI-PE model is that it distinguishes between two pathways of psychological resilience - psychological immunity and psychological elasticity - with four adaptive outcomes, namely sustainability, recovery, transformation and thriving. To explain how people arrive at these different outcomes, we argue that two consecutive mechanisms are critical in these pathways: tolerance and narrative construction. Taken as a whole, the PI-PE model presents a comprehensive framework to inspire both research and practice. It explains how the process of psychological resilience works differently for different people and how to support individuals in their process towards successfully and differently adapting to stressors.
IJntema et al. 2021.
Current Psychology, vol. 9.

Keywords: Adaptation; narrative construction; psychological immunity-psychological elasticity (PI-PE) model; psychological resilience; stressor; tolerance.

Evidence Level: 6A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8106546/

Psychosocial work exposures and health outcomes: A meta-review of 72 literature reviews with meta-analysis
Objective: This meta-review aimed to present all available quantitative pooled estimates for the associations between psychosocial work exposures and health outcomes using a systematic literature review of literature reviews with meta-analysis. **Methods**: A systematic review of the literature from 2000 to 2020 was conducted using PubMed, Web of Science, Scopus, and PsycINFO databases following the PRISMA guidelines. All literature reviews and Individual-Participant Data (IPD)-Work consortium studies exploring an association between psychosocial work exposures and health outcomes and providing pooled estimates using meta-analysis were included. All types of psychosocial work exposures and health outcomes were studied. The quality of each included review was assessed. **Results**: A total of 72 reviews and IPD-Work consortium studies were included. These mainly focused on job strain as exposure and cardiovascular diseases and mental disorders as outcomes. The associations between psychosocial work factors and cardiovascular diseases and mental disorders were in general significant, and the magnitude of these associations was stronger for mental disorders than for cardiovascular diseases. Based on high-quality reviews, significant associations were found between job/high strain and long working hours as exposures and coronary heart diseases, (ischemic) stroke, and depression as outcomes. A few additional significant associations involved other exposures and health outcomes. **Conclusions**: The included reviews brought convincing findings on the associations of some psychosocial work factors with mental disorders and cardiovascular diseases. More research may be needed to explain these associations, explore other exposures and outcomes, and make progress towards determining the causality of the associations.
Niedhammer et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 27, no. 3968.

Keywords: Work exposures; health outcomes; psychosocial.
Evidence Level: 1A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3968

Enabling Healthy and Safe Workplaces

Health and Wellbeing

Work-related physical and psychosocial risk factors cluster with obesity, smoking and physical inactivity
Objective: This study investigated associations between the co-existence of multiple types of work-related psychosocial and physical risk factors, and (1) obesity; (2) smoking; and (3) leisure-time physical inactivity. It also aimed to identify sociodemographic characteristics related to clustering of work-related risk factors and lifestyle factors. **Methods:** Cross-sectional data on work-related risk factors (e.g., decision authority and repetitive movements) and lifestyle was measured using a standardized questionnaire among 52,563 Dutch workers in health care, services, manufacturing and public sector. Multiple-adjusted logistic regression models assessed associations between the co-existence of multiple types of psychosocial and physical risk factors and lifestyle factors. Additionally, logistic regression models related age, gender and educational level to clustering of risk factors and lifestyle factors. **Results:** The co-existence of multiple types of work-related psychosocial risk factors was associated with higher odds of smoking and being physically inactive. For example, workers exposed to three psychosocial risk factors had a 1.55 times higher odds of being physically inactive (95%CI: 1.42-1.70) compared to unexposed workers. A higher number of physical risk factors was also significantly associated with higher odds of smoking and obesity. The co-existence of multiple types of physical risk factors was not associated with higher odds of physical inactivity. Clustering of work-related risk factors and at least one unhealthy lifestyle factor occurred in particular among workers with low educational level. **Conclusions:** Results imply that interventions are

needed that focus on workers with a low educational level and address work-related physical and psychosocial risk factors as well as lifestyle.
van den Berge et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 4.

Keywords: Lifestyle; obesity; occupational stress; socioeconomic position; work demands.
Evidence Level: 4B
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01627-1

Facilitators and barriers to healthy eating in a worksite cafeteria: a qualitative study
Background: Worksite-based nutrition interventions can serve as access points to facilitate healthy eating and translate existing knowledge of cardiometabolic disease prevention. We explored perceptions, facilitators, and barriers for healthy eating in a cafeteria at a large worksite in Mexico City. **Methods:** We conducted an exploratory qualitative study in a large department store in Mexico City with ~ 1500 employees. We conducted eight focus group discussions (FGD) with 63 employees stratified by job category (sales, maintenance, shipping, restaurant, cafeteria, administrative staff, and sales managers). Employees were invited to participate in the FGD if they were at the store at the day and time of the FGD for their job type. FGDs were audio-recorded, transcribed verbatim and analyzed using the thematic method. This process involved the researches´ familiarizing themselves with the data, generating initial codes, searching for themes, reviewing the themes, defining and naming themes, and then interpreting the data.
Results: Employees defined healthy eating as eating foods that are fresh, diverse, and prepared hygienically. The most commonly reported facilitators of healthy eating at the worksite were availability of affordable healthy food options and employees' high health awareness. Major barriers to healthy eating included unavailability of healthy foods, unpleasant taste of food, and preference for fatty foods and meat. For lower-wage workers, affordability was a major concern. Other barriers included lack of time to eat work and long working hours. **Conclusion:** A broad range of factors affect healthy eating at the cafeteria, some related to nutrition and some related to the employees type of job. Availability of healthy, hygienic, and tasty food at an affordable price could lead to healthier food choices in the worksite cafeteria. These strategies, along with work schedules that allow sufficient time for healthy eating, may help improve dietary behaviors and health of employees.
Stern et al. 2021.
BMC Public Health, vol. 22, no. 21.

Keywords: Barriers; cafeteria; cardiometabolic diseases; facilitators; healthy eating; worksite.
Evidence Level: 5B
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11004-3

Self-rated exhaustion disorder and associated health-related factors among municipal employees in rural areas of northern Sweden
Objective: The aims of this study among municipal employees in rural areas of northern Sweden were to assess the prevalence of self-rated exhaustion disorder (s-ED), describe plausible between-group differences in self-reported health-related factors among employees with or without s-ED, and identify health-related factors associated with s-ED. **Methods:** In a cross-sectional study, data were collected from 1093 municipal employees (76.1% women) in two rural areas using an instrument measuring s-ED and health variables drawn from the Modern Worklife Questionnaire (MWQ), the Perceived Stress Scale (PSS), and the National Board of Health and Welfare's questions about physical activity. Comparisons were made between an s-ED and a non-s-ED group. Health-related factors associated with s-ED were identified through a logistic regression. **Results:** Self-rated exhaustion disorder was reported by 21.5% of the participants. Health-related factors associated with s-ED were cognitive problems, sleep problems, depressive symptoms, high stress, poor self-rated health, and stomach problems. There was no statistically significant difference in the prevalence of participants who met the criteria of physical activity among s-ED and non-s-ED group. **Conclusion:** Findings from this study suggest that s-ED is more common among municipal employees in rural areas than in other working populations in Sweden. Several health-related factors were

associated with s-ED. Regular use of a self-rated instrument in evaluating the organizational and social work environment can identify people at risk of developing exhaustion disorder and requiring long-term sick leave.
Asplund et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 4.

Keywords: Health; municipal employees; rural areas; self-rated exhaustion disorder; work-related stress.
Evidence Level: 4B
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01617-3

Psychosocial job exposure and risk of coronary artery calcification
Purpose: The aim was to examine potential associations between psychosocial job exposures, evaluated with the Job Demand-Control-model, and presence of coronary artery calcium. **Methods:** We performed a cross-sectional study using the Swedish CArdioPulmonary bioImage Study,(SCAPIS)pilot study. Coronary artery calcium was assessed through computed tomography of the coronary arteries and with coronary artery scoring, CACS. Main outcome was CACS ≥100 compared to CACS 0. Job demand and control was analysed according to the standard categorization of the two variables into: high strain, active, passive and low strain (reference). Associations between these variables and CACS were calculated with prevalence ratios (PR) using Cox regression with robust variance, 95% confidence intervals (CI) and adjusted for age, smoking, education, socioeconomic area and metabolic syndrome. **Results:** In total 777 participants were used in our analyses, for which 20% of the men and 5% of the women had CACS ≥100, respectively. The PR of having CACS ≥100 was non-significantly elevated for men in high strain jobs 1.54 (95% CI 0.88-2.69) and in active jobs 1.67 (95% CI 0.92-3.06), adjusted for covariates. For women there was no association between exposure to high strain and having CACS ≥100 PR 1.02 (95% CI 0.24-4.31). Among women reporting passive job, the PR was non-significantly elevated, 2.40 (95% CI 0.83-6.92), adjusted for covariates. **Conclusion:** The statistical power of the study was limited, but our results suggests the possibility that exposure to a high strain or an active job situation may increase the risk of CACS in men, while in women, it may rather be exposure to passive job.
Eriksson et al. 2021.
PLoS One, vol. 16, no. 5.

Keywords: Calcification; psychosocial; job exposures; risk.
Evidence Level: 4B
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252192

How are social stressors at work related to well-being and health? A systematic review and meta-analysis
Background: Social relationships are crucial for well-being and health, and considerable research has established social stressors as a risk for well-being and health. However, researchers have used many different constructs, and it is unclear if these are actually different or reflect a single overarching construct. Distinct patterns of associations with health/well-being would indicate separate constructs, similar patterns would indicate a common core construct, and remaining differences could be attributed to situational characteristics such as frequency or intensity. The current meta-analysis therefore investigated to what extent different social stressors show distinct (versus similar) patterns of associations with well-being and health. **Methods:** We meta-analysed 557 studies and investigated correlations between social stressors and outcomes in terms of health and well-being (e.g. burnout), attitudes (e.g. job satisfaction), and behaviour (e.g. counterproductive work behaviour). Moderator analyses were performed to determine if there were differences in associations depending on the nature of the stressor, the outcome, or both. To be included, studies had to be published in peer-reviewed journals in English or German; participants had to be employed at least 50% of a full-time equivalent (FTE). **Results:** The overall relation between social stressors and health/well-being was of medium size ($r = -.30$, $p < .001$). Type of social stressor and outcome category acted as moderators, with moderating effects being larger for outcomes than for stressors. The strongest effects emerged for job satisfaction, burnout, commitment, and counterproductive work behaviour. Type of stressor yielded a significant moderation, but differences in effect sizes for different stressors were

rather small overall. Rather small effects were obtained for physical violence and sexual mistreatment, which is likely due to a restricted range because of rare occurrence and/or underreporting of such intense stressors. **Conclusions:** We propose integrating diverse social stressor constructs under the term "relational devaluation" and considering situational factors such as intensity or frequency to account for the remaining variance. Practical implications underscore the importance for supervisors to recognize relational devaluation in its many different forms and to avoid or minimize it as far as possible in order to prevent negative health-related outcomes for employees.
Gerhardt et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Health; relational devaluation; SOS-model; social stressors; well-being.
Evidence Level: 1A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10894-7

The paradox of citizenship cost: examining a longitudinal indirect effect of altruistic citizenship behavior on work-family conflict through coworker support
The objective of this study was to address the paradox of citizenship cost by hypothesizing an indirect rather than a direct effect of altruistic citizenship behavior (ACB) on employee work-family conflict (WFC) through coworker support (CWS). Data were gathered in a three-wave longitudinal survey of employees from private commercial banks (*N* = 318). A multiple linear autoregressive longitudinal mediation model was analyzed with partial least squares structural equation modeling (PLS-SEM). The results indicate that rather than directly, ACB affects indirectly employee WFC through CWS. This indirect effect is negative, which reflects that the costs of citizenship behavior are paradoxical. The present study contributes to the ongoing debate on the positive and negative outcomes of employee citizenship behavior by providing empirical evidence on the beneficial rather than harmful effect of performing such behavior. For organizational managers, promoting a culture of CWS by encouraging altruistic behaviors can be a most viable strategy to reduce WFC among their employees. The study discusses its limitations and provides future research directions.
Haider et al. 2021.
Frontiers of Psychology, vol. 7, no. 12.

Keywords: Altruistic citizenship behavior; citizenship cost; coworker support; paradox; work-family conflict.
Evidence Level: 4A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8137906/

Work Health and Safety

Association of managerial position with cardiovascular risk factors: A fixed-effects analysis for Japanese employees
Objectives: Although higher occupational classes have been reported to be associated with better health, researchers do not fully understand whether such associations derive from the position or individual characteristics of the person in that position. We examined the association between being a manager and cardiovascular disease (CVD) risk factors using unique panel data in Japan that annually observed employees' occupational class and health conditions. **Methods**: We analyzed data for 45 888 observations from a Japanese company from 2013 through 2017. The association between being a manager and CVD risk factors (metabolic risks and health-related behaviors) were evaluated using simple pooled cross-sectional analyses with adjustment for age, sex, marital status, and overtime-working hours. We further incorporated employee-level fixed-effects into the models to examine whether the associations were subject to individual time-invariant factors. **Results**: The pooled cross-sectional analyses showed that, compared to non-managers, managers had 2.0 mg/dl lower low density lipoprotein cholesterol (LDL-C) level, 1.4 mmHg-lower systolic blood pressure, and 0.2 kg/m ^{2}lower body mass index (BMI). After adjusting for employee-level fixed-effects, being a manager was associated with a significantly 2.2 mg/dl higher LDL-C

level. However, the associations between an individual's management status and blood pressure or BMI were not significant. Furthermore, managers were 5.5% less likely to exercise regularly and 6.1% less likely to report sufficient sleep in the fixed-effects models, although the pooled cross-sectional analyses did not demonstrate these significant associations. **Conclusions**: Our findings suggest the necessity of considering these unfavorable health risks associated with being promoted to a manager.
Ikesu et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 19, no. 3966.

Keywords: Cardiovascular health; risk, cardiovascular disease; managers; managerial positions
Evidence Level: 4B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3966

Retrospective review of work-related injuries sustained by foreign workers: A single centre experience over 10 years
Objectives: To investigate current patterns of work-related injuries sustained by foreign workers in Singapore and compare them to a decade ago. Secondary aim to analyse usefulness of selected trauma scores in this context. **Design:** Retrospective review of trauma registry of a single centre, from 1 April to 30 June 2015. Data compared with those from similar study performed at same centre in 2004.
Setting: Emergency department (ED) of 1500-bedded acute urban public hospital in Singapore.
Participants: 1094 foreign workers with work-related injuries were included. Tourists, foreign students, non-work-related injuries, re-attendances for the same condition were excluded. **Results:** Mean age of participants was 32.8 years (SD 7.8), 90.0% were men. ED attendance was lowest on Sundays. Mechanism of injury: blunt (78.2%), penetrating (19.2%), burns (2.6%). Compared to 2004, 5% of foreign workers required admission (vs 19.6% in 2004, p≤0.0001), 8.0% underwent day or inpatient surgical procedures (vs 13.2% in 2004, p≤0.0001), 41.6% were referred to specialist outpatient clinics (vs 27.6% in 2004, p≤0.0001), 12.5% were referred to primary care follow-up (vs 29.9% in 2004, p≤0.0001). Mean duration of sick days was 4.3 (vs 5.1 in 2004, p≤0.0001). Of admitted patients, 49.1% had extremity injuries and 36.3% had head and neck injuries. Mean Injury Severity Score (ISS) for admitted patients was 3.64 (SD 3.1) (vs 4.3 (SD 5.5) in 2004, p=0.39). Mean Revised Trauma Score (RTS) for admitted patients was 7.74 (SD 0.39) (vs 7.8 (SD 0.2) in 2004, p=0.07). Of discharged patients, 48.9% had extremity injuries and 48.9% had external injuries. There was no death. **Conclusion:** Compared to 2004, there were fewer major/fatal work-related injuries and an increased proportion of minor injuries. ISS and RTSs were of limited use in this setting.
Quek et al. 2021.
BMJ Open, vol. 11, no. 15.

Keywords: Accident & emergency medicine; public health; trauma management.
Evidence Level: 4A
Link: https://pubmed.ncbi.nlm.nih.gov/33972330/

Application of two job indices for general occupational demands in a pooled analysis of case-control studies on lung cancer
Objectives: We investigated general job demands as a risk factor for lung cancer as well as their role in the association between occupational prestige and lung cancer. **Methods:** In 13 case-control studies on lung cancer, as part of the international SYNERGY project, we applied indices for physical (PHI) and psychosocial (PSI) job demands - each with four categories (high to low). We estimated odds ratios (OR) and 95% confidence intervals (CI) for lung cancer by unconditional logistic regression, separately for men and women and adjusted for study centre, age, smoking behavior, and former employment in occupations with potential exposure to carcinogens. Further, we investigated, whether higher risks among men with low occupational prestige (Treiman's Standard International Occupational Prestige Scale) were affected by adjustment for the job indices. **Results:** In 30 355 men and 7371 women, we found increased risks (OR) for lung cancer with high relative to low job demands in both men [PHI 1.74 (95% CI 1.56-1.93), PSI 1.33 (95% CI 1.17-1.51)] and women [PHI 1.62 (95% CI 1.24-2.11), PSI 1.31 (95% CI 1.09-1.56)]. OR for lung cancer among men with low occupational prestige were slightly reduced when adjusting for PHI [low versus high

prestige OR from 1.44 (95% CI 1.32-1.58) to 1.30 (95% CI 1.17-1.45)], but not PSI. **Conclusions:** Higher physical job demands were associated with increased risks of lung cancer, while associations for higher psychosocial demands were less strong. In contrast to physical demands, psychosocial demands did not contribute to clarify the association of occupational prestige and lung cancer.
Hovanec et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 3, no. 3967.

Keywords: General job demands; cancer; risk factors; occupational prestige, lung cancer.
Evidence Level: 5A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3967

Ergonomics

The effect of occupational exposure to ergonomic risk factors on osteoarthritis of hip or knee and selected other musculoskeletal diseases: A systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury
Background: The World Health Organization (WHO) and the International Labour Organization (ILO) are developing joint estimates of the work-related burden of disease and injury (WHO/ILO Joint Estimates), with contributions from a large network of experts. Evidence from mechanistic data suggests that occupational exposure to ergonomic risk factors may cause selected other musculoskeletal diseases, other than back or neck pain (MSD) or osteoarthritis of hip or knee (OA). In this paper, we present a systematic review and meta-analysis of parameters for estimating the number of disability-adjusted life years from MSD or OA that are attributable to occupational exposure to ergonomic risk factors, for the development of the WHO/ILO Joint Estimates. **Objectives:** We aimed to systematically review and meta-analyse estimates of the effect of occupational exposure to ergonomic risk factors (force exertion, demanding posture, repetitiveness, hand-arm vibration, lifting, kneeling and/or squatting, and climbing) on MSD and OA (two outcomes: prevalence and incidence). **Data sources:** We developed and published a protocol, applying the Navigation Guide as an organizing systematic review framework where feasible. We searched electronic academic databases for potentially relevant records from published and unpublished studies, including the International Trials Register, Ovid Medline, EMBASE, and CISDOC. We also searched electronic grey literature databases, Internet search engines and organizational websites; hand-searched reference list of previous systematic reviews and included study records; and consulted additional experts. **Study eligibility and criteria:** We included working-age (≥15 years) workers in the formal and informal economy in any WHO and/or ILO Member State but excluded children (<15 years) and unpaid domestic workers. We included randomized controlled trials, cohort studies, case-control studies and other non-randomized intervention studies with an estimate of the effect of occupational exposure to ergonomic risk factors (any exposure to force exertion, demanding posture, repetitiveness, hand-arm vibration, lifting, kneeling and/or squatting, and climbing ≥ 2 h/day) compared with no or low exposure to the theoretical minimum risk exposure level (<2 h/day) on the prevalence or incidence of MSD or OA. **Study appraisal and synthesis methods:** At least two review authors independently screened titles and abstracts against the eligibility criteria at a first stage and full texts of potentially eligible records at a second stage, followed by extraction of data from qualifying studies. Missing data were requested from principal study authors. We combined odds ratios using random-effect meta-analysis. Two or more review authors assessed the risk of bias and the quality of evidence, using Navigation Guide tools adapted to this project. **Results:** In total eight studies (4 cohort studies and 4 case control studies) met the inclusion criteria, comprising a total of 2,378,729 participants (1,157,943 females and 1,220,786 males) in 6 countries in 3 WHO regions (Europe, Eastern Mediterranean and Western Pacific). The exposure was measured using self-reports in most studies and with a job exposure matrix in one study and outcome was generally assessed with physician diagnostic records or administrative health data. Across included studies, risk of bias was generally moderate. Compared with no or low exposure (<2 h per day), any occupational exposure to ergonomic risk factors increased the risk of acquiring MSD (odds ratio (OR) 1.76, 95% confidence interval [CI] 1.14 to 2.72, 4 studies, 2,376,592 participants, I^2 70%); and increased the risk of acquiring OA of knee or hip (OR 2.20, 95%

CI 1.42 to 3.40, 3 studies, 1,354 participants, I^2 13%); Subgroup analysis for MSD found evidence for differences by sex, but indicated a difference in study type, where OR was higher among study participants in a case control study compared to study participants in cohort studies. **Conclusions:** Overall, for both outcomes, the main body of evidence was assessed as being of low quality. Occupational exposure to ergonomic risk factors increased the risk of acquiring MSD and of acquiring OA of knee or hip. We judged the body of human evidence on the relationship between exposure to occupational ergonomic factors and MSD as "limited evidence of harmfulness" and the relationship between exposure to occupational ergonomic factors and OA also as "limited evidence of harmfulness". These relative risks might perhaps be suitable as input data for WHO/ILO modelling of work-related burden of disease and injury. Protocol identifier: https://doi.org/10.1016/j.envint.2018.09.053 PROSPERO registration number: CRD42018102631.
Hulshof et al. 2021.
Environment International, vol. 150.

Keywords: Ergonomic risk factors; global burden of disease; occupational exposure; osteoarthritis; other musculoskeletal diseases; systematic review.
Evidence Level: 1A
Link: https://www.sciencedirect.com/science/article/pii/S0160412020323047?via%3Dihub

Combined ergonomic exposures and development of musculoskeletal pain in the general working population: A prospective cohort study
Objective: This study aimed to investigate the importance of combined ergonomic exposures at work for the development of musculoskeletal pain. **Methods**: Through four rounds (2012-2018) of the Work Environment and Health in Denmark Study, 18 905 employees of the general working population replied to a baseline and 2-year follow-up questionnaire. First, a k-means cluster analysis of seven ergonomic factors (back bending, arm above shoulders, lifting etc., from 'never' to 'almost all the time') identified nine naturally occurring clusters. Second, using a weighted survey regression model controlling for age, gender, survey year, education, lifestyle, influence at work, and pain intensity at baseline, we estimated development of pain intensity (0-10) in the neck-shoulder and low-back in these clusters. The largest cluster served as reference to the other clusters and was characterized by low ergonomic exposures. **Results**: Clusters characterized by multiple combined ergonomic exposures for a relatively high percentage of the working time showed the largest increase in neck-shoulder as well as low-back pain intensity from baseline to follow-up. However, clusters characterized by high exposure to a few specific ergonomic factors also increased pain significantly, eg, standing/walking combined with lifting/carrying or twisted/bent back for the majority of the working time increased low-back pain, whereas repetitive arm movements for the majority of the working time with or without standing/walking increased neck-shoulder pain. **Conclusion**: Combined occupational ergonomic exposures play an important role in the development of musculoskeletal pain. Workplace preventive approaches should consider this in risk assessments and organization of the work.
Andersen et al. 2021.
Scandinavian Journal of Work, Environment and Health, vol. 47, no. 4.

Keywords: Ergonomic exposures; musculoskeletal pain; factors; work.
Evidence Level: 4A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3954

Chronic Health Issues

Work stress and oral conditions: a systematic review of observational studies
Objectives: Although psychological stress is a risk factor for oral diseases, there seems to be no review on work stress. This study aimed to review the evidence on the association between work stress and oral conditions, including dental caries, periodontal status and tooth loss. **Design:** A systematic review of published observational studies. **Data sources:** A systematic literature search was conducted in PubMed

and Scopus databases on 12 August 2020. **Study selection:** Articles were screened based on the following inclusion criteria: published after 1966; in English only; epidemiological studies on humans (except case studies, reviews, letters, commentaries and editorials); and examined the association of work stress with dental caries, periodontal status and tooth loss. **Data extraction**: Data were extracted from eligible studies. A quality assessment was conducted using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. **Results:** Of 402 articles identified, 11 met the inclusion criteria, and 1 study assessed the association of work stress with dental caries and periodontal status. Of 11 studies, 1 reported a non-significant association between work stress and dental caries; 8 of 9 studies reported a significant association between work stress and worse periodontal status; and 1 of 2 studies reported a significant association between work stress and tooth loss. Nine of 11 studies were cross-sectional, while the remaining 2 studies had unclear methodology. Only two studies were sufficiently adjusted for potential confounders. Eight studies assessed work stress but did not use the current major measures. Three studies were rated as fair, while eight studies had poor quality. **Conclusions**: There is a lack of evidence on the association of work stress with dental caries and tooth loss. Eight studies suggested potential associations between periodontal status and work stress. Cohort studies using the major work stress measures and adjusting for the potential confounders are needed.
Sato et al. 2021.
BMJ Open, vol. 28, no. 11.

Keywords: Epidemiology; occupational & industrial medicine; social medicine.
Evidence Level: 1A
Link: https://bmjopen.bmj.com/content/11/5/e046532.long

Work-life conflict and cardiovascular health: 5-year follow-up of the Gutenberg Health Study
Introduction: Work-life conflicts (WLC) may impact health, but few studies prospectively consider the impact of WLC on objective outcomes such as cardiovascular disease. Using data from the Gutenberg Health Study (GHS), we examined if WLC at baseline was associated with an increased five-year incidence of cardiovascular events (myocardial infarct, stroke, atrial fibrillation, peripheral artery disease, coronary artery disease, chronic heart failure, sudden cardiac death). We also considered if WLC was associated with incident hypertension and arterial stiffness and if the effects of WLC on cardiovascular health differ for men and women. **Methods:** A working subsample of the 15,010 GHS cohort participants completed the Copenhagen Psychosocial Questionnaire, which included five "work-privacy conflict" questions at baseline and at the five-year follow-up. Relative risks for incident hypertension due to increased WLC at baseline (WLC scores exceeding 60 out of 100) were estimated with Poisson regression in the subgroup of participants without hypertension at baseline (n = 2426). Categories of WLC at baseline and follow-up were also used to examine the risk of hypertension due to chronic/recurrent WLC. In this subgroup, we also examined the association between WLC as a continuous score ranging from 0 to 100 with change to arterial stiffness after five years using linear regression. Hazard ratios were estimated for incident cardiovascular events in a larger subsample of participants without prevalent cardiovascular disease at baseline (n = 3698) using Cox regression. We used various multivariable regression models to adjust for sex, age, socioeconomic status, occupational, household, and cardiovascular risk factors. **Results:** We found no association between WLC and incident hypertension or increased arterial stiffness. The fully-adjusted relative risk for WLC >60 at baseline and hypertension was 0.93 (95% 0.74-1.17). The risk of hypertension due to chronic/recurrent WLC >60 was increased but not statistically significant (RR = 1.13, 95% CI 0.83-1.54). Overall, hazard ratios for incident cardiovascular events were also not increased. However, stratifying the results by sex resulted in a hazard ratio of 1.47 (95% CI 0.54-3.98) for incident cardiovascular disease among women in the fully adjusted model. **Conclusions:** Although our results were not statistically significant, they indicate that WLC is negatively impacting the cardiovascular health of women. While these results need to be confirmed with additional research and a longer follow-up, interventions to prevent WLC will promote health and could be especially beneficial for women.
Hegewald et al. 2021.
PLoS One, vol. 16, no. 5.

Keywords: Work-life conflict; cardiovascular health; cardiovascular disease
Evidence Level: 4B
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0251260

Is job strain associated with a higher risk of type 2 diabetes mellitus? A systematic review and meta-analysis of prospective cohort studies
Objectives: Epidemiological studies have explored the relationship between work-related stress and the risk of type 2 diabetes mellitus (T2DM), but it remains unclear on whether work-related stress could increase the risk of T2DM. We aimed to evaluate the association between job strain and the risk of T2DM. **Methods:** We searched PubMed and Web of Science up to April 2019. Summary risk estimates were calculated by random-effect models. And the analysis was also conducted stratifying by gender, study location, smoking, drinking, body mass index, physical activity, family history of T2DM, education and T2DM ascertainment. Studies with binary job strain and quadrants based on the job strain model were analyzed separately. **Results:** A total of nine studies with 210 939 participants free of T2DM were included in this analysis. High job strain (high job demands and low control) was associated with the overall risk of T2DM compared with no job strain (all other combinations) [relative risk (RR) 1.16, 95% confidence interval (CI) 1.03-1.31], and the association was more evident in women (RR 1.48, 95% CI 1.02-2.14). A statistically significant association was also observed when using high strain as a category (job strain quadrants) rather than binary variable (RR 1.62, 95% CI 1.04-2.55) in women but not men. **Conclusions:** Our study suggests that job strain is an important risk factor for T2DM, especially among women. Appropriate preventive interventions in populations with high job strain would contribute to a reduction in T2DM risk.
Li et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 47, no. 4.
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Keywords: Job strain; diabetes; Type 2 diabetes; risk factors; work.
Evidence Level: 1A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3938

Occupational Exposure

Secondary organizing pneumonia following occupational acute nitrogen oxide poisoning: a case report
Secondary organizing pneumonia (SOP) is a nonspecific inflammatory response towards acute lung injuries caused by various diseases. However, organizing pneumonia (OP) secondary to occupational acute nitrogen oxide poisoning has been reported rarely. We report a 49-year-old man who suffered from nitrogen oxide poisoning after inhaling mixed gas at work. After pathological examination, he was diagnosed with OP. In the absence of other underlying factors causing OP, he was diagnosed with SOP owing to acute nitrogen oxide poisoning. After systematic treatment, the patient recovered and was discharged in better health. In patients with lung injury caused by acute nitrogen oxide poisoning, physicians should be alert to the risk of patients subsequently developing SOP, and timely diagnosis and treatment are essential for complete recovery.
Ma et al. 2021.
Journal of International Medical Research, vol. 49, no. 5.
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Keywords: Case report; nitrogen oxide; occupational exposure; organizing pneumonia; poisoning; secondary.
Evidence Level: 5A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8113927/

Occupational exposure during asphalt paving-comparison of hot and warm mix asphalt in field experiments

Objectives: Several studies have demonstrated an increased risk of adverse health effects, including reduced lung function and lung cancer among asphalt pavers, which has been related to occupational exposure to contaminants during asphalt paving. Consequently, occupational exposure among asphalt pavers must be reduced. The aim of this study was to compare the impact of hot mix asphalt (HMA) and warm mix asphalt (WMA) paving on occupational exposure levels during road paving in field experiments. Asphalt temperatures when paving with WMA are usually lower than when paving with HMA due to differences in the asphalt's composition and method of application. **Methods:** On 11 different road sections, one lane was paved with WMA and one with HMA during the same work shift under approximately identical weather conditions. The weather conditions and asphalt surface temperature were monitored during paving. Fifty-seven samples of fumes and vapor, organic and elemental carbon, amines, and respirable, thoracic, and inhalable particulate matter (PM) fractions were collected by stationary sampling. In addition, 30 samples of fumes and vapor were collected by personal sampling. **Results:** Compared to paving with HMA, paving with WMA significantly ($P < 0.05$; paired Student's t-test) reduced the geometric mean (GM) air concentration of asphalt vapor (0.04 versus 0.08 p.p.m.), organic carbon (OC; 0.09 versus 0.18 mg m-3), and respirable PM (0.12 versus 0.22 mg m-3). Additionally, the air concentration of OC correlated strongly with the respirable fraction of PM (Pearson's correlation coefficient 0.83). **Conclusions:** Measured airborne concentrations of respirable PM, OC, and asphalt vapor were lower when paving with WMA than with HMA. Because exposure to airborne contaminants generated during asphalt paving is believed to be responsible for the adverse health effects observed among asphalt pavers, paving with WMA rather than HMA may have health benefits.

Olsen et al. 2021.
Annals of Work Exposures and Health, vol. 65, no. 4.

Keywords: Asphalt fumes; asphalt paving; organic carbon; respirable dust.
Evidence Level: 3A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8091472/

Global infectious disease risks associated with occupational exposure among non-healthcare workers: a systematic review of the literature

Objectives: Employees in non-healthcare occupations may be in several ways exposed to infectious agents. Improved knowledge about the risks is needed to identify opportunities to prevent work-related infectious diseases. The objective of the current study was to provide an updated overview of the published evidence on the exposure to pathogens among non-healthcare workers. Because of the recent SARS-CoV-2 outbreaks, we also aimed to gain more evidence about exposure to several respiratory tract pathogens. **Methods:** Eligible studies were identified in MEDLINE, Embase and Cochrane between 2009 and 8 December 2020. The protocol was registered with International Prospective Register of Systematic Reviews (CRD42019107265). An additional quality assessment was applied according to the Equator network guidelines. **Results:** The systematic literature search yielded 4620 papers of which 270 met the selection and quality criteria. Infectious disease risks were described in 37 occupational groups; 18 of them were not mentioned before. Armed forces (n=36 pathogens), livestock farm labourers (n=31), livestock/dairy producers (n=26), abattoir workers (n=22); animal carers and forestry workers (both n=16) seemed to have the highest risk. In total, 111 pathogen exposures were found. Many of these occupational groups (81.1%) were exposed to respiratory tract pathogens. **Conclusion:** Many of these respiratory tract pathogens were readily transmitted where employees congregate (workplace risk factors), while worker risk factors seemed to be of increasing importance. By analysing existing knowledge of these risk factors, identifying new risks and susceptible risk groups, this review aimed to raise awareness of the issue and provide reliable information to establish more effective preventive measures.

Acke et al. 2021.
Occupational and Environmental Medicine.

Keywords: Communicable diseases; military personnel; occupational health; respiratory system; zoonoses.
Evidence Level: 1A
Link: https://oem.bmj.com/content/early/2021/05/24/oemed-2020-107164.long

The association between silica exposure, silicosis and tuberculosis: A systematic review and meta-analysis

Background: While the association between occupational inhalation of silica dust and pulmonary tuberculosis has been known for over a century, there has never been a published systematic review, particularly of experience in the current era of less severe silicosis and treatable tuberculosis. We undertook a systematic review of the evidence for the association between (1) silicosis and pulmonary tuberculosis, and (2) silica exposure and pulmonary tuberculosis controlling for silicosis, and their respective exposure-response gradients. **Methods:** We searched PUBMED and EMBASE, and selected studies according to a priori inclusion criteria. We extracted, summarised and pooled the results of published case-control and cohort studies of silica exposure and/or silicosis and incident active tuberculosis. Study quality was assessed on the Newcastle-Ottawa Scale. Where meta-analysis was possible, effect estimates were pooled using inverse-variance weighted random-effects models. Otherwise narrative and graphic synthesis was undertaken. Confidence regarding overall effect estimates was assessed using the GRADE schema. **Results:** Nine studies met the inclusion criteria. Meta-analysis of eight studies of silicosis and tuberculosis yielded a pooled relative risk of 4.01 (95% confidence interval (CI) 2.88, 5.58). Exposure-response gradients were strong with a low silicosis severity threshold for increased risk. Our GRADE assessment was high confidence in a strong association. Meta-analysis of five studies of silica exposure controlling for or excluding silicosis yielded a pooled relative risk of 1.92 (95% CI 1.36, 2.73). Exposure-response gradients were observable in individual studies but not finely stratified enough to infer an exposure threshold. Our GRADE assessment was low confidence in the estimated effect owing to inconsistency and use of proxies for silica exposure. **Conclusions:** The evidence is robust for a strongly elevated risk of tuberculosis with radiological silicosis, with a low disease severity threshold. The effect estimate is more uncertain for silica exposure without radiological silicosis. Research is needed, particularly cohort studies measuring silica exposure in different settings, to characterise the effect more accurately as well as the silica exposure threshold that could be used to prevent excess tuberculosis risk.
Ehrlich et al. 2021.
BMC Public Health, vol. 20, no. 21.

Keywords: Silica exposure; silicosis; tuberculosis.
Evidence Level: 1A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10711-1

Assessment of occupational exposure from radon in the newly formed underground tourist route under Książ castle, Poland

In the present study, ^{222}Rn activity concentrations in a newly formed underground tourist route under Książ castle, Poland, were investigated for periods undisturbed and disturbed by construction works. This preliminary assessment is based on the almost 3-year long continuous measurements (28 Oct. 2016-02 Jul. 2019) done with an SRDN-3 instrument. In detail described are radon concentrations for periods of renovation (11 Aug. 2018-10 Oct. 2018), opening (15 Oct. 2018-10 Apr. 2019) and operation and monitoring (11 Apr. 2019-02 Jul. 2019) of the facility. It was observed that after the termination of construction work, when natural ventilation returned to the state preceding this work, the absolute values of radon activity concentration decreased. The mean annual radon concentrations were higher than the reference level of radon concentration in underground spaces recommended by IAEA, ICRP, and by the EU Council Directive for workplaces. They reached 1179 Bq/m^3 and 943 Bq/m^3 in 2017 and 2018, respectively. Cyclically recurring daily changes in radon concentrations occurred only in April and October (so-called transitional periods) and only outside the period of construction work. The results confirmed; however, that these changes need not be considered when planning the work in the tunnel. The minimum effective dose rate from radon exposure occurs in colder periods of the year, from November to the end of March,

where the mean effective dose rate value was found to be 0.0003 mSv/h. In contrast, the maximum dose rate of 0.014 mSv/h was observed from April to August.
Fijałkowska-Lichwa et al. 2021.
Radiation and Environmental Biophysics, vol. 60, no. 2.

Keywords: Construction works; effective dose; radiation protection; radon measurements; ventilation; workplace.
Evidence Level: 5B
Link: https://link.springer.com/article/10.1007%2Fs00411-021-00903-z

HBM4EU chromates study - Reflection and lessons learnt from designing and undertaking a collaborative European biomonitoring study on occupational exposure to hexavalent chromium
The EU human biomonitoring initiative, HBM4EU, aims to co-ordinate and advance human biomonitoring (HBM) across Europe. As part of HBM4EU, we presented a protocol for a multicentre study to characterize occupational exposure to hexavalent chromium (Cr(VI)) in nine European countries (HBM4EU chromates study). This study intended to collect data on current occupational exposure and to test new indicators for chromium (Cr) biomonitoring (Cr(VI) in exhaled breath condensate and Cr in red blood cells), in addition to traditional urinary total Cr analyses. Also, data from occupational hygiene samples and biomarkers of early biological effects, including genetic and epigenetic effects, was obtained, complementing the biomonitoring information. Data collection and analysis was completed, with the project findings being made separately available. As HBM4EU prepares to embark on further European wide biomonitoring studies, we considered it important to reflect on the experiences gained through our harmonised approach. Several practical aspects are highlighted for improvement in future studies, e.g., more thorough/earlier training on the implementation of standard operating procedures for field researchers, training on the use of the data entry template, as well as improved company communications. The HBM4EU chromates study team considered that the study had successfully demonstrated the feasibility of conducting a harmonised multicentre investigation able to achieve the research aims and objectives. This was largely attributable to the engaged multidisciplinary network, committed to deliver clearly understood goals. Such networks take time and investment to develop, but are priceless in terms of their ability to deliver and facilitate knowledge sharing and collaboration.
Galea et al. 2021.
International Journal of Hygiene and Environmental Health, vol. 234

Keywords: Biological monitoring; harmonisation; methodology; multicentre; occupational exposure; standard operating procedure.
Evidence Level: 6B
Link: https://www.sciencedirect.com/science/article/pii/S1438463921000407?via%3Dihub

Occupation, socioeconomic status and chronic obstructive respiratory diseases - The EpiLung study in Finland, Estonia and Sweden
Objective: To study occupational groups and occupational exposure in association with chronic obstructive respiratory diseases. **Methods:** In early 2000s, structured interviews on chronic respiratory diseases and measurements of lung function as well as fractional expiratory nitric oxide (F_{ENO}) were performed in adult random population samples of Finland, Sweden and Estonia. Occupations were categorized according to three classification systems. Occupational exposure to vapours, gases, dusts and fumes (VGDF) was assessed by a Job-Exposure Matrix (JEM). The data from the countries were combined. **Results:** COPD, smoking and occupational exposure were most common in Estonia, while asthma and occupations requiring higher educational levels in Sweden and Finland. In an adjusted regression model, non-manual workers had a three-fold risk for physician-diagnosed asthma (OR 3.18, 95%CI 1.07-9.47) compared to professionals and executives, and the risk was two-fold for healthcare & social workers (OR 2.28, 95%CI 1.14-4.59) compared to administration and sales. An increased risk for physician-diagnosed COPD was seen in manual workers, regardless of classification system, but in contrast to asthma, the risk was mostly

explained by smoking and less by occupational exposure to VGDF. For $F_{ENO,}$ no associations with occupation were observed. **Conclusions:** In this multicenter study from Finland, Sweden and Estonia, COPD was consistently associated with manual occupations with high smoking prevalence, highlighting the need to control for tobacco smoking in studies on occupational associations. In contrast, asthma tended to associate with non-manual occupations requiring higher educational levels. The occupational associations with asthma were not driven by eosinophilic inflammation presented by increased F_{ENO}.
Jalasto et al. 2021.
Respiratory Medicine, vol. 3.

Keywords: Asthma; COPD; fraction of exhaled nitric oxide (FENO); occupational exposure; smoking; socioeconomic status.
Evidence Level: 3B
Link: https://www.resmedjournal.com/article/S0954-6111(21)00109-8/fulltext

Asbestosis and Mesothelioma

Asbestos exposure and ovarian cancer - A gynaecological occupational disease. Background, mandatory notification, practical approach
In 2017, ovarian cancer due to asbestos exposure was designated a new, and thereby the first, gynaecological occupational disease in Germany. Asbestos is a naturally occurring mineral fibre with an annual usage in Germany of 160 000 - 180 000 metric tonnes in the 1960s and 1970s. The carcinogenicity of asbestos for the target organs lungs, larynx, pleura including pericardium, and peritoneum including tunica vaginalis testis has been clearly established for many years. Recent meta-analyses of data from cohort studies have demonstrated that the risk of ovarian cancer roughly doubles in women with occupational exposure to asbestos. Since the group of people with double the risk of developing lung cancer due to work-related asbestos exposure has a 2.25-fold increased risk of mortality from ovarian cancer on average, work-related ovarian cancer has been assigned the same recognition requirements as in occupational lung (and laryngeal) cancer. Thus, gynaecologists must obtain a thorough history of occupational exposure to asbestos, even if it may have taken place long in the past. The law mandates that suspected such cases must be reported to the Statutory Accident Insurance carrier or the State Occupational Safety and Health Agency.
Nowak et al. 2021.
Thieme Geburtshilfe und Frauenheilkunde, vol. 81, no. 5.

Keywords: Asbestos; occupational disease; ovarian cancer; ovary.
Evidence Level: 6A
Link: https://www.thieme-connect.com/products/ejournals/abstract/10.1055/a-1361-1715

Sedentary Practices

Office work and stretch training (OST) study: effects on the prevalence of musculoskeletal diseases and gender differences: a non-randomised control study
Objectives: For the prevention of musculoskeletal diseases (MSDs), stretch training can be a measure of the workplace health promotion (WHP) for office workers. This can lead to an increase in mobility and, ultimately, reduce or prevent MSD. The aim of the study was to examine a standardised and individualised stretch training on a device, specifically 'five Business', for the prevalence of MSD. **Design:** This study is a non-randomised control study. **Setting:** WHP programme with clerical employees of a German car manufacturer. **Participants:** 252 (110 women; 142 men) subjects (median age of 44 ([Formula: see text] 21 years) finished the study successfully. Inclusion criteria included a full-time employment in the office workplace and subjective health. **Intervention:** The intervention group completed 22-24 training units of 10 min each on the 'five-Business' device two times a week for 12 weeks. **Primary and secondary outcome**

measures: Data were collected in the form of a pre-post study Nordic Questionnaire. **Results:** After the intervention, significantly fewer subjects reported pain in the area of the neck (-17.79), shoulder (-11.28%), upper back (-14.7%), lower back (-12.78%) and feet (-8.51%). The gender analysis revealed that women are, in general, more often affected by musculoskeletal complaints than men, especially in the neck (+29.5%) and feet (+15.03%). Both sexes had significant reductions of MSD in the most commonly affected regions. Thus, 27.12% less women reported having neck pain, while 13.14% less men reported having low back pain. **Conclusions:** The results suggest that a stretching programme performed for 3 months can reduce musculoskeletal complaints in the most commonly affected areas in office workers. Both men and women benefited from the stretch training to a similar extent, suggesting that this would be a promising measure for therapy and prevention as part of WHP.

Holzgreve et al. 2021.

BMJ Open, vol. 11, no. 5.

Keywords: Back pain; education & training; musculoskeletal disorders; occupational & industrial medicine; preventive medicine; sports medicine.

Evidence Level: 3A

Link: https://bmjopen.bmj.com/content/11/5/e044453.long

Workplace sitting is associated with self-reported general health and back/neck pain: a cross-sectional analysis in 44,978 employees

Background: Total sitting time is associated with a higher risk for cardio metabolic disease and mortality, while breaks in prolonged sitting attenuate these effects. However, less is known about associations of different specific domains and breaks of sitting on general health, back/neck pain and if physical activity could influence these associations. The aim was to investigate how workplace sitting and frequency of breaking up workplace sitting is associated with self-reported general health and self-reported back/neck pain. **Methods:** 44,978 participants (42% women) from the Swedish working population, who participated in a nationwide occupational health service screening 2014-2019, were included in this cross-sectional study. Self-reported sitting duration and frequency of breaks from sitting at work, general health, back/neck pain, exercise, leisure time sitting, diet, smoking, stress and body mass index were assessed. Occupation was classified as requiring higher education qualifications or not. Logistic regression modelling was used to assess the association between workplace sitting/frequency of breaks in workplace sitting and poor general health and back/neck pain, respectively. **Results:** Compared to sitting all the time at work, sitting ≤75% of the time showed significantly lower risks for poor general health (OR range 0.50-0.65), and sitting between 25 and 75% of the time showed significantly lower risks (OR 0.82-0.87) for often reported back/neck pain. For participants reporting sitting half of their working time or more, breaking up workplace sitting occasionally or more often showed significantly lower OR than seldom breaking up workplace sitting; OR ranged 0.40-0.50 for poor health and 0.74-0.81 for back/neck pain. **Conclusions:** Sitting almost all the time at work and not taking breaks is associated with an increased risk for self-reported poor general health and back/neck pain. People sitting almost all their time at work are recommended to take breaks from prolonged sitting, exercise regularly and decrease their leisure time sitting to reduce the risk for poor health.

Kallings et al. 2021.

BMC Public Health, vol. 21, no. 1.

Keywords: Breaks; exercise; health risk; public health; sedentary behaviour; self-reported health; working population.

Evidence Level: 4A

Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10893-8

Physical Activity

Health and physical fitness profiling of working population: Sport4Health 2021
Sport4Health Network (SPORT4H) is a multidisciplinary project co-funded by the European Union Erasmus+ programme aimed to encourage participation in physical activity in working population. SPORT4H includes educational and instructional activities that provide top-notch knowledge on various physical activities that may have an additional benefit to improve healthy lifestyle behaviours across workforce. The aims of Sport4Health 2021 e-symposium organized from 22nd to 23th March 2021 were to: (1) summarize data collected during this project through evaluation of health and fitness profiles for over 40,000 employees from all Sport4HealthNet countries (Belgium, Bulgaria, Croatia, Netherlands, Serbia and Slovenia); (2) discuss the applicability of user-friendly guidelines for physical activity at workplace and e-learning module that includes multicomponent interventions with innovative activities; (3) share experiences from different partners about the effects of educational interventions in specific working environment; and, (4) overview challenges identified during the implementation of interventions at work settings. The Sport4Health 2021 e-symposium facilitated networking between partner institutions, provided practical information for extensive public education that advances physical activity at workplace, and capacitated interaction and recruitment of end-users through e-learning modules and guidelines.
Todorovic et al. 2021.
BMC Proceedings, vol. 17, no. 15.

Keywords: Fitness; health; physical activity; SPORT4H; workplace.
Evidence Level: 5B
Link: https://bmcproc.biomedcentral.com/articles/10.1186/s12919-021-00216-5

Musculoskeletal Health

Work-related risk factors for ulnar nerve entrapment in the Northern Finland Birth Cohort of 1966
Ulnar nerve entrapment (UNE) is the second most common entrapment neuropathy in the upper extremity. The aetiology of UNE is multifactorial and is still not fully understood. The aim of the study was to identify occupational risk factors for UNE and to determine whether smoking modifies the effects of work-related factors on UNE. The study population consisted of the Northern Finland Birth Cohort of 1966 (NFBC1966). In total, 6325 individuals active in working life participated at baseline in 1997. Occupational risk factors were evaluated by a questionnaire at baseline. The data on hospitalizations due to UNE were obtained from the Care Register for Health Care between 1997 and 2018. The incidence rate of hospitalization due to UNE was 47.6 cases per 100,000 person-years. After adjusting for confounders, entrepreneurs (Hazard ratio (HR) = 3.68, 95% CI 1.20-11.27), smokers (HR = 2.51, 95% CI 1.43-4.41), workers exposed to temperature changes (HR = 1.72, 95% CI 1.00-2.93), workers with physically demanding jobs (HR = 3.02, 95% CI 1.39-6.58), and workers exposed to hand vibration (HR = 1.94, 95% CI 1.00-3.77) were at an increased risk of hospitalization for UNE. Exposure to work requiring arm elevation increased the risk of hospitalization due to UNE among smokers (HR = 2.62, 95% CI 1.13-6.07), but not among non-smokers. Work-related exposure to vibration and temperature changes, and physically demanding work increase the risk of hospitalization for UNE. Smoking may potentiate the adverse effects of work-related factors on UNE.
Miettinen et al. 2021.
Scientific Reports, vol. 11, no. 1.

Keywords: Ulnar nerve entrapment; work-related; risk factors; neuropathy; Finland.
Evidence Level: 4A
Link: https://www.nature.com/articles/s41598-021-89577-7

Effects of an active break and postural shift intervention on preventing neck and low-back pain among high-risk office workers: a 3-arm cluster-randomized controlled trial

Objective: This study evaluated the effects of the promotion of active breaks and postural shifts on new onset of neck and low-back pain during a 6-month follow-up among high-risk office workers. **Methods:** A 3-arm cluster-randomized controlled trial with 6-month follow-up was conducted among healthy but high-risk office workers. Participants were recruited from six organizations in Bangkok, Thailand (N=193) and randomly assigned at cluster level into active break intervention (N=47), postural shift intervention (N=46), and control (N=100) groups. Participants in the intervention groups received a custom-designed apparatus to facilitate designated active breaks and postural shifts during work. Participants in the control group received a placebo seat pad. The primary outcome measure was new onset of neck and low-back pain during 6-month follow-up. Analyses were performed using Cox proportional hazard models. **Results:** One-hundred and eighty-six (96%) predominantly female participants were successfully followed up over six months. New onset of neck pain during the 6-month follow-up occurred in 17%, 17%, and 44% of the participants in the active break, postural shift, and control groups, respectively. For new onset of low-back pain, these percentages were 9%, 7%, and 33%, respectively. Hazard rate (HR) ratios after adjusting for biopsychosocial factors indicated a protective effect of the active break and postural shift interventions for neck pain [HRadj 0.45, 95% confidence interval (CI) 0.20-0.98 for active break and HRadj 0.41, 95% CI 0.18-0.94 for postural shift] and low-back pain (HRadj 0.34, 95% CI 0.12-0.98 for active break and HRadj 0.19, 95% CI 0.06-0.66 for postural shift). **Conclusion:** Interventions to increase either active breaks or postural shifts reduced new onset of neck and low-back pain among high-risk office workers.

Waongenngarm et al. 2021.

Scandinavian Journal of Work, Environment & Health, vol. 1, no. 47.

Keywords: Postural shift; neck pain; low-back pain; office workers.

Evidence Level: 2A

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3949

Is working in a cold environment associated with musculoskeletal complaints 7-8 years later? A longitudinal analysis from the Tromsø Study

Objective: Exposure to a cold environment at work is associated with a higher prevalence of musculoskeletal pain and chronic pain in cross-sectional studies. This study aims to determine the association between working in a cold environment ≥ 25% of the time and musculoskeletal complaints (MSC) 7-8 years later. **Methods:** We followed participants from the sixth survey (Tromsø 6, 2007-2008) to the seventh survey (Tromsø 7, 2015-2016) of the Tromsø Study. Analyses included 2347 men and women aged 32-60 years who were not retired and not receiving full-time disability benefits in Tromsø 6. Three different binary outcomes were investigated in Tromsø 7: any MSC, severe MSC, and MSC in ≥ 3 anatomical regions. We excluded participants with severe MSC, MSC in ≥ 3 regions, or missing values in Tromsø 6. The association between working in a cold environment and future MSC were examined using Poisson regression and adjusted for age, sex, number of moderate MSC, education, physical activity at work, smoking status, body mass index, and self-reported health in Tromsø 6. **Results:** 258 participants reported to work in a cold environment ≥ 25% of the time in Tromsø 6. They had an increased risk of having any MSC in Tromsø 7 (incidence rate ratio 1.15; 95% confidence interval 1.03-1.29). There was no significantly increased risk of severe MSC or MSC in ≥ 3 regions. **Conclusion:** Working in a cold environment was associated with future MSC, but not with future severe MSC or future MSC in ≥ 3 regions.

Farbu et al. 2021.

International Archives of Occupational and Environmental Medicine, vol. 94, no. 4.

Keywords: Cold environment; cold temperature; epidemiology; musculoskeletal complaints; musculoskeletal pain.

Evidence Level: 4B

Link: https://link.springer.com/article/10.1007%2Fs00420-020-01606-6

COVID 19

Adapting to the Future of Work

How do employees think the COVID-19 crisis will affect their careers?
This study is the first in the world to investigate the expected impact of the COVID-19 crisis on career outcomes and career aspirations. To this end, high-quality survey research with a relevant sample of Flemish (Belgian) employees was conducted. About 21% of them fear losing their jobs due to the crisis-14% are concerned that they will even lose their jobs in the near future. In addition, 26% expect to miss out on promotions that they would have received had the COVID-19 crisis not occurred. This fear of a negative impact is higher in vulnerable groups, such migrants. In addition, we observe that many respondents believe they will look at the labour market differently and will have different work-related priorities in the future. In this respect, more than half of the respondents indicate that they have attached more importance to working conditions and work-life balance since the COVID-19 crisis.
Lippens et al. 2021.
PLoS One, vol. 16, no. 5.

Keywords: COVID-19; impact; career; career aspirations; outcomes; employees.
Evidence Level: 5B
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0246899

Guiding and Supporting Mental Health and Wellbeing

Flattening the latent growth curve? Explaining within-person changes in employee well-being during the COVID-19 pandemic
The COVID-19 pandemic represents one of the greatest global crises in modern history. In addition to recession and high unemployment, agencies such as the Centers for Disease Control and Prevention warn that stressors associated with a pandemic can cause increased strains, including difficulty concentrating, anxiety, and decreased mental health (CDC, 2020). Two general frameworks that explain these stressor-strain relationships over time include *stress-reaction* and *adaptation models*. Stress-reaction models suggest that stressors, such as heightened job demands due to the pandemic, accumulate over time and thus prolonged exposure to these stressors results in both immediate and long-term strain; conversely, adaptation models suggest that people adapt to stressors over time, such that strains produced by ongoing stressors tend to dissipate. After controlling for county-level COVID-19 cases, we found that (a) workers in general exhibited decreasing cognitive weariness and psychological symptoms over time, providing support for the adaptation model; (b) on-site workers experienced increasing physical fatigue over time, supporting the stress-reaction model among those workers; and (c) engaging in recovery behaviors was associated with improvements in cognitive weariness and psychological symptoms for all workers. We also found that our Time 1 outcomes were significantly different than pre-pandemic norms, such that our participants displayed lower initial levels of job-related burnout and higher initial levels of psychological symptoms than pre-pandemic norms. Furthermore, supplemental qualitative data support our quantitative findings for recovery behaviors. These findings have important implications for understanding workers' responses to the pandemic and they can help inform organizational practice.
Michel et al. 2021.
Occupational Health Science, vol. 14, no. 1-29.

Keywords: Burnout; COVID-19; latent growth modeling; longitudinal; psychological health.
Evidence Level: 6A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8120500/

Mental disorders associated with COVID-19 related unemployment
In response to the COVID-19 pandemic, restrictions on economic activities have resulted in a sharp rise of unemployment. The purpose of this research is to explore mental disorders associated with COVID-19

related unemployment using a large, nationally representative dataset, the 2020 COVID-19 Household Pulse Survey. ANOVA with post hoc tests (Tukey HSD) are utilized to reveal the mean difference of mental disorders between various employment status, as well as between reasons of unemployment. Binary logit model is used to investigate the potential effect of different reasons of unemployment on mental disorders. Individuals who were not working during the pandemic due to involuntary reasons had higher probabilities of mental disorders than those who were working and those who voluntarily separated from work. Among respondents who were not working due to COVID-19 related reasons, respondents whose employer went out of business were the most likely to experience mental disorders. Household job uncertainty in the next four weeks positively contributed to mental disorders. Government should consider measures to contain the spread of virous while keeping as many people employed as possible. Government should also consider providing adequate financial and counseling assistance to individuals who are in the greatest need for such support.
Yao et al. 2021.
Applied Research in Quality of Life, vol. 5, no. 1-22.
User License: *PMC Open Access Subset*
Keywords: Anxiety disorder; COVID-19; depressive disorder; mental disorders; unemployment.
Evidence Level: 5B
Link: https://pubmed.ncbi.nlm.nih.gov/33968280/

Potential impact of COVID-19 related unemployment on increased cardiovascular disease in a high-income country: modeling health loss, cost and equity
Background: Cardiovascular disease (CVD) is a leading cause of health loss and health sector economic burdens in high-income countries. Unemployment is associated with increased risk of CVD, and so there is concern that the economic downturn associated with the COVID-19 pandemic will increase the CVD burden. **Aims:** This modeling study aimed to quantify potential health loss, health cost burden and health inequities among people with CVD due to additional unemployment caused by COVID-19 pandemic-related economic disruption in one high-income country: New Zealand (NZ). **Methods:** We adapted an established and validated multi-state life-table model for CVD in the national NZ population. We modeled indirect effects (ie, higher CVD incidence due to high unemployment rates) for various scenarios of pandemic-related unemployment projections from the NZ Treasury. **Results:** We estimated the potential CVD-related heath loss in NZ to range from 23,300 to 36,900 health-adjusted life years (HALYs) for the different unemployment scenarios. Health inequities would be increased with the per capita health loss for Māori (Indigenous population) estimated to be 3.7 times greater than for non-Māori (49.9 vs 13.5 HALYs lost per 1000 people). The estimated additional health system costs ranged between (NZ$303 million [m] to 503m in 2019 values; or US$209m to 346m). **Conclusions and policy implications:** Unemployment due to the COVID-19 pandemic could cause significant health loss, increase health inequities from CVD, and impose additional health system costs in this high-income country. Prevention measures should be considered by governments to reduce this risk, including additional job creation programs and measures directed towards the primary prevention of CVD.
Nghiem et al. 2021.
PLoS One, vol. 16, no. 5.
User License: *Creative Commons Attribution (CC BY 4.0) (https://creativecommons.org/licenses/by/4.0/)*
Keywords: COVID-19; unemployment; cardiovascular disease; health loss; impact.
Evidence Level: 5A
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0246053

Health, work, and contributing factors on life satisfaction: A study in Norway before and during the COVID-19 pandemic
Background: The COVID-19 outbreak has posed considerable challenges for people's health, work situations and life satisfaction. This article reports on a study of the relationship between self-reported health and life satisfaction before and during the COVID-19 pandemic in Norway, and examines the role of work in explaining the health-life satisfaction relationship. **Method:** The study was based on survey data collected from 3185 Norwegian employees in 2019 and 3002 employees in 2020. Propensity score

matching techniques were used to assess the mediating effects of work situations and income loss on the health-life satisfaction relationship. Skew-*t* regression models were further applied to estimate changes in life satisfaction before and during the pandemic, as well as to explore different underlying mechanisms for the health-life satisfaction association. **Results:** The study found a negative association between ill health and life satisfaction. Compared to the healthy population, people with poor health were more likely to experience worsened work situations. A negative work situation is further associated with lower life satisfaction, and the pandemic aggravated life satisfaction for those who had worsened work situations. When exploring central contributing factors for life satisfaction, we found that health-related risks and work-life balance played predominant roles in predicting life satisfaction before the pandemic, while different types of household structure were among the most important predictors of life satisfaction during the pandemic. **Conclusion:** A reduction in life satisfaction is explained by ill health, but different underlying mechanisms facilitated people's life satisfaction before and during the pandemic. While work situation and health risks were important predictors for life satisfaction in 2019, worries about more unstable work situations and less access to family support accentuated worsened life satisfaction in 2020. The findings suggest the necessity of labour market interventions that address the security and maintenance of proper and predictable work situations, especially in these more uncertain times.

Bakkeli et al. 2021.

SSM – Population Health, vol. 4, no. 14.

Keywords: COVID-19; health; inequality; life satisfaction; work.

Evidence Level: 4B

Link: https://www.sciencedirect.com/science/article/pii/S2352827321000793?via%3Dihub

Symptoms of anxiety and depression in relation to work patterns during the first wave of the COVID-19 epidemic in Philadelphia PA: A cross-sectional survey

Objective: We investigated whether patterns of work during COVID-19 pandemic altered by effort to contain the outbreak affected anxiety and depression. **Methods:** We conducted a cross-sectional online survey of 911 residents of Philadelphia, inquiring about their working lives during early months of the epidemic, symptoms of anxiety and depression, plus demographics, perceived sources of support, and general health. **Results:** Occupational contact with suspected COVID-19 cases was associated with anxiety. Concerns about return to work, childcare, lack of sick leave, and loss/reduction in work correlated with anxiety and depression, even when there was no evidence of occupational contact with infected persons; patterns differed by sex. **Conclusions:** Heightened anxiety and depression during COVID-19 pandemic can be due to widespread disruption of working lives, especially in "non-essential" low-income industries, on par with experience in healthcare.

Burstyn et al. 2021.

Journal of Occupational and Environmental Medicine, vol. 63, no. 5.

Keywords: Anxiety; depression; COVID-19; epidemic; Philadelphia

Evidence Level: 4B

Link:
https://journals.lww.com/joem/Fulltext/2021/05000/Symptoms_of_Anxiety_and_Depression_in_Relation_to.16.aspx

Enabling Healthy and Safe Workplaces

What industrial categories are workers at excess risk of filing a COVID-19 workers' compensation claim? A study conducted in 11 Midwestern US states

Objective: Determine the industries with the highest proportion of accepted COVID-19 related workers' compensation (WC) claims. **Methods**: Study included 21,336 WC claims (1898 COVID-19 and 19,438 other claims) that were filed between January 1, 2020 and August 31, 2020 from 11 states in the Midwest United States. **Result**: The overwhelming proportion of all COVID-19 related WC claims submitted and accepted were from healthcare workers (83.77%). Healthcare was the only industrial classification that was at significantly higher COVID-19 WC claim submission risk (odds ratio [OR]: 4.00; 95% confidence intervals [CI]: 2.77 to 5.79) controlling for type of employment, sex, age, and presumption of COVID-19 work-relatedness. Within healthcare employment, WC claims submitted by workers in medical laboratories had the highest risk (crude rate ratio of 8.78). **Conclusion**: Healthcare employment is associated with an increased risk of developing COVID-19 infections and submitting a workers' compensation claim.

Bernacki et al. 2021.

Journal of Occupation and Environmental Medicine, vol. 63, no. 5.

Keywords: Industries; compensation; Midwest; healthcare.

Evidence Level: 4A

Link:
https://journals.lww.com/joem/Fulltext/2021/05000/What_Industrial_Categories_Are_Workers_at_Excess.4.aspx

Assessing the effect of beard hair lengths on face masks used as personal protective equipment during the COVID-19 pandemic

Workplace regulations prohibit beards with N95 respirators, but the effect of beards with face masks worn by the public for protection against SARS-CoV-2 remains unknown. **This study found that** N95 respirators offer the best respiratory protection for bearded men, and whilst KF94 and KN95 FFE is compromised by beard length, they were safer options than procedure and cotton face masks.

Prince et al. 2021.

Journal of Exposure Science & Environmental Epidemiology, vol. 18.

Keywords: SARS-CoV-2; beard; intervention; mask; particles; respiratory protection.

Evidence Level: 3A

Link: https://www.nature.com/articles/s41370-021-00337-1

Socioeconomic factors associated with an intention to work while sick from COVID-19

Objective: We sought to understand barriers to staying home from work when sick from COVID-19 (COVID-19 presenteeism) to understand COVID-19 health disparities and transmission and guide workplace and social policy. **Methods:** We used logistic regression models to assess which socioeconomic factors were associated with intended COVID-19 presenteeism among an online study population working outside their home in March 2020 (N = 220). **Results:** Overall, 34.5% of participants reported intended COVID-19 presenteeism. Younger individuals and individuals making over $90,000 per year were less likely to report COVID-19 presenteeism. Individuals who were worried about having enough food had 3-fold higher odds of intended COVID-19 presenteeism. **Conclusion:** Current policies around food access, paid sick leave, and other workplace protections need to be expanded and made more accessible to reduce health disparities as well as the transmission of COVID-19 and other infections.

Tilchin et al. 2021.

Journal of Occupational and Environmental Medicine, vol. 1, no. 63.

Keywords: COVID-19; sick; socioeconomic; work.

Evidence Level: 5A

Link:
https://journals.lww.com/joem/Fulltext/2021/05000/Socioeconomic_Factors_Associated_With_an_Intention.2.aspx

COVID-19 vaccine acceptability among US firefighters and emergency medical services workers: a cross-sectional study

Objectives: Estimate the point prevalence of COVID-19 vaccine acceptability among US firefighters and Emergency Medical Services (EMS) workers. **Methods:** A cross-sectional study design was used to administer an anonymous online survey to a national non-probabilistic sample of firefighter and EMS workers. **Results:** Among the 3169 respondents, 48.2% expressed high acceptability of the COVID-19 vaccine when it becomes available, while 24.2% were unsure and 27.6% reported low acceptability. Using the "high COVID-19 vaccine acceptability" group as the reference category, the groups with greater odds of reporting low acceptability included those: 30 to 39 years of age (odds ratio = 3.62 [95% confidence interval = 2.00 to 6.55]), Black race (3.60 [1.12 to 11.53]), Hispanic/Latinx ethnicity (2.39 [1.45 to 3.92]), with some college education (2.06 [1.29 to 3.27]), married (1.65 [1.03 to 2.65]), of current rank firefighter/EMS (2.21 [1.60 to 3.08]). **Conclusions:** Over half of US firefighters and EMS workers were uncertain or reported low acceptability of the COVID-19 vaccine when it becomes available.

Caban-Martinez et al. 2021.
Journal of Occupational and Environmental Medicine, vol. 63, no. 5.

Keywords: COVID-19 vaccine; vaccination; emergency medical services.
Evidence Level: 4B
Link:
https://journals.lww.com/joem/Fulltext/2021/05000/COVID_19_Vaccine_Acceptability_Among_US.3.aspx

Can allodynia predict headache related to personal protective equipment for the prevention of COVID-19?

In this complex context of coronavirus disease 2019 (COVID-19), headache medicine has been completely affected by this new reality, with new types of headaches directly or indirectly related to COVID-19 being detected. Personal protective equipment (PPE) was recommended for workers in many professions that did not previously require wearing masks leading to new headaches, or the exacerbation of past headaches, especially among health workers. A 57-year-old female working in a secondary care hospital had a history of migraine twice/month without aura and allodynia symptom checklist (ASC12) scored as 7 before COVID-19 outbreak. She began to work with PPE (surgical masks, face shield and surgical cap) and migraines became daily (bifrontal, pulsatile, with photophobia, nausea, vomiting and of severe intensity, visual analog scale: 7), starting after 1 h of wearing protective equipment and lasted for at least 6 h during the day. There was no adequate response to treatment. The headache frequency retuned to twice/month after the patient stayed home 45 days due to another condition. It is hypothesized here that people with allodynia symptoms when exposed to PPE are more susceptible to the development of new headaches or to the worsening of existing primary headaches. The relationship between previous allodynia determined with the ASC12 questionnaire and new headaches, or past primary headaches that have become worse during the COVID-19 pandemic in workers using PPE, should be better investigated in order to clarify this hypothesis. Cutaneous allodynia could be related with the sensitivity to PPE and headache progression.

Dos Santos Ferreira et al. 2021.
Journal of Medical Cases, vol. 12, no. 5.

Keywords: COVID-19; headache; migraine.
Evidence Level: 5B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8040452/