



Emerging Evidence Alert April 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 March 2021 only.

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Supporting sustainable employment for employees with chronic health conditions

For employees with chronic health conditions, participation in work is important for both physical and mental health as well as recovery. Given the increasing number of employees with chronic health conditions in the workplace, a [recent qualitative study](#) explores the barriers and opportunities in preventing work-related problems and facilitating sustainable employment for employees with chronic conditions.

Barriers can include negative attitudes towards employees with health conditions, poor communication between employees and employers in addressing work-related problems, lack of collaboration between health professionals and employers, and gaps in employers' skills and knowledge.

There are practical ways workplaces can improve preventative support for employees with chronic conditions including:

- focusing more on prevention and less on reducing absenteeism
- making prevention a shared responsibility between everyone involved – employers, health professionals and employees
- incorporating prevention into workplace policies and practices
- establishing a supportive working environment
- increasing engagement with health professionals and providers.

For employers, these insights can be used to drive organisational-level interventions for employees with chronic conditions that improve preventative support and increase work participation.

For more information about the benefits of returning to work, visit the [Comcare website](#). Comcare also has a [return to work information sheet](#) that highlights why 'good work' is beneficial for employee mental and physical health and wellbeing.

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
A1	Study with practicable applicability conducted in Australia or the study has been conducted outside Australia but confounders unlikely to affect relevance
A2	Study with theoretical focus conducted in Australia or the study has been conducted outside Australia but confounders unlikely to affect relevance
B1	Study with practicable applicability conducted outside Australia and confounders likely to affect generalisability
B2	Study with theoretical focus conducted outside Australia and confounders likely to affect generalisability

Fostering Work Participation

Return to Work

Do work ability and life satisfaction matter for return to work? Predictive ability of the work ability index and life satisfaction questionnaire among women with long-term musculoskeletal pain

Background: Impaired work ability and reduced life satisfaction due to long-term musculoskeletal pain, particularly in neck, shoulders and back, are considered occupational health problems that can result in workers taking sick leave. The aim of the study was to determine whether work ability and life satisfaction predict return to work (RTW) among women with long-term neck/shoulder and/or back pain, and to assess the ability of the Work Ability Index (WAI) and the Life Satisfaction Questionnaire (LiSat-11) to discriminate between those who did RTW and those who did not RTW (NRTW). **Methods:** This is a cohort study with 1-year follow-up. A survey was sent to 600 women receiving sick leave benefits from the Swedish Social Insurance Agency. In total, 208 women responded at baseline, and 141 at a 1-year follow-up. To identify whether work ability and life satisfaction predicted RTW, multiple logistic regression analyses were performed with and without adjustment for type of work and pain intensity. To assess the discriminative ability of the WAI and the LiSat-11 for women who did RTW and those who did NRTW, receiver operating characteristic curves were fitted. **Results:** Work ability predicted RTW, and the results remained significant after adjusting for type of work and pain intensity (OR 1.12, 95% CI: 1.04-1.22). Life satisfaction was not significant. The WAI at baseline adequately discriminated between RTW and NRTW after 1 year (Area under curve 0.78, 95% CI: 0.70-0.86), but the LiSat-11 did not. **Conclusions:** This study supports a relationship between work ability and RTW among women on sick leave for long-term neck/shoulder and/or back pain. The results indicate that the WAI, but not the LiSat-11, can discriminate between RTW and NRTW in the population under study. Although the discriminative ability of the WAI needs to be verified in new samples before it can be recommended for use in rehabilitation settings, we suggest that healthcare professionals consider how women perceive their work ability in order to better support them in their RTW.

Rashid et al. 2021.

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

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Keywords: Musculoskeletal disorders; quality of life; sickness absence; work capacity; work status.

Evidence Level: 1:A2

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10510-8>

Vocational rehabilitation for patients with chronic musculoskeletal pain with or without a work module: an economic evaluation

Purpose: Vocational rehabilitation (VR) is a widely used intervention aimed to optimize work participation for patients on sick leave due to chronic musculoskeletal pain (CMP). Economic evaluations of care as usual VR are scarce, and may provide relevant information to guide clinical, reimbursement and policy decisions. The aim of this study was to evaluate the short-term cost-effectiveness and return on investment (ROI) of VR for patients on sick leave due to CMP with an additional work module (VR+) compared to VR without work module, from a societal and employers' perspective. **Methods:** A retrospective longitudinal cohort study within a Dutch care as usual context was applied. Participants with CMP and decreased work participation originating from seven Dutch rehabilitation centers were included in this study. Participants underwent VR or VR+. Main data sources at baseline and discharge: Quality-adjusted life year (QALY) based on EQ-5D, intervention costs, self-reported productivity and health care utilization. Main analyses cost-effectiveness, including incremental cost-effectiveness ratio (ICER) and a cost-effectiveness acceptability curve (CEAC); and ROI analyses with use of the human capital method. **Results:** N = 324 participants were analyzed. The results show that VR+ was cost-effective compared to VR: mean cost savings of €820 per 0.012 QALY gained. CEAC suggests probability of VR+ being cost-effective is > 0.91 for thresholds of €20,000 and evhigher. The mean ROI of VR+ for employers was 38%. **Conclusion:** It was concluded that at discharge, VR+ was cost-effective compared to VR. ROI was positive for employers.

Reneman et al. 2021.

Journal of Occupational Rehabilitation, vol. 31, no.1.

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Keywords: CEAC; chronic pain; cost-effectiveness; ICER; QALY; return on investment.

Evidence Level: 4:B1

Link: <https://link.springer.com/article/10.1007%2Fs10926-020-09921-y>

Motivational interviewing and return to work for people with musculoskeletal disorders: a systematic mapping review

Purpose: There is limited knowledge about motivational interviewing (MI) for people on sick leave with musculoskeletal disorders. Hence, our objective was to investigate what research on MI as a method to facilitate return to work for individuals who are on sick leave due to musculoskeletal disorders exists, and what are the results of the research? **Methods:** We systematically searched MEDLINE, PsycINFO, EMBASE, Cochrane Library, CINAHL, Web of Science, Sociological Abstracts, Epistemonikos, SveMed + and DARE & HTA (covering 1983 to August 2019). We also searched the MINT bulletin and relevant web pages. Eligibility criteria: empirical studies investigating MI and return to work for people with musculoskeletal disorders. Two authors independently screened the records, critically appraised the studies and charted the data using a data extraction form. **Results:** The searches identified 1264 records of which two studies were included. One randomized controlled trial (RCT) found no effect of MI on return to work for disability pensioner with back pain (n = 89, high risk of bias), while a cluster RCT found that MI increased return to work for claimants with chronic musculoskeletal disorders (n = 728, low risk of bias). **Conclusions:** This mapping review identified a huge gap in research on MI to increase return to work for individuals with musculoskeletal disorders.

Aanesen et al. 2021.

Journal of Occupational Rehabilitation, vol. 31, no. 1.

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Keywords: Motivational interviewing; musculoskeletal diseases; return to work; sick leave; systematic review

Evidence Level: 1:A2

Link: <https://link.springer.com/article/10.1007%2Fs10926-020-09892-0>

Multidisciplinary programme for rehabilitation of chronic low back pain - factors predicting successful return to work

Background: There are no clear indicators for predicting return to work for patients with chronic low back pain (LBP). We aim to report the outcomes of a 14-week multidisciplinary programme targeting patients with chronic LBP who failed conventional physiotherapy to provide functional rehabilitation. Also, this study will identify factors predicting successful return to work (RTW). **Methods:** A collected cohort of patients with chronic LBP was consecutively enrolled into the programme from 1996 to 2014. All recruited patients failed to RTW despite at least 3 months of conservative treatment. Patient underwent weekly multidisciplinary sessions with physiotherapists, occupational therapists and clinical psychologists. Patient perceived function was considered the primary outcome of the programme. Patients were assessed for their sitting, standing and walking tolerance. Oswestry Disability Index (ODI) and Spinal Function Sort Score (SFSS) were used to assess patient perceived disability. **Results:** One hundred and fifty-eight patients were recruited. After the programme, statistically significant improvement was found in ODI (47.5 to 45.0, p = 0.01) and SFSS (98.0 to 109.5, p < 0.001). There was statistically significant improvement (p < 0.01) in sitting, standing, walking tolerance and straight leg raise tests. 47.4% of the patients were able to meet their work demand. Multivariate logistic regression model ($R^2 = 59.5\%$, $\chi^2(9) = 85.640$, p < 0.001) demonstrated that lower initial job demand level and higher patient-perceived back function correlated with greater likelihood of returning to work. **Conclusion:** The results of this study may support the use of this multidisciplinary programme to improve patient function and return to work.

Leung et al. 2021.

BMC Musculoskeletal Disorders, vol. 22, no. 1.

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Keywords: Conservative treatment; logistic models; low back pain; return to work; spine.

Evidence Level: 3:A1

Link: <https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-021-04122-x>

Are return to work beliefs, psychological well-being and perceived health related to return-to-work intentions among women on long-term sick leave for common mental disorders? A cross-sectional study based on the theory of planned behaviour

Background: Long-term sick leave due to common mental disorders (CMDs) is a great burden in society today, especially among women. A strong intention to return to work (RTW) as well as symptom relief may facilitate RTW in this group. However, there is a lack of knowledge regarding what constitutes a strong intention. The Theory of Planned Behaviour is well-suited to identifying underlying beliefs about intentions to perform a behaviour. By including psychological well-being and perceived health, a more comprehensive picture of determinants of RTW intention might be achieved. Thus, the aim of the present study was to identify associations between RTW beliefs, psychological well-being, perceived health and RTW intentions among women on long-term sick leave due to CMDs, and to do so based on the Theory of Planned Behaviour. **Methods:** The study was cross-sectional. Between October 2019 and January 2020, 282 women on long-term sick leave (> 2 months) due to CMDs were included in the study. The questionnaires for data collection were: "RTW Beliefs Questionnaire", the "General Health Questionnaire -12" and the "EuroQol Visual Analogue Scale". Standard multiple regression analysis was performed both with and without adjustment for potential confounders. **Results:** The results showed that a more positive attitude towards RTW, stronger social pressure to RTW, higher perceived control over RTW and higher psychological well-being were associated with stronger RTW intention. The adjusted analysis eliminated the importance of psychological well-being for RTW intention, but showed that women who reported that their employer had taken actions to facilitate their RTW had stronger RTW intention. **Conclusion:** The RTW beliefs, derived from the Theory of Planned Behaviour, were all important for a strong RTW intention, while psychological well-being and perceived health showed weaker associations. Furthermore, having an employer that take actions for facilitating RTW was associated with stronger RTW intentions. Though some caution is warranted regarding the representativeness of the sample, the results do improve our understanding of some important determinants of RTW intention among women on long-term sick leave for CMDs.

Hedlund et al. 2021.

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

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Keywords: Beliefs; common mental disorders; long-term sick leave; return to work; women.

Evidence Level: 4:A2

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10562-w>

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.

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Keywords: Anxiety; common mental disorder; comorbid condition; depression; gender-stratified; mental health; musculoskeletal disorder; return to work; sickness absence; work disability; workplace.

Evidence Level: 4:A1

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3951

Vocational rehabilitation with or without work module for patients with chronic musculoskeletal pain and sick leave from work: Longitudinal impact on work participation

Purpose: To study the longitudinal relationship between interdisciplinary vocational rehabilitation (VR) with and without additional work module on work participation of patients with chronic musculoskeletal pain and sick leave from work. **Methods:** Retrospective longitudinal data retrieved from care as usual in seven VR centers in the Netherlands was used. The VR program without work module consisted of multi-component healthcare (physical exercise, cognitive behavioral therapy, education, relaxation). The other program with additional work module (VR+) included case management and a workplace visit. Generalized estimating equations using binary logistic was applied. The dependent variable was work participation (achieved/not achieved) on discharge and 6-months follow-up. Independent variables were type of intervention, return to work expectation, sick leave duration, working status, job strain, and job dissatisfaction. **Results:** Data from N = 470 patients were analyzed, of which 26% received VR and 74% VR+. Both programs increased work participation at 6-months follow-up (VR 86%, VR+ 87%). The crude model showed a significant longitudinal relationship between type of intervention and work participation in favor of VR+ (OR 1.8, p = 0.01). The final model showed a non-significant relationship on discharge (OR 1.3, p = 0.51) and a significant relationship on 6-months follow-up in favor of VR+ (OR 1.7, p = 0.04). RTW expectation was a significant confounder in the final model on discharge and 6-months follow up (OR 3.1, p = 0.00). **Conclusions:** Both programs led to increased work participation. The addition of a work module to the VR program lead to a significant increase in odds of work participation at 6-months follow-up.

Beemster et al. 2021.

Journal of Occupational Rehabilitation, vol. 31, no. 1.

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Keywords: Biopsychosocial; chronic pain; multidisciplinary; observational study; occupational therapy.

Evidence Level: 4:A1

Link: <https://pubmed.ncbi.nlm.nih.gov/32378023/>

Strengthened workplace relationships facilitate recovery at work - qualitative experiences of an intervention among employees in primary health care

Background: The literature on workplace interventions focusing on recovery is scarce; hence this study intends to expand that knowledge. An intervention was run for one year, aiming at increasing the experience of recovery during the workday among primary health care employees. During the intervention, different forms of recovery activities were integrated into the daily work at six primary health care centres. The aim of this study was to explore the intervention process and its effects. **Methods:** After completion of an intervention, 39 employees in seven focus groups were interviewed about their experiences of the intervention. A semi-structured interview guide was used, and the qualitative analysis was conducted by systematic text condensation. **Results:** Despite different conditions and attitudes when the project was launched, the participants portrayed a positive outcome of the intervention at all six workplaces. Four promoting factors for intervention success were identified: support, legitimacy, customization, and simplicity. Also, three areas of improvement during the intervention period were described: the workplace climate, employee well-being, and recovery awareness, which in turn became promoting factors. **Conclusions:** An intervention aiming at increasing workplace recovery can be promoted by support, legitimacy, customization, and simplicity. By using these promoting factors, health care workplaces can implement activity models which could increase employees' experiences of recovery during the workday. Positive effects on workplace climate and employee well-being can also be achieved.

Ejlertsson et al. 2021.

BMC Family Practice, vol. 22, no. 1.

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Keywords: Employee health; health promotion; intervention; primary health care; qualitative research; recovery.

Evidence Level: 5:A1

Link: <https://bmcfampract.biomedcentral.com/articles/10.1186/s12875-021-01388-x>

Presenteeism and Absenteeism

The role of alcohol use and cigarette smoking in sickness absence: Are there social inequalities?

Background: While studies have found a social gradient in negative consequences of drinking and smoking, evidence is less clear for a gradient also in alcohol use and smoking's association with sickness absence. We investigate the association between alcohol use and cigarette smoking and general sickness absence, and examine the moderating role of socio-economic status for these associations when controlling for general health status. **Method:** Questions on alcohol use, measured by the Alcohol Use Disorders Identification Test (AUDIT-C), smoking, general health and sickness absence were included in annual national cross-sectional telephone surveys on alcohol, tobacco and drug use (2015-18) amongst Norwegian adults aged 16-79-years (average response rate=59%). The analytic sample comprised 4719 full- and part-time employees aged 25-79 years (46.7% were female, mean age=44.3 years). Individual-level data on education were obtained from national registries. **Results:** In adjusted negative binomial regression analyses, current and former daily smoking were associated with a higher occurrence of sickness absence in groups with low educational attainment, but not in groups with high educational attainment. Alcohol use was negatively associated with sickness absence. While a significantly higher number of sickness days was reported by smokers in the low compared with the high education group, educational attainment did not moderate the alcohol use - sickness absence association. **Conclusion:** Daily smoking is associated with sickness absence. A negative social gradient was found in the smoking - absence association. Reduced daily smoking might give a reduction in sickness absence.

Lund et al. 2021.

International Journal of Drug Policy

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Keywords: Alcohol use; educational groups; sickness absence; smoking; social inequality.

Evidence Level: 4:A2

Link: <https://www.sciencedirect.com/science/article/pii/S0955395921000888?via%3Dihub>

Sickness absence among privately employed white-collar workers: A total population study in Sweden

Background: Knowledge about sickness absence (SA) and disability pension (DP) among privately employed white-collar workers is very limited. **Aims:** This study aimed to explore SA and DP among privately employed white-collar women and men using different measures of SA to investigate differences by branch of industry, and to analyse the association between sociodemographic factors and SA. **Methods:** This was a population-based study of all 1,283,516 (47% women) privately employed white-collar workers in Sweden in 2012, using register data linked at the individual level. Several different measures of SA and DP were used. Logistic regression was used to investigate associations of sociodemographic factors with SA. **Results:** More women than men had SA (10.9% women vs. 4.5% men) and DP (1.8% women vs. 0.6% men). While women had a higher risk of SA than men and had more SA days per employed person, they did not have more SA days per person with SA than men. The risk of SA was higher for women (odds ratio (OR)=2.54 (95% confidence interval (CI) 2.51-2.58)), older individuals (OR age 18-24 years=0.58 (95% CI 0.56-0.60); age 55-64 years OR=1.43 (95% CI 1.40-1.46) compared to age 45-54 years), living in medium-sized towns (OR=1.05 (95% CI 1.03-1.06)) or small towns/rural areas (OR=1.13 (95% CI 1.11-1.15)), with shorter education than college/university (OR compulsory only=1.64 (95% CI 1.59-1.69); OR high school=1.38 (95% CI 1.36-1.40)), born outside the EU25 (OR=1.23 (95% CI 1.20-1.27)) and singles with children at home (OR=1.33 (95% CI 1.30-1.36)). **Conclusions:** SA and DP among privately employed white-collar workers were

lower than in the general population. SA prevalence, length and risk varied by branch of industry, sex and other sociodemographic factors, however, depending on the SA measure used.

Farrants et al. 2021.

Scandinavian Journal of Public Health, vol. 49, no. 2.

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Keywords: Sick leave; disability pension; private sector; sickness absence; white-collar workers.

Evidence Level: 4:B2

Link: <https://journals.sagepub.com/doi/full/10.1177/1403494820934275>

Impact of physical activity levels on musculoskeletal symptoms and absenteeism of workers of a metallurgical company

Introduction: Physical inactivity is the fourth biggest risk factor for global mortality. In Brazilian metallurgical industries, workers present a high incidence of musculoskeletal symptoms as one of the main causes of absenteeism. **Objectives:** To investigate the impact of physical activity levels and leisure-time physical exercise on musculoskeletal symptoms and absenteeism among administrative and production workers of a metallurgical industry. **Methods:** This is a transversal study that included 206 workers. We applied the Modified Baecke Questionnaire, leisure-time physical activity and leisure-time physical exercise domains), as well as the Nordic Musculoskeletal Questionnaire regarding symptom occurrence and severity scores (1-4), and compared levels of absenteeism. Our sample was divided into 2 groups: production and office workers. **Results:** We observed a significant difference between the groups regarding symptom severity score 3 ($p = 0.03$) and absenteeism ($p = 0.02$); the production group presented higher results. There was a correlation between leisure-time physical exercise and absenteeism ($r = -0.57$, $p = 0.01$) and between leisure-time physical activity and absenteeism ($r = -0.55$, $p = 0.01$) in the production worker group, whereas in the office worker group, leisure-time physical activity and symptom severity score 4 were correlated ($r = 0.63$, $p = 0.02$). **Conclusions:** Production workers presented higher occurrences of symptom severity score 3 and absenteeism; increased levels of leisure-time physical activity and physical exercise reduced absenteeism. Leisure-time physical activity was correlated with severity score 4 in the office worker group.

Ribas et al. 2021.

Revista Brasileira de Medicina do Trabalho, vol. 18, no. 4.

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Keywords: Absenteeism; lifestyle; repetitive strain injury; work-related musculoskeletal disorders.

Evidence Level: 5:B2

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7934174/>

The contribution of physical working conditions to sickness absence of varying length among employees with and without common mental disorders

Aims: The aim was to examine whether the contribution of physical work exposures to the risk of sickness absence (SA) is different between those with and without common mental disorders (CMD). **Methods:** We used questionnaire data on four work exposures and CMD from 6159 participants of the Helsinki Health Study cohort with 12,458 observations from three surveys (2000-2002, 2007 and 2012). We formed combination exposures for the work exposures (hazardous exposures, physical workload, computer and shift work) with CMD. Associations with SA of different length were examined with negative binomial regression models. **Results:** We observed stronger associations for CMD with SA than for the individual work exposures. The strength of the associations for hazardous exposures and physical workload increased with length of SA, especially when the participant also had CMD. The strongest associations for the combined exposures were observed for SA ≥ 15 days, the rate ratios being 2.63 (95% CI 2.27-3.05) among those with hazardous exposure and CMD, and 3.37 (95% CI 2.93-3.88) among those with heavy physical workload and CMD. **Conclusions:** Employees with hazardous exposures or physical workload combined with CMD were at the highest risk of SA compared with those without these exposures or with only one exposure.

Halonen et al. 2021.

Scandinavian Journal of Public Health, vol. 49, no. 2.

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Keywords: Computer work; common mental disorder; hazardous exposure; physical work; shift work; sickness absence.

Evidence Level: 4:B2

Link: <https://journals.sagepub.com/doi/full/10.1177/1403494820901411>

Working Hours

Is work hour mismatch associated with depression?

Background: Many studies have reported noticeable increases in the proportion of employees working either relatively short or relatively long hours. Such trends have been accompanied by an increasing concern regarding work hour mismatches defined as a discrepancy between actual and preferred work hours. The aim of this study was to investigate association between work hour mismatch and depression.

Methods: Data regarding work hour mismatches for 47,551 adults were extracted from the 2017 Korean Working Conditions Survey. The World Health Organization-Five Well-Being Index was used to measure depression. Multiple logistic regression analyses were performed to examine the association between work hour mismatch and depression. **Results:** Men and women workers with work hour mismatch were more likely to have depression [underemployed males: odds ratio (OR) = 1.30, 95% confidence interval (CI) = 1.14-1.49, overemployed males: OR = 1.28, 95% CI = 1.18-1.40; underemployed females: OR = 1.37, 95% CI = 1.20-1.56, overemployed females: OR = 1.12, 95% CI = 1.02-1.23]. Underemployed workers, workers who worked more than 52 hours per week, and workers with a high income level, all had higher ORs for depression. The greater the discrepancy between actual and preferred work hours, the higher OR for depression among both underemployed and overemployed workers. **Conclusions:** A difference between actual and preferred work hours was associated with depression. Underemployed workers had a higher risk of depression than that of overemployed workers. As a work hour mismatch negatively affected workers' mental health, it is important to reduce work hours mismatches as well as shorten the absolute number of work hours.

Kim et al. 2021.

Safety and Health at Work, vol. 12, no. 1.

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(<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

Keywords: Depression; overemployed; underemployed; work hours mismatch.

Evidence Level: 4:B1

Link: <https://www.sciencedirect.com/science/article/pii/S2093791120303395?via%3Dihub>

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

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Keywords: Working hour characteristics; short sickness absence; retail workers.

Evidence Level: 5:B2

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3952

The interplay of sleep duration, working hours, and obesity in Korean male workers: The 2010-2015 Korea National Health and Nutrition Examination Survey

The purpose of this study was to clarify the odds ratio for association between working hours and obesity in Korean male wage workers and investigate the role of sleep duration. This study is a cross-sectional one using large-scale national data from the Korea National Health and Nutrition Examination Survey collected between 2010 and 2015 to evaluate 2,592 male wage workers (between the ages of 19 and 60 years). Obesity was defined as 25kg/m² or more and working hours per week were categorized into <40, 40-49, 50-59, and ≥60 hours. Multiple regression analysis was performed to examine the odds ratio for association between working hours and obesity, after controlling for age, education, income, marital status, smoking, drinking, physical activity, daily energy intake, sleep duration, hypertension, diabetes, dyslipidemia, work schedule, and job category. Next, to study the mediating effect of sleep duration on the association between working hours and obesity, an analysis was performed using the Baron and Kenny method and the Sobel test. Results showed that workers with 50 to 59 hours had 1.4 times higher odds (odds ratio [OR] = 1.4, confidence interval [CI]: 1.11-1.85) of obesity and workers with 60 hours or more had 1.4 times higher odds (OR = 1.4, CI: 1.06-1.90) of obesity than workers with less than 40 hours. Sleep was found to have a mediating effect on the association between working time and body mass index. Therefore, the results of this analysis suggest that practitioners should identify potential factors such as working time and sleeping time when preventing work-related obesity.

Eum et al. 2021.

PLoS One, vol. 16, no. 3.

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Keywords: Sleep duration; working hours; obesity; male workers.

Evidence Level: 4:B2

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0247746>

Building Employer Capability

Wellness Programs

Do workplace health-promotion interventions targeting employees with poor health reduce sick-leave probability and disability rates?

Aims: This study aimed to investigate whether introducing workplace health-promotion interventions targeting employees with health problems or reduced work ability affected overall sick leave and disability risk. **Methods:** The study population comprised data from an establishment survey from 2010 identifying who had introduced workplace health promotion (the intervention) linked to register data on all employees and their sickness absence and disability pension uptake from 2000 through 2010.

Results: Interventions had moderate effects due to varying efficacy in different parts of the labour market. Intervention success was more likely among white-collar workers (e.g. in public administration) compared to blue-collar workers (e.g. in manufacturing), probably due to variations in both organisational and technological constraints. Effects were small among men and moderate among older workers, particularly among women. Overall, disability risk reduction was accompanied by an increase in sickness absence.

Sometimes, sickness absence increased in groups with no change in disability risk, suggesting that presenteeism in one group may increase absenteeism in other groups.

Conclusions: Introducing workplace health-promotion interventions may prolong work careers in some labour-market segments. Financial incentives for Norwegian establishments to continue offering workplace health-promotion interventions may be improved, given the current financial model for disability pension and sickness benefits.

Nielsen et al. 2021.

Scandinavian Journal of Public Health, vol. 49, no.2.

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Keywords: Workplace health promotion; disability; interventions; sick leave.

Evidence Level: 4:A1

Link: <https://journals.sagepub.com/doi/full/10.1177/1403494820946543>

Organisational Issues

Association between area-level risk of job instability and workers' health: a multi-level analysis using population-based survey data from Japan

Background: Precarious job status is negatively related with workers' health. Research has yet to address whether and to what extent the area-level risk of precarious employment is associated with workers' health, independently from their job status. We addressed this issue in the present study. **Methods:** We estimated multi-level logistic regression models using repeated cross-sectional data comprising 253,048 men and 210,761 women aged 20-59 years who were living in 47 prefectures. This data were obtained from population-based surveys conducted in 2010, 2013, and 2016 in Japan. **Results:** For male workers, the estimated odds of reporting poor self-rated health, subjective symptoms, and problems in activities of daily living for those residing in the prefectures in the highest tertile of the proportion of precarious employees were 1.10 (95% confidence interval [CI], 1.01-1.18), 1.12 (95% CI, 1.05-1.19), and 1.15 (95% CI, 1.04-1.28) times, respectively, higher than those living in the prefectures in the lowest tertile, even after controlling for individuals' job status and key covariates. The results remained largely similar, despite focusing on the sample with information about household income, which was available from the survey, and controlling for it. In contrast, the results indicated that women's health outcomes were not associated with the prefecture-level proportion of precarious employees. **Conclusions:** The area-level risk of precarious employment matters for male workers' health independently from their job status, underscoring the importance of policy measures aimed to reduce the adverse impacts of precarious employment on workers' health.

Oshio et al. 2021.

Journal of Epidemiology, vol.31, no.3.

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Keywords: Area-level job instability; multi-level analysis; precarious employment; workers' health.

Evidence Level: 4:B1

Link: https://www.jstage.jst.go.jp/article/jea/31/3/31_JE20200032/article

Shift Work

Night-shift work duration and breast cancer risk: an updated systematic review and meta-analysis

Background: The International Agency for Research on Cancer (IARC) has classified shift work as a possible human carcinogen. The results of systematic on this topic is contradictory. This systematic review and meta-analysis, therefore, aimed to update the current evidence regarding the relationship between night-shift work duration and breast cancer risk. **Methods:** PubMed, Web of Science, and Scopus as well as reference list of included studies were searched until December 19, 2020. Observational case-control or cohort studies investigating the relationship between the duration of night-shift work and breast cancer in women were included, which all quantified night-shift work exposure. All statistical analyses were done by Stata version 11.2. **Results:** Our literature search was resulted in retrieval of 4854 publications from which

26 eligible studies with 1,313,348 participants were included in the meta-analyses. The pooled relative risk (RR) and 95% confidence intervals (CIs) of breast cancer for short-term night-shift workers (< 10 years) was 1.13 (95% CI 1.03-1.24, $p = 0.008$, $I^2 = 71.3\%$), and for long-term night-shift workers (≥ 10 years) was 1.08 (95% CI 0.99-1.17, $p = 0.09$, $I^2 = 42.2\%$), with moderate to substantial statistical heterogeneity observed in both analyses. The results of subgroup analysis showed that flight attendants with long overnight flights were at an elevated risk of breast cancer, but unmeasured confounders limited these results. The risk of breast cancer in case control studies, adjusted for reproductive factors and family history of breast cancer as well as studies with high quality was increased in both short term and long term night-shift workers.

Conclusions: This systematic review found a positive statistical relationship between night work and breast cancer risk in short-term night-shift workers but no increase was observed in the long-term night-shift workers.

Manouchehri et al. 2021.

BMC Women's Health, vol. 21, no. 1.

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Keywords: Breast cancer; meta-analysis; night-shift work; shift-work; systematic review.

Evidence Level: 1:A2

Link: <https://bmcwomenshealth.biomedcentral.com/articles/10.1186/s12905-021-01233-4>

The role of circadian rhythm stability and amplitude in musculoskeletal disorder prevalence and work-family conflict

Aim: This study aimed to investigate the effect of circadian rhythm stability and amplitude on musculoskeletal disorder prevalence and work-family conflict among nurses. **Design:** This cross-sectional study was conducted on 386 nurses working in three hospitals, in Shahroud, Iran. **Method:** The data were collected using the Circadian Rhythm Inventory, Nordic Musculoskeletal Disorders, and Carlson Work-Family Conflict questionnaires. **Results:** The highest prevalence of musculoskeletal disorders was reported in the lower back (68.4%), upper back (65.5%) and shoulders (53.6%), respectively. No significant relation was found between circadian rhythm stability and amplitude, and musculoskeletal disorders prevalence. The nurses who could not overcome drowsiness reported more Work Interference with Family (WIF), Family Interference with Work (FIW) (time-based) and FIW (strain-based) compared to the nurses who overcame drowsiness. In addition, the appropriate nurses for shift work experienced less WIF, FIW (behavioural-based) and WIF (strain-based) compared to the nurses who could not work overtime or at night.

Hosseinabadi et al. 2021.

Nursing Open.

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Keywords: Circadian rhythm amplitude; circadian rhythm stability; family interference with work; musculoskeletal disorders; work interference with family.

Evidence Level: 4:B2

Link: <https://onlinelibrary.wiley.com/doi/10.1002/nop2.865>

Effects of work organization on the occurrence and resolution of sleep disturbances among night shift workers: a longitudinal observational study

This study aimed to investigate the association between work organization and the trajectories of insomnia patterns among night shift workers in a hospital. The health examination data of hospital workers, recorded from January 2014 to December 2018, were collected; 6765 records of 2615 night shift workers were included. Insomnia was defined as a score of ≥ 15 on the Insomnia Severity Index (ISI). Participants were categorized into five groups according to insomnia patterns derived from the analysis of their ISI scores. Work organization and socio-demographic characteristics were also investigated. Generalized estimating equation models and linear mixed models were constructed to analyze the longitudinal data. Of the total participants, 53.0% reported insomnia at least once during the follow-up period. The lack of nap opportunities and work-time control was associated with the occurrence of insomnia, whereas more than 5 years of shift work experience was related to the resolution of insomnia. All work-related factors were significantly related to insomnia risk; however, the effects were not significant in the sustained insomnia

group. Although sleep problems are inevitable in night shift workers, well-designed work schedules and better work organization can help reduce the occurrence of insomnia among them.

Lee et al. 2021.

Scientific Report, vol. 11, no. 1.

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Keywords: Work organization; sleep disturbances; night shift; workers; insomnia.

Evidence Level: 4:A1

Link: <https://www.nature.com/articles/s41598-021-85017-8>

Night shift schedule alters endogenous regulation of circulating cytokines

Night shift work is a risk factor for viral infection, suggesting that night shift schedules compromise host defense mechanisms. Prior studies have investigated changes in the temporal profiles of circulating cytokines important for priming and restraining the immune response to infectious challenges from night shift work, but not by way of a 24-h constant routine of continuous wakefulness devoid of behavioral or environmental influences. Hence the true *endogenous* pattern of cytokines, and the combined effect of sleep loss and circadian misalignment on these cytokines remains unknown. Here, 14 healthy young men and women underwent three days of either a simulated night shift or a simulated day shift schedule under dim light in a controlled in-laboratory environment. This was followed by a 24-h constant routine protocol during which venous blood was collected at 3-h intervals. Those who had been in the night shift schedule showed lower mean circulating TNF- α ($t_{13} = -6.03$, $p < 0.001$), without any significant differences in IL-1 β , IL-8 and IL-10, compared with those who had been in the day shift (i.e., control) schedule. Furthermore, circulating IL-6 increased with time awake in both shift work conditions ($t_{13} = 6.03$, $p < 0.001$), such that temporal changes in IL-6 were markedly shifted relative to circadian clock time in the night shift condition. These results indicate that night shift work compromises host defense by creating cytokine conditions that initially impede anti-viral immunity (lower TNF- α) and may eventually promote autoimmunity (mistimed rise in IL-6).

Liu et al. 2021.

Neurobiology of Sleep and Circadian Rhythms

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Keywords: COVID-19; cytokine storm; infectious disease; inflammation; night work; temporal regulation.

Evidence Level: 3:A2

Link: <https://www.sciencedirect.com/science/article/pii/S2451994421000043?via%3Dihub>

Efficacy of intermittent exposure to bright light for treating maladaptation to night work on a counterclockwise shift work rotation

Objectives Rotating shift work is associated with adverse outcomes due to circadian misalignment, sleep curtailment, work-family conflicts, and other factors. We tested a bright light countermeasure to enhance circadian adaptation on a counterclockwise rotation schedule. **Methods** Twenty-nine adults (aged 20-40 years; 15 women) participated in a 4-week laboratory simulation with weekly counterclockwise transitions from day, to night, to evening, to day shifts. Each week consisted of five 8-hour workdays including psychomotor vigilance tests, two days off, designated 8-hour sleep episodes every day, and an assessment of circadian melatonin secretion. **Participants** were randomized to a treatment group (N=14), receiving intermittent bright light during work designed to facilitate circadian adaptation, or a control group (N=15) working in indoor light. Adaptation was measured by how much of the melatonin secretion episode overlapped with scheduled sleep timing. **Results** On the last night shift, there was a greater overlap between melatonin secretion and scheduled sleep time in the treatment group [mean 4.90, standard deviation (SD) 2.8 hours] compared to the control group (2.62, SD 2.8 hours; $P=0.002$), with night shift adaptation strongly influenced by baseline melatonin timing ($r^2=-0.71$, $P=0.01$). While the control group exhibited cognitive deficits on the last night shift, the treatment group's cognitive deficits on the last night and evening shifts were minimized. **Conclusions** In this laboratory setting, intermittent bright light during work hours enhanced adaptation to night work and subsequent readaptation to evening and day work.

Light regimens scheduled to shift circadian timing should be tested in actual shift workers on counterclockwise schedules as a workplace intervention.

Holst et al. 2021.

Scandinavian Journal of Work and Environmental Health.

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Keywords: Night work; shift work; rotation; bright light; misalignment, sleep curtailment, work-family conflicts.

Evidence Level: 3:A2

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3953

Differences between fixed day shift workers and rotating shift workers in gastrointestinal problems: a systematic review and meta-analysis

This study comprised a review and compilation of literature to gain an in-depth understanding of the impact of rotating shift work on gastrointestinal health. PubMed, CINAHL, and the Cochrane Library were searched for studies published between January 1, 1985, and June 30, 2020. Fixed day shifts were defined as work shifts that began between 7:00 and 9:00 in the morning. Shifts beginning at any other time were classified as rotating shifts. A meta-analysis was performed using Comprehensive Meta-Analysis Software (CMA) version 3. In the end, 16 studies were included in the meta-analysis. An odds ratio (OR) of 1.56 (95% confidence interval (CI): 1.24-1.95), indicating that gastrointestinal problems are more common in rotating shift workers than in fixed day shift workers. Four gastrointestinal problems, namely, irritable bowel syndrome, constipation, indigestion, and peptic ulcers, were then analyzed separately. Significant differences between rotating shift workers and fixed day shift workers were found only for indigestion and peptic ulcers. For indigestion, the OR was 1.72 (95% CI: 1.28-2.30). For peptic ulcers, the OR was 1.66 (95% CI: 1.19-2.30). Thus, research indicates that rotating shift work may increase the risk of gastrointestinal problems, particularly indigestion and peptic ulcers.

Chang et al. 2021.

Industrial Health, vol. 59, no. 2.

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Keywords: Fixed day shift; gastrointestinal problems; meta-analysis; rotating shift; worker.

Evidence Level: 1:A2

Link: https://www.jstage.jst.go.jp/article/indhealth/59/2/59_2020-0153/article

Management and Leadership

Do managers sleep well? The role of gender, gender empowerment and economic development

Work demands often disrupt sleep. The stress of higher status theory posits that workers with greater resources often experience greater stress. We extend this theory to sleep and ask: do managers report more disrupted sleep and does this vary by gender and country context? Data come from the 2012 European Social Survey Programme and our sample comprised those currently employed in their prime working age (n = 27,616; age 25-64) in 29 countries. We include country level measures of the Gender Development Index (GDI) and gross domestic product (GDP). We find that workers sleep better, regardless of gender, in countries where women are empowered. For managers, women sleep better as GDI increases and men as GDP increases. Our results suggest that men experience a sleep premium from economic development and women from gender empowerment.

Tan et al. 2021.

PLoS One, vol. 16, no. 3.

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Keywords: Managers; sleep; gender; empowerment; economic development.

Evidence Level: 4:A2

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0247515>

Risk factors and leadership in a digitalized working world and their effects on employees' stress and resources: Web-based questionnaire study

Background: In today's world of work, the digitalization of work and communication processes is increasing, and will increase even further. This increase in digitalization at the workplace brings many new aspects of working life to light, such as working in virtual teams, mobile working, expectations of being constantly available, and the need for support in adapting and learning new digital tools. These changes to the workplace can contain risks that might harm the well-being of employees. Leaders can support the well-being of their employees in terms of protecting and replenishing their work-related resources to cope with critical work demands. This so-called health-promoting leadership could serve as a buffer between risk at the workplace and critical outcomes, such as stress, by amplifying work-related resources.

Objective: This study's aims were twofold. First, we wanted to investigate if risk factors related to higher digitalization at the workplace can be identified and if these risk factors have an impairing effect on the well-being of employees (eg, higher stress and lower resources). Second, we wanted to investigate if the health-impairing effects of these risk factors can be reduced by health-promoting leadership. **Methods:** A total of 1412 employees from Austria, Germany, and Switzerland took part in this online study and provided information on their perceived risks at the workplace, their leaders' health-promoting behaviors, and their work-related stress and resources. **Results:** The results of a hierarchical regression analysis showed that all four risk factors of digital work (distributed team work, mobile work, constant availability, and inefficient technical support) were related to higher stress at the workplace. In addition, distributed team work and inefficient technical support were associated with lower work-related resources. A possible buffer effect of health-promoting leadership between these risks and employee well-being was visible for inefficient technical support. In particular, in the case of having fewer support opportunities in learning and using digital tools, leaders could weaken the potential critical effects on stress. As for the other risk factors, leaders might engage in a different leadership behavior to improve their employees' well-being, as the physical distance between leaders and employees in virtual team work or mobile work could make health-promoting leadership more difficult. **Conclusions:** In a digitalized working world, solutions are needed to create working conditions that benefit employees. The results of this study strongly support the importance of investigating risk factors associated with an increase in digitalization at the workplace in addition to traditional risk factors. As for leadership, leaders need to show leadership behavior adapted to a digitalized workplace in order to reduce employee stress and increase work-related resources.

Bregenzer et al. 2021.

Journal of Medical Internet Research, vol. 23, no. 3.

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Keywords: Digitalization; leadership; new ways of working; resources; stress.

Evidence Level: 5:B1

Link: <https://www.jmir.org/2021/3/e24906/>

Work Ability

Supporting employees with chronic conditions to stay at work: perspectives of occupational health professionals and organizational representatives

Background: Supporting employees with chronic conditions can prevent work-related problems and facilitate sustainable employment. Various stakeholders are involved in providing support to these employees. Understanding their current practices and experienced barriers is useful for the development of an organizational-level intervention to improve this support. The aim of this study was to explore the current practices of occupational physicians and organizational representatives, identifying both barriers to providing support and opportunities for improvement. **Methods:** Two focus groups with sixteen occupational physicians and seven semi-structured interviews with organizational representatives were held between January and June 2018. Data was analyzed using thematic content analysis. **Results:** Several barriers to offer support were identified, including barriers at the organizational level (negative organizational attitudes towards employees with chronic conditions), the employee level (employees' reluctance to collaborate with employers in dealing with work-related problems), and in the collaboration

between occupational physicians and organizational representatives. In addition, barriers in occupational health care were described, e.g. occupational physicians' lack of visibility and a lack of utilization of occupational physicians' support. Opportunities to optimize support included a shared responsibility of all stakeholders involved, actively anchoring prevention of work-related problems in policy and practice and a more pronounced role of the health care sector in preventing work-related problems.

Conclusions: Preventing work-related problems for employees with chronic conditions can be achieved by addressing the identified barriers to provide support. In addition, both occupational physicians and organizational representatives should initiate and secure preventive support at the organizational level and in occupational health care. These insights are helpful in developing an intervention aimed at supporting employees with chronic conditions to stay at work.

Bosma et al. 2021.

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

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Keywords: Chronic disease; occupational health services; organizations; prevention; qualitative research; work.

Evidence Level: 5:A1

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10633-y>

Interventions to promote work ability by increasing physical activity among workers with physically strenuous jobs: A scoping review

Aims: The potential benefits of workplace physical activity (PA) interventions are in improving both health and important workplace outcomes. Despite the differences in PA level between physically strenuous and inactive work, the literature reporting the effectiveness of the interventions does not usually differentiate physically active and inactive jobs. The aim of the current study was therefore to collect and synthesise research evidence on workplace PA interventions to promote work ability specifically among workers in physically strenuous jobs by means of a scoping review. **Methods:** The databases Medline, Cochrane Central and Scopus were used to identify interventions to promote work ability by increasing PA among workers in physically strenuous jobs. An iterative method was used to obtain an overview of the study elements and to extract details on the study design, sample, intervention, outcomes and effectiveness. **Results:** A total of 47 studies evaluating eight categories of interventions were found. Out of these, 18 reported significant effects on work ability. Positive results came from a range of different interventions, including aerobic exercise, strength training, combined aerobic exercise and strength training, stretching, yoga, consultation and tailored physical exercise programmes. **Conclusions:** Few interventions were effective in promoting work ability by increasing PA among workers in physically strenuous jobs. In particular, trials based on the demands of work, multimodal interventions and applying wearable technology are needed.

Mänttari et al. 2021.

Scandinavian Journal of Public Health, vol. 49, no. 2.

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Keywords: Workplace interventions; physical activity; physical workload; scoping review; work ability.

Evidence Level: 6:A2

Link: <https://journals.sagepub.com/doi/full/10.1177/1403494820917532>

Safety climate as a predictor of work ability problems in blue-collar workers: prospective cohort study

Objectives: To evaluate whether safety climate items would be predictive of future physical and mental work ability among blue-collar workers. **Methods:** Blue-collar workers (n=3822) from the Danish Work Environment and Health study replied to questions on safety climate, physical and mental work ability, and health in 2012 and 2014. Using multivariate logistic regression, we estimated the association of number of safety climate items (0-5) in 2012 with physical and mental work ability in 2014. Potential confounders included sex, age, socioeconomic class, occupational group, lifestyle (smoking habits and body mass index) and previous accidents. **Results:** In the fully adjusted model, workers reporting two and three or more safety climate problems (reference: 0) had higher risk for reduced physical work ability at follow-up (OR

1.29 [95% CI 1.03 to 1.61] and OR 1.52 [95% CI 1.27 to 1.84], respectively). Similar outcomes were observed for mental work ability. Using number of safety climate items as a continuous variable, a dose response association existed both for physical and mental work ability (trend-test <0.0001). **Conclusion:** A dose-response association between the number of safety climate items at baseline and lower physical and mental work ability was detected after 2 years. Safety climate items should be highly prioritised in blue-collar companies.

Brandt et al. 2021.

BMJ Open, vol. 11, no. 3.

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Keywords: Epidemiology; health & safety; mental health; occupational & industrial medicine; organisational development; risk management.

Evidence Level: 4:A1

Link: <https://bmjopen.bmj.com/content/11/3/e040885.long>

Labor-force participation and working patterns among women and men who have survived cancer: A descriptive 9-year longitudinal cohort study

Aims: Our aim was to investigate labor-force participation, working hours, job changes, and education over 9 years among persons who have survived more than 10 years after cancer, and compare it to controls.

Methods: Register data on 2629 persons who survived cancer were stratified by gender and compared to data on 5258 matched controls. Persons who survived cancer were aged 30-50 when diagnosed with cancer and had a work contract prior to diagnosis. Descriptive analysis and *t*-tests were performed.

Results: The proportion of female persons who survived cancer in the labor force was reduced from 100% to 83.9% during follow-up, demonstrating a significant difference compared to controls for each year measured. The proportion of male persons who survived cancer dropped from 100% to 84.8%, but was only significantly different compared to controls in 2 years. The proportion of female persons who had survived cancer who worked full-time was lower in all years compared to both controls and male persons who survived cancer; in turn, male persons who had survived cancer worked full-time less than male controls. The proportion of female persons who had survived cancer who worked less than 20 hours per week increased compared to controls. The frequency of change of employer was higher among female persons who survived cancer compared to controls for some years, but no significant differences between male persons who survived cancer and controls were found. Female persons who survived cancer were in education more often than male persons who survived cancer. **Conclusions:** Persons who survived cancer experienced reduced labor-force participation and working hours 9 years after diagnosis, and the reduction was more pronounced for women than for men. Working patterns were also different between genders and between persons who survived cancer and controls.

Brusletto et al. 2021.

Scandinavian Journal of Public Health, vol. 49, no. 2.

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Keywords: Cancer survivor; registries; return to work; vocational rehabilitation.

Evidence Level: 4:A2

Link: <https://pubmed.ncbi.nlm.nih.gov/32883170/>

Guiding and Supporting Mental Health and Wellbeing

Mental Health

Mindfulness-based programmes to reduce stress and enhance well-being at work: a realist review

Objectives: To understand how and why workplace mindfulness-based programmes (MBPs) work or do not work. **Design:** A realist review. **Eligibility criteria for selection:** We considered any studies (experimental quasi-experimental, observational, qualitative and mixed-methods studies) of workplace MBPs as long as they provided data to explain our programme theories. All MBP formats and delivery modes were included.

Analysis: Consistent with realist review methodology, we systematically screened and analysed data to explain how and why workplace MBPs work or do not work. These explanations were consolidated into a programme theory augmented by theories from organisational literature, such as conservation of resources theory. **Results:** Findings from 75 primary studies suggest that workplace MBPs enable participants (including healthcare professionals) to deal more skillfully with stressful events and improve their well-being. The mechanisms involved can be grouped around awareness/self-regulation, acceptance/compassion, feeling permitted to take care of self, sense of growth and promise of goal attainment. In order for professionals to invest in an MBP and benefit from it, it is important that they feel safe to engage with self-care at work and share emotional difficulties among peers. It is also important that employees are able to link the programme and its activities to existing goals and practices. Concerns of being non-productive, of not getting work done or of being exposed in front of colleagues can result in strategic use of brief mindfulness exercises, non-adherence or drop-out. **Conclusions:** Simply offering an MBP to (healthcare) professionals in order to reduce stress and enhance well-being does not suffice. A supportive environment must exist in order for the programme's benefits to be reaped.

Micklitz et al. 2021.

BMJ Open, vol. 11, no. 3.

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Keywords: Human resource management; mental health; social medicine.

Evidence Level: 6:A1

Link: <https://bmjopen.bmj.com/content/11/3/e043525.long>

Short-term effects of social stressors at work on rumination and physical symptoms

The present study focuses on social stressors at work and the development of physical symptoms in social workers on a daily basis. In a seven-day diary study it was anticipated that daily rumination functions as a mediator, linked to additional daily physical symptoms in individuals. Before and after work, 81 social workers completed daily questions on social stressors, rumination, and physical symptoms. Multilevel analyses of up to 391 daily measurements revealed that more intense social stressors predicted more rumination, as well as physical symptoms. Rumination anteceded higher physical symptoms. A test of the indirect effects showed a significant indirect path from social stressors at work via rumination to physical symptoms. Hence, it was found that social stressors and rumination contribute to the ongoing health crisis in the social work profession. These findings advance our understanding of the stress mechanisms in social work, as well as point to individual and organizational aspects that occupational health prevention programs should consider.

Egglı et al. 2021.

Industrial Health

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Keywords: Occupational health; physical symptoms; rumination; social stressors; social work.

Evidence Level: 4:B1

Link: https://www.jstage.jst.go.jp/article/indhealth/advpub/0/advpub_2020-0192/_article

Employment status change and new-onset depressive symptoms in permanent waged workers

Background: This study aimed to investigate the relationship between changes in employment status and new-onset depressive symptoms through a one-year follow-up of permanent waged workers.

Methods: We analyzed the open-source data from the Korea Welfare Panel Study. Using the 2017 data, we selected 2,314 permanent waged workers aged 19 to 59 years without depressive symptoms as a base group. The final analysis targeted 2,073 workers who were followed up in 2018. In 2018, there were five categories of employment status for workers who were followed up: permanent, precarious, unemployed, self-employed, and economically inactive. Multiple logistic regression was used to determine the association between employment status change and new-onset depressive symptoms. **Results:** Adjusted multiple logistic regression analysis showed that among male workers, workers who went from permanent status to being unemployed (odds ratio: 4.50, 95% confidence interval: 1.19 to 17.06) and from permanent status to being precarious workers (odds ratio: 3.15, 95% confidence interval: 1.30 to 7.65) had significantly

high levels of new-onset depressive symptoms compared with those who retained their permanent employment status. There were no significant increases in new-onset depressive symptoms of male workers who went from permanent status to being self-employed or economically inactive. On the other hand, no significant differences were found among female workers. **Conclusion:** Our study suggests that the change of employment status to precarious workers or unemployment can cause new-onset depressive symptoms in male permanent waged workers.

Kim et al. 2021.

Safety and Health at Work, vol. 12, no. 1.

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Keywords: Depressive symptoms; employment status; permanent waged worker; precarious worker; unemployment.

Evidence Level: 4:B1

Link: <https://www.sciencedirect.com/science/article/pii/S2093791120303371?via%3Dihub>

Harmonized definition of occupational burnout: A systematic review, semantic analysis, and Delphi consensus in 29 countries

Objective: A consensual definition of occupational burnout is currently lacking. We aimed to harmonize the definition of occupational burnout as a health outcome in medical research and reach a consensus on this definition within the Network on the Coordination and Harmonisation of European Occupational Cohorts (OMEGA-NET). **Methods:** First, we performed a systematic review in MEDLINE, PsycINFO and Embase (January 1990 to August 2018) and a semantic analysis of the available definitions. We used the definitions of burnout and burnout-related concepts from the Systematized Nomenclature of Medicine Clinical Terms (SNOMED-CT) to formulate a consistent harmonized definition of the concept. Second, we sought to obtain the Delphi consensus on the proposed definition. **Results:** We identified 88 unique definitions of burnout and assigned each of them to 1 of the 11 original definitions. The semantic analysis yielded a first proposal, further reformulated according to SNOMED-CT and the panelists' comments as follows: "In a worker, occupational burnout or occupational physical AND emotional exhaustion state is an exhaustion due to prolonged exposure to work-related problems". A panel of 50 experts (researchers and healthcare professionals with an interest for occupational burnout) reached consensus on this proposal at the second round of the Delphi, with 82% of experts agreeing on it. **Conclusion:** This study resulted in a harmonized definition of occupational burnout approved by experts from 29 countries within OMEGA-NET. Future research should address the reproducibility of the Delphi consensus in a larger panel of experts, representing more countries, and examine the practicability of the definition.

Canu et al. 2021.

Scandinavian Journal of Work, Environment & Health, vol. 47, no. 2.

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Keywords: Occupational burnout; consensual definition; health outcome; medical research.

Evidence Level: 1:A2

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3935

Bullying and Harassment

Workplace violence: legislation, public policies and possibility of advances for health workers

Objectives: to discuss specific laws and public policies for workplace violence in the health sector, highlighting possibilities for the collective confrontation of this phenomenon in Brazil. **Methods:** this is a reflective and argumentative study that refers to some previous experiences regarding the implementation of legal aspects to curb workplace violence directed at health professionals. **Results:** there are experiences regarding the existence of legislation or public policies to specifically contain workplace violence in the health sector, but these are still restricted to some places or countries. The literature provides resources for developing specific strategies for managing this phenomenon, highlighting prevention programs and conducts for case management. **Final considerations:** implementation of legal aspects or public policies at

the municipal, regional, state and/or national level is a strategy with potential to confront workplace violence in health services in a collective and sustainable way.

Bordignon et al. 2021.

Rev Bras Enferm, vol. 74, no. 1.

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Keywords: Workplace violence; legislation; public policies; health workers; health sector.

Evidence Level: 6:B1

Link: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672021000100402&lng=en&nrm=iso&tlng=en

Psychosocial Issues – Risk Factors

Interrelationships between job demands, low back pain and depression: A four-way decomposition analysis of direct and indirect effects of job demands through mediation and/or interaction

Background: Psychosocial work stressors may lead to low back pain (LBP) through depressive symptoms or to depression through LBP. Depressive symptoms or LBP may also modify these associations. **Methods:** We examined prospective interrelationships between job demands, LBP and depressive symptoms. We used comparable data from three consecutive biennial surveys in 2010-2016, from the Swedish Longitudinal Occupational Survey of Health (SLOSH) and the Work Environment and Health in Denmark (WEHD) cohorts, broadly representative of the working populations in Sweden and Denmark. We conducted multivariate counterfactual based mediation analyses allowing for four-way decomposition of the total effect of job demands, on incident LBP (N=2813, 2701) and incident major depression (N=3707, 5496). The four components estimated direct and indirect effects through mediation and/or interaction. **Results:** We observed no association between job demands and incident LBP four years later, but job demands was associated with later major depression (relative risks=1.88, 95% confidence interval=1.45-2.31 in SLOSH and 1.64, 1.18-2.11 in WEHD, adjusted for age, sex, panel (SLOSH data), education, cohabitation, physically strenuous work and chronic diseases. About 37% of the association was attributed to interaction between job demands and LBP in SLOSH. No interaction was found in WEHD. LBP partly mediated the relationship, by 14% in SLOSH and 2%, while statistically insignificant in WEHD. **Limitations:** Possible limitations include lack of comparable data on disabling low back pain, different scales for depressive symptoms, misclassification and residual confounding. **Conclusions:** This suggests mainly a direct effect of job demands on major depression, or through other pathways than LBP.

Ahlin et al. 2021.

Journal of Affective Disorders.

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Keywords: Depression; interaction; job demands; low back pain; mediation; psychosocial working conditions

Evidence Level: 4:B1

Link: <https://www.sciencedirect.com/science/article/pii/S0165032720331517?via%3Dihub>

Enabling Healthy and Safe Workplaces

Health and Wellbeing

The glass ceiling for women managers: Antecedents and consequences for work-family interface and well-being at work

Despite significant promotion of diversity in companies, as well as legislation for equal opportunities for women and men, it must be noted that women still remain largely in the minority in decision-making positions. This observation reflects the phenomenon of the glass ceiling that constitutes vertical discrimination within companies against women. Although the glass ceiling has generated research interest, some authors have pointed out that theoretical models have made little attempt to develop an

understanding of this phenomenon and its implications. Therefore, our study aims to fill this gap and to better understand the phenomenon of the glass ceiling by considering both its antecedents and its possible consequences. More precisely, we extend the model developed by Elacqua et al. (2009), proposing a more comprehensive model including organizational gender culture as a third factor (in addition to situational and interpersonal issues) in the emergence of the glass ceiling through the perception of differential treatment. We also investigated the glass ceiling's consequences for organizational attitudes and well-being at work by considering work-to-family conflict (WFC) as a possible mediator. We surveyed 320 women in managerial positions in a Belgian organization. Our study highlights the importance of all three factors in the emergence of the perception of differential treatment and, ultimately, the perception that a glass ceiling exists. Moreover, our results show that WFC fully mediates the effects of the glass ceiling on job strain and job engagement, and partially mediates the effects of the glass ceiling on job satisfaction and intention to quit.

Babic et al. 2021.

Frontiers in Psychology.

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Keywords: Differential treatment; glass ceiling; interpersonal issues; organizational attitudes; situational issues; well-being at work; work-to-family conflict.

Evidence Level: 5:B2

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7985459/>

Work Health and Safety

The impact of emotional contagion on workplace safety: Investigating the roles of sleep, health, and production pressure

Using emotional contagion theory and the Job Demands-Resources model as a theoretical foundation, we tested the proposition that higher levels of contagion of anger (i.e., a demand) vs. higher levels of contagion of joy (i.e., a resource) will be associated respectively with more vs. fewer sleep disturbances and health problems, which in turn are related to more workplace accidents and injuries. Moreover, we examined the moderating impact of production pressure (i.e., a contextual demand) on the relationship between emotional contagion and employee poor sleep and health. Data from 1000 employees in Italy showed that the conditional indirect effects of contagion of anger, but not of joy, on accidents and injuries via sleep and health problems were intensified as levels of production pressure increased. Furthermore, contagion of anger was positively associated with both sleep disturbances and health problems whereas contagion of joy was negatively related to only sleep disturbances. These findings suggest that the effect of anger that employees absorb during social interactions at work likely persists when coming at home and represents an emotional demand that impairs the physiological functions that regulate restorative sleep and energies recharging; and, this effect is even stronger among employees who perceived higher levels of organizational production pressure.

Petitta et al. 2021.

Current Psychology

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Keywords: Emotional contagion; health problems; production pressure; sleep disturbances; workplace accidents and injuries.

Evidence Level: 5:B2

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7972334/>

How effectively safety incentives work? A randomized experimental investigation

Background: Incentive and penalty (I/P) programs are commonly used to increase employees' safety outcomes, but its influence on employees' safety outcomes is under-investigated. Moreover, under developed economies lack safety culture and there is dearth of literature focusing on empirical studies over there [1]. Based on these gaps, this study attempts to see the impact of I/P programs on safety outcomes in a developing country. **Methods:** The study was carried out in three stages, where Stage I revealed that

selected 45 organizations were deficit of safety culture and practices, while only three firms were found good at safety practices. At Stage II, these three firms were divided in two clusters (groups), and were probed further at Stage III. At this stage group, one was manipulated by providing incentives (experimental group) and employees' responses in terms of safety motivation and performance were noticed. **Results:** It was observed that the experimental group's safety motivation and performance had improved (both for immediate and 1-month later performance). The results were further probed at Phase 3 (after 3 months), where it was found that the benefits of I/P programs were not long lasting and started replenishing.

Conclusion: Findings of the study helped researchers conclude that safety incentives have only short-term influence on safety outcomes, while a long-term and permanent solution should be found.

Ahmed et al. 2021.

Safety and Health at Work, vol. 12, no. 1.

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Keywords: Employee's performance; health and safety; incentive and penalty; safety incentives; safety motivation

Evidence Level: 3:B1

Link: <https://www.sciencedirect.com/science/article/pii/S2093791120303140?via%3Dihub>

Occupational accidents involving biological material: demographic and occupational profile of affected workers

Introduction: Work accidents involving biological material are characterized as those whose exposure involves direct or indirect contact with human or animal blood and biological fluids, with a potential degree of contamination. **Objectives:** To investigate the sociodemographic and occupational profile of workers, as well as data on occupational accidents with exposure to biological material in the municipalities that make up the Centro de Referência em Saúde do Trabalhador da Região dos Vales do estado do Rio Grande do Sul (Cerest-Vales/RS). **Methods:** Documentary, retrospective, descriptive, quantitative research, where 1,260 Sistema de Informação de Agravos de Notificação (Sinan) notifications were analyzed, between 2014 and 2018. Data were collected in a unit specialized in worker health care. **Results:** The sex most affected by accidents was female, with 80.2% of cases, age group of 28 to 33 years (26.4%), and level of education represented mostly by complete high school (55.4%). Health professionals concentrated 84.1% of accidents, most of which occurred with nursing technicians, followed by nurses and doctors. Professionals from different occupations, such as veterinarians, students, janitors and garbage collectors were also exposed. Blood was the organic material that prevailed (81.1%) between accidents and exposure, percutaneous (70.3%). Clinical data revealed the prevalence of patients vaccinated for hepatitis B (90.6%), but 62.7% with (hepatitis B surface antigen, HBsAg) negative; 49.5% of the injured were discharged with a negative source patient and 66% the Comunicação de Acidente de Trabalho (CAT) issued.

Conclusions: Accidents occurred more frequently among females, individuals with low education and health professionals. The weakness in the reports of accidents with professionals with no presumed risk is reiterated, which generates underreporting rates.

Bertelli et al. 2021.

Rev Bras Med Trab, vol. 18, no. 4.

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Keywords: Exposure to biological agents; occupational accidents; occupational exposure; occupational health.

Evidence Level: 5:B1

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7934171/>

Prevalence of occupational accidents and associated variables in the Brazilian workforce

Introduction: Current estimates suggest that 317 million occupational accidents occur annually worldwide.

Objectives: To estimate the prevalence of occupational accidents and associated variables in the Brazilian workforce. **Methods:** A cross-sectional study was performed using data from adults aged 18 or older who participated in the National Health Survey (Pesquisa Nacional de Saúde) (2013). This study was based on participants' responses to questions regarding their history of occupational accidents in the previous 12

months. Socioeconomic, lifestyle and health-related variables were also examined. Prevalence rates and ratios were calculated using Poisson multivariate regression models (with 95% confidence intervals), followed by Wald's tests for robust variance estimation. **Results:** The prevalence of occupational accidents was 2.79% (95% confidence interval, 2.53-3.08%). These incidents were associated with male gender (prevalence ratio = 1.42; 95% confidence interval, 1.14-1.77), living in rural areas (prevalence ratio = 1.27; 95% confidence interval, 1.06-1.62), age 18 to 24 (prevalence ratio = 2.02; 95% confidence interval, 1.20-3.40), illiteracy (prevalence ratio = 3.12; 95% confidence interval, 1.96-4.96) and having two or more chronic illnesses (prevalence ratio = 2.12; 95% confidence interval, 1.29-3.47).

Conclusions: Though the prevalence of occupational accidents in the Brazilian workforce was low, these incidents were associated with multimorbidity, socioeconomic status and lifestyle variables.

de Souza et al. 2021.

Revista Brasileira de Medicina do Trabalho, vol. 18, no. 4.

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Keywords: Absenteeism/presenteeism; occupational accident; occupational health

Evidence Level: 4:B2

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7934164/>

Extreme heat and occupational injuries in different climate zones: A systematic review and meta-analysis of epidemiological evidence

Background: The link between heat exposure and adverse health outcomes in workers is well documented and a growing body of epidemiological evidence from various countries suggests that extreme heat may also contribute to increased risk of occupational injuries (OI). Previously, there have been no comparative reviews assessing the risk of OI due to extreme heat within a wide range of global climate zones. The present review therefore aims to summarise the existing epidemiological evidence on the impact of extreme heat (hot temperatures and heatwaves (HW)) on OI in different climate zones and to assess the individual risk factors associated with workers and workplace that contribute to heat-associated OI risks.

Methods: A systematic review of published peer-reviewed articles that assessed the effects of extreme heat on OI among non-military workers was undertaken using three databases (PubMed, Embase and Scopus) without temporal or geographical limits from database inception until July 2020. Extreme heat exposure was assessed in terms of hot temperatures and HW periods. For hot temperatures, the effect estimates were converted to relative risks (RR) associated with 1 °C increase in temperature above reference values, while for HW, effect estimates were RR comparing heatwave with non-heatwave periods. The patterns of heat associated OI risk were investigated in different climate zones (according to Köppen Geiger classification) based on the study locations and were estimated using random-effects meta-analysis models. Subgroup analyses according to workers' characteristics (e.g. gender, age group, experience), nature of work (e.g. physical demands, location of work i.e. indoor/outdoor) and workplace characteristics (e.g. industries, business size) were also conducted. **Results:** A total of 24 studies published between 2005 and 2020 were included in the review. Among these, 22 studies met the eligibility criteria, representing almost 22 million OI across six countries (Australia, Canada, China, Italy, Spain, and USA) and were included in the meta-analysis. The pooled results suggested that the overall risk of OI increased by 1% (RR 1.010, 95% CI: 1.009-1.011) for 1 °C increase in temperature above reference values and 17.4% (RR 1.174, 95% CI: 1.057-1.291) during HW. Among different climate zones, the highest risk of OI during hot temperatures was identified in Humid Subtropical Climates (RR 1.017, 95% CI: 1.014-1.020) followed by Oceanic (RR 1.010, 95% CI: 1.008-1.012) and Hot Mediterranean Climates (RR 1.009, 95% CI: 1.008-1.011). Similarly, Oceanic (RR 1.218, 95% CI: 1.093-1.343) and Humid Subtropical Climates (RR 1.213, 95% CI: 0.995-1.431) had the highest risk of OI during HW periods. No studies assessing the risk of OI in Tropical regions were found. The effects of hot temperatures on the risk of OI were acute with a lag effect of 1-2 days in all climate zones. Young workers (age < 35 years), male workers and workers in agriculture, forestry or fishing, construction and manufacturing industries were at high risk of OI during hot temperatures. Further young workers (age < 35 years), male workers and those working in electricity, gas and water and manufacturing industries were found to be at high risk of OI during HW. **Conclusions:** This review strengthens the evidence on the risk of heat-associated OI in different climate zones. The risk of OI associated with extreme heat is not evenly distributed and is dependent on underlying climatic conditions, workers' attributes, the nature of

work and workplace characteristics. The differences in the risk of OI across different climate zones and worker subgroups warrant further investigation along with the development of climate and work-specific intervention strategies.

Fatima et al. 2021.

Environment International.

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Keywords: Climate zones; heatwaves; hot temperatures; occupation injuries.

Evidence Level: 1:A2

Link: <https://www.sciencedirect.com/science/article/pii/S0160412021000088?via%3Dihub>

Ergonomics

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 & Health.

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Keywords: Musculoskeletal pain; ergonomic exposures; work; Denmark.

Evidence Level: 4:A1

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3954

Effect of an ergonomic intervention involving workstation adjustments on musculoskeletal pain in office workers-a randomized controlled clinical trial

Office workers remain in a awkward position for long periods, which can lead to musculoskeletal symptoms. Ergonomic guidelines are recommended to avoid such problems. Evidence of the long-term effectiveness of ergonomic interventions is scarce. The aim of this randomised controlled trial was to compare pain intensity among office workers who received an ergonomic intervention and a control group before as well as 12, 24, and 36 wk after the intervention. Workers were randomly allocated to a control group (CG) and experimental group (EG). The EG received an ergonomic workstation intervention. Furniture measurements were related to individual anthropometric measurements to identify mismatches. The outcome was pain intensity, which was determined using a numerical pain scale and the Nordic Musculoskeletal Questionnaire. A linear mixed model was created with pain intensity as the dependent variable. Group and time were the independent variables. No significant interactions were found between group and time. Significant differences between groups were found for the pain intensity in the neck, shoulder, upper back, and wrist/hand ($p < 0.05$), with lower intensity in the EG. The intervention reduced

pain intensity in the neck, shoulder, upper back, and wrist/hand. However, no reduction in pain intensity was found for the lower back or elbow.

Lee et al. 2021.

Industry Health, vol. 59, no. 2.

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Keywords: Chronic pain; ergonomics; musculoskeletal disorders; randomized controlled trial; worker's health.

Evidence Level: 2:A1

Link: https://www.jstage.jst.go.jp/article/indhealth/59/2/59_2020-0188/article

Chronic Health Issues

Direct healthcare resource utilisation, health-related quality of life, and work productivity in patients with moderate rheumatoid arthritis: an observational study

Background: The aim was to describe the population of patients with moderate rheumatoid arthritis (RA) in the United Kingdom and the burden of disease from the perspectives of the patient, caregiver, and health service. **Methods:** In this descriptive study, retrospective patient-level data were extracted from hospital medical records to assess healthcare resource utilisation and validated outcome measures were administered via questionnaire to patients with moderate RA (Disease Activity Score [DAS28] between 3.2 and 5.1) from eight secondary care centres, and their caregivers. Patient-reported outcome instruments were scored according to licensed manuals. **Results:** Outcome measures were completed by 102 patients and 38 caregivers. The mean EuroQoL-5 dimension-5 level crosswalk index value for patients was 0.62 (SD 0.24) compared to an England population norm of 0.82. Mean pain VAS score was 37.7 (SD 24.0) and mean Health Assessment Questionnaire Disability Index was 1.1 (SD 0.8). In employed patients who completed the Work Productivity and Activity Impairment questionnaire (n = 26), a mean 29% (SD 26%) reduction in work productivity was recorded. Patients experienced significant fatigue as a result of their RA (median Functional Assessment of Chronic Illness Therapy fatigue score 17.2 of a possible 52, interquartile range [IQR] 11.0-28.8). Over 50% of caregivers reported providing > 7 h of support care per week to the patient with RA, and 16 and 11% took paid/unpaid leave or reduced working hours, respectively. Mean Caregiver Reaction Assessment subscale scores were 1.9 (SD 0.9) for finance, 1.7 (SD 0.8) for health, 2.3 (SD 1.0) for schedule disruption, and 1.9 (SD 0.8) for family support. Patients had a mean 5.5 (SD 4.1) outpatient attendances and a median 9.0 (IQR 2.0-20.0) diagnostic and monitoring tests in the 12 months prior to enrolment. **Conclusions:** This study shows that moderate RA has a considerable impact on healthcare resources and on patients' and caregivers' lives. There is scope to improve the management of patients with moderate RA.

Galloway et al. 2021.

BMC Musculoskeletal Disorders, vol. 22, no. 1.

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Keywords: Burden; caregiver; DAS28; EQ-5D; moderate; patient-reported outcome; quality of life; resource utilisation; rheumatoid arthritis.

Evidence Level: 4:A2

Link: <https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-021-04110-1>

Occupational and environmental risk factors of idiopathic pulmonary fibrosis: a systematic review and meta-analyses

Idiopathic pulmonary fibrosis (IPF) is a chronic, progressive, fibrosing interstitial lung disease of unknown cause. It has a high risk of rapid progression and mortality. We conducted a systematic review and meta-analysis to evaluate the risk factor of IPF. We searched Medline, Embase, and the Cochrane library from the earliest record to March, 2020. Case-control studies on occupational and environmental risk factors or on jobs with a risk of IPF were searched for. From 2490 relevant records, 12 studies were included. Any occupational or environmental exposure to metal dust (OR 1.83, 95% CI 1.15-2.91, $I^2 = 54%$), wood dust (OR

1.62 5% CI 1.04-2.53, $I^2 = 5\%$) and pesticide (OR 2.07, 95% CI 1.24-3.45, $I^2 = 0\%$) were associated with an increased risk of IPF. Farming or agricultural work (OR 1.88, 95% CI 1.17-3.04, $I^2 = 67\%$) was also associated with an increased risk of IPF. Moreover, smoking increased IPF risk with an odds ratio of 1.39 (95% CI 1.01-1.91, $I^2 = 29\%$). In conclusion, metal dust, wood dust, pesticide, occupational history of farming or agriculture and ever smoking increased the risk of IPF.

Park et al. 2021.

Scientific Reports, vol. 11, no. 1

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Keywords: Idiopathic pulmonary fibrosis; occupation; risk factors; environmental.

Evidence Level: 1:A2

Link: <https://www.nature.com/articles/s41598-021-81591-z>

Occupational Exposure

Breast cancer among Danish women occupationally exposed to diesel exhaust and polycyclic aromatic hydrocarbons, 1964-2016

Objective: The aim of this study was to explore the association between occupational exposure to diesel exhaust and polycyclic aromatic hydrocarbons (PAH), respectively, and breast cancer subtypes. **Methods:** The study included 38 375 women <70 years with incident breast cancer, identified in the Danish Cancer Registry, and 5 breast cancer-free controls per case who were randomly selected from the Danish Civil Registration System and matched on year of birth. Full employment history was obtained for all study subjects from a nationwide pension fund, and exposure to diesel exhaust and PAH was assessed using a job exposure matrix. Conditional logistic regression was used for estimation of odds ratios (OR) with adjustment for reproductive factors and socioeconomic status. **Results:** No noteworthy associations were observed for overall breast cancer in women exposed to diesel exhaust. However, diesel exhaust modestly elevated the risk of estrogen receptor negative breast tumors before age 50 [OR 1.26, 95% confidence interval (CI) 1.09-1.46]. Duration- and dose-response relationships were further observed for this subtype in this age group. No notable risk patterns were generally observed for PAH exposure. **Conclusion:** Occupational exposure to diesel exhaust may increase the risk of early-onset estrogen receptor negative breast tumors in women. Future studies exploring this association are warranted.

Pedersen et al. 2021.

Scandinavian Journal of Work, Environment & Health, vol. 47, no. 2.

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Keywords: Breast cancer; women; occupationally exposure; diesel exhaust; polycyclic aromatic hydrocarbons.

Evidence Level: 4:B2

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3923

Systematic review of potential occupational respiratory hazards exposure among sewage workers

Background: Sewage workers have a higher risk of exposure to various potential occupational respiratory hazards found in sewage plants. Although previous studies discuss occupational respiratory hazard concentration impacting sewage workers' respiratory health, the results are scarce and mixed. Hence, there is a need to identify the potential respiratory hazards in sewage plants so as to clarify the short- and long-term respiratory health effects. Therefore, this systematic review (SR) aims to critically review previous studies investigating potential respiratory hazards found at sewage plants and their effects on sewage workers' respiratory health. **Methods:** An SR was conducted using PubMed, EBSCO Medline, Web of Science, Scopus, and Google Scholar on peer-reviewed studies published between January 1994 and October 2020 evaluating the impact of potential exposure to respiratory hazards and its effects on respiratory health among sewage workers. "Sewage treatment plant," "respiratory hazards," and "respiratory health effects" were the three main search terms chosen in this SR. The inclusion criteria were (1) studies on potential occupational respiratory hazard exposure among sewage workers, (2) manuscripts written in English, and (3) studies published in the peer-reviewed literature. The human observational

studies' quality was assessed using the Effective Public Health Practice Project Quality Assessment Tool. **Results:** We identified 5,660 articles through an initial database search. Only 26 items met the inclusion criteria and were included in this review; 15 human observational studies and 11 environmental assessment studies were conducted in the sewage industries. Most of the human observational studies were rated as moderate quality, two studies were rated as weak quality, and one study with strong quality was identified. Hydrogen sulfide, bioaerosols, particulate matter 2.5 (PM 2.5), and volatile organic compounds (VOC) were found to be potential respiratory hazards. Most of the risks contributed to adverse outcomes on the sewage workers' respiratory health with some inconsistent findings on the relationship between respiratory hazard exposure and respiratory health effects. **Conclusion:** Our review finds that, although this area is of great importance, quality studies are still lacking. There is a need for additional studies to clarify the effects of respiratory hazard exposure on sewage workers and respiratory health, especially PM 2.5 and VOC.

Muziani et al. 2021.

Frontiers in Public Health

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Keywords: Pulmonary function; respiratory hazards; respiratory symptoms; sewage plants; sewage workers.

Evidence Level: 1:A1

Link: <https://www.frontiersin.org/articles/10.3389/fpubh.2021.646790/full>

Chronic exposure to diesel exhaust may cause small airway wall thickening without lumen narrowing: a quantitative computerized tomography study in Chinese diesel engine testers

Background: Diesel exhaust (DE) is a major source of ultrafine particulate matters (PM) in ambient air and contaminates many occupational settings. Airway remodeling assessed using computerized tomography (CT) correlates well with spirometry in patients with obstructive lung diseases. Structural changes of small airways caused by chronic DE exposure is unknown. Wall and lumen areas of 6th and 9th generations of four candidate airways were quantified using end-inhalation CT scans in 78 diesel engine testers (DET) and 76 non-DETs. Carbon content in airway macrophage (CCAM) in sputum was quantified to assess the dose-response relationship. **Results:** Environmental monitoring and CCAM showed a much higher PM exposure in DETs, which was associated with higher wall area and wall area percent for 6th generation of airways. However, no reduction in lumen area was identified. No study subjects met spirometry diagnosis of airway obstruction. This suggested that small airway wall thickening without lumen narrowing may be an early feature of airway remodeling in DETs. The effect of DE exposure status on wall area percent did not differ by lobes or smoking status. Although the trend test was of borderline significance between categorized CCAM and wall area percent, subjects in the highest CCAM category has a 14% increase in wall area percent for the 6th generation of airways compared to subjects in the lowest category. The impact of DE exposure on FEV1 can be partially explained by the wall area percent with mediation effect size equal to 20%, $P_{perm} = 0.028$. **Conclusions:** Small airway wall thickening without lumen narrowing may be an early image feature detected by CT and underlie the pathology of lung injury in DETs. The pattern of changes in small airway dimensions, i.e., thicker airway wall without lumen narrowing caused by occupational DE exposure was different to that (i.e., thicker airway wall with lumen narrowing) seen in our previous study of workers exposed to nano-scale carbon black aerosol, suggesting constituents other than carbon cores may contribute to such differences. Our study provides some imaging indications of the understanding of the pulmonary toxicity of combustion derived airborne particulate matters in humans.

Liu et al. 2021.

Particle and Fibre Toxicology, vol. 18, no. 1.

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Keywords: Airway wall thickening; carbon content in airway macrophage; diesel exhaust; mediation effect; spirometry.

Evidence Level: 5:B2

Link: <https://particleandfibretoxicology.biomedcentral.com/articles/10.1186/s12989-021-00406-1>

The effectiveness of removal from exposure and reduction of exposure for managing occupational asthma: Summary of an updated Cochrane systematic review

Background: The objective was to update the 2011 Cochrane systematic review on the effectiveness of workplace interventions for the treatment of occupational asthma. **Methods:** A systematic review was conducted with the selection of articles and reports through 2019. The quality of extracted data was evaluated, and meta-analyses were conducted using techniques recommended by the Cochrane Handbook for Systematic Reviews of Interventions. **Results:** Data were extracted from 26 nonrandomized controlled before-and-after studies. The mean number of participants per study was 62 and the mean follow-up time was 4.5 years. Compared with continued exposure, removal from exposure had an increased likelihood of improved symptoms and change in spirometry. Reduction of exposure also had more favorable results for symptom improvement than continued exposure, but no difference for change in spirometry. Comparing exposure removal to reduction revealed an advantage for removal with both symptom improvement and change in spirometry for the larger group of patients exposed to low-molecular-weight agents. Also, the risk of unemployment was greater for exposure removal versus reduction. **Conclusions:** Exposure removal and reduction had better outcomes than continued exposure. Removal from exposure was more likely to improve symptoms and spirometry than reduction among patients exposed to low-molecular-weight agents. The potential benefits associated with exposure removal versus reduction need to be weighed against the potential for unemployment that is more likely with removal from exposure. The findings are based on data graded as very low quality, and additional studies are needed to generate higher quality data.

Henneberger et al. 2021.

American Journal of Industrial Medicine, vol. 64, no. 3.

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Keywords: Asthma management; exposure reduction; exposure removal; interventions at work; work-related asthma.

Evidence Level: 1:A1

Link: <https://onlinelibrary.wiley.com/doi/10.1002/ajim.23208>

Breast cancer and occupational exposures: an integrative review of the literature

Occupational factors can lead to breast cancer, though the relationship between these variables is not well established. The objective of this study was to search the relevant literature for information on the association between breast cancer and exposure to occupational risk factors. For that purpose, electronic databases were searched using the following keywords: breast cancer and occupational exposures. A total of 40 articles published in the 10-year period from 2009 to 2019 were included in this review. Workers exposed to metals such as cadmium, chemical products, radiation and night work were more susceptible to breast cancer. The findings showed significant evidence to support an association between breast cancer and some chemical products, ionizing radiation and night work. However, most studies have difficulty establishing a causal relationship between these variables, pointing to the need for further investigation of these issues.

Brito-Marcelino et al. 2021.

Revista Brasileira de Medicina do Trabalho, vol. 18, no. 4.

User License: *Creative Commons Attribution (CC BY 4.0)* (<https://creativecommons.org/licenses/by/4.0/>)

Keywords: Breast cancer; cancer; occupational illness; workers' health.

Evidence Level: 6:A1

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7934163/>

Airborne occupational exposures and the risk of developing respiratory symptoms and airway obstruction in the Lifelines Cohort Study

Objectives: To date, only a few studies have investigated the associations between occupational exposures and respiratory outcomes longitudinally in the general population. We investigated the associations between occupational exposures and the development of respiratory symptoms and airway obstruction in the Lifelines Cohort Study. **Methods:** We included 35 739 occupationally active subjects with data on

chronic cough, chronic phlegm, chronic bronchitis or airway obstruction at baseline and approximately 4.5 years follow-up. Exposures to biological dust, mineral dust, gases/fumes, pesticides, solvents and metals in the current job at baseline were estimated with the ALOHA+job-exposure matrix (JEM). Airway obstruction was defined as FEV₁/FVC below the lower limit of normal. Logistic regression analysis adjusted for baseline covariates was used to investigate the associations. **Results:** At follow-up, 1888 (6.0%), 1495 (4.7%), 710 (2.5%) and 508 (4.5%) subjects had developed chronic cough, chronic phlegm, chronic bronchitis and airway obstruction, respectively. High exposure to biological dust was associated with a higher odds to develop chronic cough and chronic bronchitis. High exposure to pesticides was associated with a higher odds for the development of all respiratory symptoms and airway obstruction. In the multiple exposures analyses, only the association between pesticides exposure and respiratory symptoms remained. **Conclusions:** Subjects exposed to high pesticides had a higher odds to develop respiratory symptoms on average 4.5 years later. Control measures should be taken to reduce pesticides exposure among the working population to prevent respiratory symptoms and airway obstruction.

Faruque et al. 2021.

Thorax.

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Keywords: COPD epidemiology; occupational lung disease.

Evidence Level: 4:A1

Link: <https://thorax.bmj.com/content/early/2021/03/02/thoraxinl-2020-216721.long>

Are occupational and environmental noises associated with periodontitis? Evidence from a Korean representative cross-sectional study

Background: Evidences have shown that noise could be a risk factor for cardiovascular and metabolic diseases. Since periodontitis and CVD are characterized by inflammation, it is reasonable to doubt that occupational/environmental noise is a risk factor for periodontitis. The aim of this study was to examine the relationship between occupational/environmental noise and periodontitis in a nationally representative sample of Korean adults. **Methods:** This cross-sectional study used data from the 7th Korean National Health and Nutrition Examination Survey. The study sample included 8327 adults aged 40 to 80 years old. Noise exposure and the duration of the exposure were assessed with self-report questionnaires. The dependent variable was periodontitis. Age, gender, place of residence, income, marital status, smoking, frequency of daily tooth brushing, recent dental checkup, and diabetes were included as covariates. Logistic regression analyses estimated the association between noise exposure and periodontitis. **Results:** Those who were exposed to environmental noise during their lifetime had an increased prevalence of severe periodontitis (odds ratio [OR] 1.88; 95% confidence interval [CI] 1.05 to 3.40), and this association was strengthened as the duration of the environmental noise exposure was longer (OR of > 120 months 2.35 and OR of ≤120 months 1.49). There was a combined relationship for severe periodontitis between occupational and environmental noise exposure (OR of both exposures 2.62, OR of occupational exposure only 1.12, and OR of environmental exposure only 1.57). **Conclusion:** Our study shows that noise exposure is associated with periodontitis, and the association was higher in the synergism between occupational and environmental interaction.

Han et al. 2021.

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

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Keywords: Epidemiology; noise; periodontitis; risk factor.

Evidence Level: 4:B1

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10672-5>

Effect of occupational exposure to herbicides on oxidative stress in sprayers

Background: Herbicides such as glyphosate, paraquat, and 2,4-dichlorophenoxyacetic acid have been reported to cause adverse side effects through production of reactive oxygen species. However, there were no data representing the adverse effects of a mixture herbicide usage in farmers, especially the changes in oxidative marker and antioxidant defense. This study aimed to determine the urinary malondialdehyde (MDA) and glutathione (GSH) level in farmers using mixed herbicides. **Methods:** Ninety-three farmers were

recruited, and two spot urine samples (before and after work) were collected. The urinary MDA level was evaluated by thiobarbituric acid reactive substance assay, and the urinary GSH level was determined using the enzymatic recycling method. **Results:** Sixty-two percent of the participants were men, and 59% of the participants worked in a farm for 20-40 years. The common combinations of herbicide usage were glyphosate with 2,4-dichlorophenoxyacetic acid (36.5%). There was no significant difference between pre- and post-work urinary MDA and GSH levels among the 3 groups of herbicides. However, the urinary MDA levels in farmers using the combination of glyphosate and paraquat were significantly higher than those found in farmers using glyphosate alone. The associated factors with changes in MDA levels found that the exposure intensity index ($B = 0.154$), the cumulative exposure intensity index ($B = 0.023$), and wearing gloves while working ($B = -2.347$) were found to be significantly associated with MDA level. **Conclusion:** The results suggest that the combined use of glyphosate and paraquat caused a significant increase in urinary MDA levels. Moreover, intensity of exposure to herbicide and wearing gloves were associated with the level of MDA.

Intayoung et al. 2021.

Safety and Health at Work, vol. 12, no. 1.

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(<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

Keywords: 2,4-D; glutathione (GSH); glyphosate; malondialdehyde (MDA); paraquat.

Evidence Level: 4:A2

Link: <https://www.sciencedirect.com/science/article/pii/S2093791120303413?via%3Dihub>

Increased risk of gastric cancer in workers with occupational dust exposure

Background/aims: Workers who are exposed to dust in the workplace tend to show a higher incidence of gastric cancer. Nevertheless, scientific evidence to support an association between dust exposure and the risk of gastric cancer is inadequate. This study aimed to investigate whether or not occupational dust exposure influences the risk of gastric cancer. **Methods:** We collected the electronic data from the Pneumoconiosis Health Examination (PHE) program, provided by the Ministry of Employment and Labor and the Korea Workers' Compensation and Welfare Service from 2002 to 2017. The PHE database was linked to the National Health Insurances databases. The age-standardized incidence ratio (SIR) and 95% confidence intervals (CIs) of the risk of gastric cancers were evaluated in workers with occupational dust exposure, and the results were compared to those in the general population. **Results:** From 2004 to 2015, 1,543 cases of gastric cancer were observed in the male participants, as compared with 1,174 of expected cases, which yielded an SIR of 1.314 (95% CI, 1.249 to 1.380). Under dust exposure, the risk of gastric cancer was increased 23.9% in the male participants (95% CI, 19.9 to 27.5), and the degree of impairment of lung function was inversely related to the risk of gastric cancer. **Conclusion:** Workers with occupational dust exposure were at higher risk of developing gastric cancer than the general population. Thus, future efforts for the prevention of gastric cancer are necessary for dust exposed workers.

Kang et al. 2021.

Korean Journal of Internal Medicine, vol. 36.

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(<https://creativecommons.org/licenses/by-nc/4.0/>)

Keywords: Incidence; occupation dust; stomach neoplasms.

Evidence Level: 4:A2

Link: <https://www.kjim.org/journal/view.php?doi=10.3904/kjim.2019.421>

Musculoskeletal Health

The unequal burden of self-reported musculoskeletal pains among South Korean and European employees based on age, gender, and employment status

Background: The objective of this study was to elucidate the relationships musculoskeletal pains with combined vulnerability in terms of age, gender, and employment status. **Methods:** The fifth European Working Conditions Survey (EWCS) in 2010 (43,816 participants aged 15 years and over) analyzed for

European employees and the third Korean Working Conditions Survey (KWCS) in 2011 (50,032 participants aged 15 years and older) analyzed for Korean employees. In this study, three well known vulnerable factors to musculoskeletal pains (older age, female gender, and precarious employment status) were combined and defined as combined vulnerability. Associations of musculoskeletal pains with combined vulnerability were assessed with prevalence ratios (PRs) and 95% confidence intervals (CIs) estimated by Poisson regression models with robust estimates of variance. **Results:** The prevalences of musculoskeletal pains were lower but the absolute and relative differences between combined vulnerabilities were higher among Korean employees compared with the European employees. Furthermore, the increased risk of having musculoskeletal pains according to combined vulnerability was modestly explained by socioeconomic factors and exposure to ergonomic risk factors, especially in Republic of Korea. **Conclusions:** The results of this study showed that the labor market may be more unfavorable for female and elderly workers in Republic of Korea. Any prevention strategies to ward off musculoskeletal pains, therefore, should be found and implemented to mitigate or buffer against the most vulnerable work population, older, female, and precarious employment status, in Republic of Korea.

Bahk et al. 2021.

Safety and Health at Work, vol. 12, no. 1.

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Keywords: Europe; musculoskeletal pains; Republic of Korea; vulnerable population.

Evidence Level: 4:B2

Link: <https://pubmed.ncbi.nlm.nih.gov/33732530/>

Passive trunk exoskeleton acceptability and effects on self-efficacy in employees with low-back pain: A mixed method approach

Purpose: Determinants of successfully introducing passive exoskeletons in the working environment to decrease mechanical loading on the back, are acceptability of the device to management and employees, including self-efficacy of employees when using the device. Therefore, the aim of this study was to assess self-efficacy of employees with low-back pain when using an exoskeleton and the acceptability of such a device to these employees and their managers. **Methods:** We used a mixed method approach. We quantitatively assessed the change in self-efficacy of 17 employees with low-back pain when performing daily activity tasks with the exoskeleton, using the modified spinal function sort (M-SFS). Qualitatively, we conducted a focus group with employees and a double interview with two managers to add more insight and understandings into changes in self-efficacy and to discuss challenges of implementing an exoskeleton in the working environment. **Results:** Self-efficacy significantly increased by 7% when using the exoskeleton. Employees acknowledged the flexibility of the exoskeleton being advantageous to current static external lifting devices, which confirmed the increase of self-efficacy in both static and dynamic tasks. Individual data showed that the increase in self-efficacy was largest for participants, being greatly restricted by their low-back pain. In the focus group, employees confirmed that they are mostly open to wearing the exoskeleton if they suffer from low-back pain. **Conclusion:** If potential challenges, e.g. visibility and potential refusal of wearing an exoskeleton are considered in the implementation strategy, acceptability of and self-efficacy in using the passive trunk exoskeleton would be further improved, potentially contributing to reduced risk of low-back pain.

Baltrusch et al. 2021.

Journal of Occupational Rehabilitation, vol. 31, no. 1.

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Keywords: Implementation strategy; lifting device; self-belief; technology acceptance.

Evidence Level: 5:A1

Link: <https://link.springer.com/article/10.1007%2Fs10926-020-09891-1>

COVID 19

Adapting to the Future of Work

Impacts of working from home during COVID-19 pandemic on physical and mental well-being of office workstation users

Objective: To understand impacts of social, behavioral and physical factors on well-being of office workstation users during COVID-19 work from home (WFH). **Methods:** A questionnaire was deployed from April 24 to June 11, 2020 and 988 responses were valid. Linear regression, multinomial logistic regression and chi-square tests were used to understand factors associated with overall physical and mental health statuses and number of new physical and mental health issues. **Results:** Decreased overall physical and mental well-being after WFH were associated with physical exercise, food intake, communication with coworkers, children at home, distractions while working, adjusted work hours, workstation set-up and satisfaction with workspace indoor environmental factors. **Conclusion:** This study highlights factors that impact workers' physical and mental health well-being while WFH and provides a foundation for considering how to best support a positive WFH experience.

Xiao et al. 2021.

Journal of Occupational and Environmental Medicine, vol.63, no.3.

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Keywords: Working from home; COVID-19; pandemic; physical well-being; mental well-being; office workstation users.

Evidence Level: 5:A1

Link:

https://journals.lww.com/joem/Abstract/2021/03000/Impacts_of_Working_From_Home_During_COVID_19.2.aspx

What is new in occupational allergic contact dermatitis in the year of the COVID pandemic?

Purpose of review: This article reviews the literature related to occupational allergic contact dermatitis (ACD), including related to pandemic-level personal protective equipment. The review concludes that COVID-19 pandemic has resulted in a wave of occupational ACD due to increased use of personal protective equipment, and new potential allergens for individuals working from home.

Lee et al. 2021.

Current Allergy and Asthma Reports, vol. 21, no. 4.

Keywords: COVID-19; isobornyl acrylate; isothiazolinone; lavender; limonene; linalool; occupational allergic contact dermatitis; propylene glycol.

Evidence Level: 6:A2

Link: <https://link.springer.com/article/10.1007%2Fs11882-021-01000-3>

Working from home during the COVID-19 outbreak in Sweden: effects on 24-h time-use in office workers

Background: The COVID-19 pandemic has triggered national recommendations encouraging people to work from home (WFH), but the possible impact of WFH on physical behaviors is unknown. This study aimed to determine the extent to which the 24-h allocation of time to different physical behaviors changes between days working at the office (WAO) and days WFH in office workers during the pandemic.

Methods: Data were collected on 27 office workers with full-time employment at a Swedish municipal division during the COVID-19 outbreak in May-July 2020. A thigh-worn accelerometer (Axivity) was used to assess physical behavior (sedentary, stand, move) during seven consecutive days. A diary was used to identify periods of work, leisure and sleep. 24-h compositions of sedentary, standing and moving behaviors during work and non-work time were examined using Compositional data analysis (CoDA), and differences between days WAO and days WFH were determined using repeated measures ANOVA.

Results: Days WFH were associated with more time spent sleeping relative to awake, and the effect size was large ($F = 7.4$; $p = 0.01$; $\eta_p^2 = 0.22$). The increase (34 min) in sleep time during WFH occurred at the

expense of a reduction in work and leisure time by 26 min and 7 min, respectively. Sedentary, standing and moving behaviors did not change markedly during days WFH compared to days WAO.

Conclusion: Days working from home during the COVID-19 pandemic in Sweden were associated with longer duration of sleep than days working at the office. This behavioral change may be beneficial to health.

Hallman et al. 2021.

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

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Keywords: Corona; physical activity; sedentary; sleep; telework.

Evidence Level: 5:A1

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10582-6>

Guiding and Supporting Mental Health and Wellbeing

The impact of work loss on mental and physical health during the COVID-19 pandemic: Baseline findings from a prospective cohort study

Purpose: To determine if losing work during the COVID-19 pandemic is associated with mental and physical health status. To determine if social interactions and financial resources moderate the relationship between work loss and health. **Methods:** Participants were Australians aged 18 + years that were employed in paid work prior to the COVID-19 pandemic who responded to an online or telephone survey from 27th March to 12th June 2020 as part of a prospective longitudinal cohort study. Outcome measures include Kessler-6 score > 18 indicating high psychological distress, and Short Form 12 (SF-12) mental health or physical health component score ≤ 45 indicating poor mental or physical health. **Results:** The cohort consisted of 2,603 respondents, including groups who had lost their job (N = 541), were not working but remained employed (N = 613), were working less (N = 660), and whose work was unaffected (N = 789). Three groups experiencing work loss had greater odds of high psychological distress (AOR = 2.22-3.66), poor mental (AOR = 1.78-2.27) and physical health (AOR = 2.10-2.12) than the unaffected work group. Poor mental health was more common than poor physical health. The odds of high psychological distress (AOR = 5.43-8.36), poor mental (AOR = 1.92-4.53) and physical health (AOR = 1.93-3.90) were increased in those reporting fewer social interactions or less financial resources. **Conclusion:** Losing work during the COVID-19 pandemic is associated with mental and physical health problems, and this relationship is moderated by social interactions and financial resources. Responses that increase financial security and enhance social connections may alleviate the health impacts of work loss.

Griffiths et al. 2021.

Journal of Occupational Rehabilitation.

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Keywords: COVID-19; employment; financial support; mental health; psychological distress.

Evidence Level: 4:A1

Link: <https://link.springer.com/article/10.1007%2Fs10926-021-09958-7>

Mental health status of health sector and community services employees during the COVID-19 pandemic

Purpose: This study was conducted to evaluate the depression, anxiety and stress status of health sector and community service workers who were actively working during the pandemic period. **Methods:** This is a descriptive study. A total of 735 people consisting of 426 health sector employees and 309 service sector employees, constituted the study sample. In this study, the data were collected using the personal information form and the Depression Anxiety Stress Scales-21 (DASS-21). A regression model was established to test the effect of socio-demographic characteristics on depression, anxiety, and stress levels during the COVID-19 pandemic. **Results:** While there was no difference in working a second job across different sectors ($p = 0.450$), the household income ($p < 0.001$) and the increase in expenditures during the COVID-19 pandemic ($p < 0.001$) were different across the sectors. The scores of the overall scale and its sub-dimensions were significantly different across the sectors ($p < 0.001$). The DASS-21 scores were higher in the participants, who started to smoke more and who had their sleep duration decreased ($p < 0.001$).

There is a statistically significant difference between social media use and the DASS-21 score ($p < 0.001$). There is a significant difference across all DASS-21 subgroups by the daily working hours in the health sector ($p < 0.001$). **Conclusion:** Our study provides significant findings regarding the mental health of individuals who continued working during the pandemic. To implement effective mental health interventions to risk groups and affected people in the COVID-19 pandemic, the recommendations of leading organizations, including WHO and ILO, should be implemented effectively concerning occupational health.

Kabasakal et al. 2021.

International Archives of Occupational and Environmental Medicine.

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Keywords: COVID-19; community services employee; health sector employee; mental health; occupational health.

Evidence Level: 5:A2

Link: <https://link.springer.com/article/10.1007/s00420-021-01678-y>

Working in lockdown: the relationship between COVID-19 induced work stressors, job performance, distress, and life satisfaction

Background & aim: In the wake of COVID-19, organizations all over India have closed their premises and shifted to work from home policy to curb the further spread of the virus. This has led to increased stress and anxiety among employees, which explicable affects their satisfaction with life. Thus, the present study analyses the effect of COVID-19 induced stressors (role overload, lifestyle choices, family distraction, and occupational discomfort) on employees' distress levels and job performance. Subsequently, the impact of such distress and job performance on the employees' life satisfaction is analyzed during the lockdown period. **Methodology:** Data was collected from 433 working professionals of private and public organizations in the Delhi and NCR region of India during India's third and fourth phase of lockdown via a survey, which was distributed online. Partial least squares structural equation modelling was applied first to establish the validity of this study's model (measurement model validity) and subsequently test the hypothesized relationships in the model (structural model). **Results:** The COVID-19 induced stressors, i.e., role overload, lifestyle choices, and occupational discomfort, were significant predictors of distress during the lockdown. It has been found that role overload and change in lifestyle choice did not significantly affect job performance. Family distraction, occupational discomfort, and distress were significant in impacting job performance, with distress being the most significant one. During the COVID-19 pandemic, life satisfaction has reduced due to a significant increase in distress levels and lowered job performances.

Kumar et al. 2021.

Current Psychology.

User License: *PMC Open Access Subset*

Keywords: COVID-19; family distraction; job performance; life satisfaction; occupational discomfort; role overload; SARS coronavirus.

Evidence Level: 4:B2

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7955899/>

Enabling Healthy and Safe Workplaces

Physician's guide for workers' return to work during COVID-19 pandemic

Objective: Higher probability of developing severe COVID-19 has been associated with health risk factors and medical conditions which are common among workers globally. For at risk workers, return to work may require additional protective policies and procedures. **Methods:** A review of the medical literature was conducted on health risk factors and medical conditions associated with increased COVID-19 morbidity and mortality, standardized measures for community COVID transmission, and occupation-specific risk.

Results: The relative risk of acquiring and the severity of COVID-19 for workers is associated with three pillars: individual risk, workplace risk, and community risk. Matrices were developed to determine a

worker's individual risk based on these three pillars. **Conclusions:** A practical decision tool is proposed for physicians evaluating and managing individual worker COVID-19 risk in the context of returning to work. **Baptista et al. 2021.**

Journal of Occupational and Environmental Medicine, vol. 63, no. 3.

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Keywords: Return to work; COVID-19; health; risk factors.

Evidence Level: 6:A1

Link:

https://journals.lww.com/joem/Fulltext/2021/03000/A_Physician_s_Guide_for_Workers_Return_to_Work.4.aspx

Workplace safety concerns in medico-legal death investigations related to COVID-19

The personnel involved in the management of COVID-19 affected dead bodies, including law enforcement personnel at the scene of crime, personnel involved in transportation of the dead bodies, forensic practitioners, autopsy pathologists, mortuary personnel, as well as the family members of the dead, etc. are at risk of exposure to SARS-CoV-2 infection. Post-mortem examination is a high-risk procedure, considering that it involves aerosol generating procedures, and exposure to body fluids. The safety of the forensic practitioners and support staff in the management of suspected or confirmed COVID-19 deaths hence, is of extreme importance, especially in the absence of pre-autopsy testing for COVID-19 and due to non-availability of adequate first-hand medical history of the deceased. This communication aims to highlight the current practices and advises certain guidelines in ensuring occupational health and safety in view of these risks in medico-legal death investigations.

Shrestha et al. 2021.

Journal of Infection in Developing Countries, vol. 15, no.2.

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Keywords: COVID-19; death investigations; occupational health safety; SARS-CoV-2; autopsy; mortuary

Evidence Level: 6:A2

Link: <https://jicd.org/index.php/journal/article/view/33690208>

Changes in workers' sedentary and physical activity behaviors in response to the COVID-19 pandemic and their relationships with fatigue: Longitudinal online study

Background: Sedentary behaviors and physical activity are likely to be affected by the COVID-19 outbreak, and sedentary lifestyles can increase subjective fatigue. The nonpharmaceutical policies imposed as a result of the COVID-19 pandemic may also have adverse effects on fatigue. **Objective:** This study has two aims: to examine the changes in sedentary behaviors and physical activity of company workers in response to the COVID-19 pandemic in Japan and to examine relationships between changes in these sedentary behaviors and physical activity and changes in fatigue. **Methods:** Data from a nationwide prospective online survey conducted in 2019 and 2020 were used. On February 22, 2019, an email with a link to participate in the study was sent to 45,659 workers, aged 20 to 59 years, who were randomly selected from a database of approximately 1 million individuals. A total of 2466 and 1318 participants, who self-reported their occupation as company workers, answered the baseline and follow-up surveys, respectively. Surveys captured fatigue, workday and daily domain-specific sedentary behaviors and physical activity, and total sedentary behaviors and physical activity. We used multivariable linear regression models to estimate associations of changes in sedentary behaviors and physical activity with changes in fatigue.

Results: Increases in public transportation sitting during workdays, other leisure sitting time during workdays, and other leisure sitting time were associated with an increase in the motivation aspect of fatigue ($b=0.29$, 95% CI 0-0.57, $P=.048$; $b=0.40$, 95% CI 0.18-0.62, $P<.001$; and $b=0.26$, 95% CI 0.07-0.45, $P=.007$, respectively). Increases in work-related sitting time during workdays, total sitting time during workdays, and total work-related sitting time were significantly associated with an increase in the physical activity aspect of fatigue ($b=0.06$, 95% CI 0-0.12, $P=.03$; $b=0.05$, 95% CI 0.01-0.09, $P=.02$; and $b=0.07$, 95% CI 0-0.14, $P=.04$, respectively). The motivation and physical activity aspects of fatigue increased by 0.06 for each 1-hour increase in total sitting time between baseline and follow-up ($b=0.06$, 95% CI 0-0.11, $P=.045$;

and $b=0.06$, 95% CI 0.01-0.10, $P=.009$, respectively). **Conclusions:** Our findings demonstrated that sedentary and active behaviors among company workers in Japan were negatively affected during the COVID-19 outbreak. Increases in several domain-specific sedentary behaviors also contributed to unfavorable changes in workers' fatigue. Social distancing and teleworking amid a pandemic may contribute to the sedentary lifestyle of company workers. Public health interventions are needed to mitigate the negative effects of the COVID-19 pandemic or future pandemics on sedentary and physical activity behaviors and fatigue among company workers.

Koohsari et al. 2021.

JMIR Public Health and Surveillance, vol. 7, no. 3.

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Keywords: COVID-19; Japan; mental health; physical inactivity; prospective design; sitting time.

Evidence Level: 4:A2

Link: <https://publichealth.jmir.org/2021/3/e26293/>

Antibodies to SARS-CoV-2 and risk of past or future sick leave

The extent that antibodies to SARS-CoV-2 may protect against future virus-associated disease is unknown. We invited all employees ($n = 15,300$) at work at the Karolinska University Hospital, Stockholm, Sweden to participate in a study examining SARS-Cov-2 antibodies in relation to registered sick leave. For consenting 12,928 healthy hospital employees antibodies to SARS-CoV-2 could be determined and compared to participant sick leave records. Subjects with viral serum antibodies were not at excess risk for future sick leave (adjusted odds ratio (OR) controlling for age and sex: 0.85 [95% confidence interval (CI) (0.85 (0.43-1.68))]. By contrast, subjects with antibodies had an excess risk for sick leave in the weeks prior to testing [adjusted OR in multivariate analysis: 3.34 (2.98-3.74)]. Thus, presence of viral antibodies marks past disease and protection against excess risk of future disease. Knowledge of whether exposed subjects have had disease in the past or are at risk for future disease is essential for planning of control measures.

Dillner et al. 2021.

Scientific Reports, vol. 11, no. 1.

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Keywords: Antibodies; SARS-CoV-2; risk; sick leave; virus-associated disease.

Evidence Level: 5:A2

Link: <https://www.nature.com/articles/s41598-021-84356-w>

Personal protective equipment in COVID-19: Impacts on health performance, work-related injuries, and measures for prevention

Objective: To assess impact of personal protective equipment (PPE) on healthcare providers (HCPs) in caring for COVID-19 patients. **Methods:** A cross-sectional survey was conducted over 50 hospitals in China. Descriptive analyses and Chi-square tests were performed on the collected data. **Results:** All 104 frontline HCPs report negative impacts of PPE on their clinical performance, 97% of them experienced discomfort and injuries caused by wearing PPE for long hours. Frontline HCPs provided suggestions to alleviate the negative impacts and to enhance communication between healthcare staff and patients. Two hundred eighty two non-frontline HCPs also revealed similar problems; however, we recorded a few discrepancies between answers given by frontline and non-frontline HCPs. **Conclusions:** Wearing PPE for long hours degrades health performance. Measures were suggested to improve the design of PPE for protecting HCPs and enhancing their services to COVID patients.

Duan et al. 2021.

Journal of Occupational and Environmental Medicine, vol. 63, no. 3.

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Keywords: Personal protective equipment; COVID-19; health performance; work-related injuries; prevention.

Evidence Level: 4:B2

Link:

https://journals.lww.com/joem/Abstract/2021/03000/Personal_Protective_Equipment_in_COVID_19_Impacts.5.aspx

Risk assessment at work and prevention strategies on COVID-19 in Italy

The COVID-19 pandemic has spread worldwide, with considerable public health and socio-economic impacts that are seriously affecting health and safety of workers, as well as their employment stability. Italy was the first of many other western countries to implement extended containment measures. Health workers and others employed in essential sectors have continued their activity, reporting high infection rate with many fatalities. The epidemiological trend highlighted the importance of work as a substantial factor to consider both when implementing strategies aimed at containing the pandemic and shaping the lockdown mitigation strategy required for sustained economic recovery. To support the decision-making process, we have developed a strategy to predict the risk of infection by SARS-CoV-2 in the workplace based on the analysis of the working process and proximity between employees; risk of infection connected to the type of activity; involvement of third parties in the working processes and risk of social aggregation. We applied this approach to outline a risk index for each economic activity sector, with different levels of detail, also considering the impact on mobility of the working population. This method was implemented into the national epidemiological surveillance model in order to estimate the impact of re-activation of specific activities on the reproduction number. It has also been adopted by the national scientific committee set up by the Italian Government for action-oriented policy advice on the COVID-19 emergency in the post lockdown phase. This approach may play a key role for public health if associated with measures for risk mitigation in enterprises through strategies of business process re-engineering. Furthermore, it will make a contribution to reconsidering the organization of work, including also innovation and fostering the integration with the national occupational safety and health (OSH) system.

Lavicoli et al. 2021.

PLoS One, vol. 16, no. 3.

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Keywords: COVID-19; risk assessment; work; prevention.

Evidence Level: 6:B2

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0248874>