Australian Government
Comcare

Emerging Evidence Alert May 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 April 2021 only.

Contents

Three factors critical to the successful implementation of workplace health and wellbeing practices

Many workplaces around the world offer their workers a range of programs and services to promote workplace health and wellbeing, often with mixed results. Why are some programs and services more successful than others? New research highlights the importance of implementation planning and finds there are 3 critical factors that can determine the success of workplace health and wellbeing practices (WHWPs).

In a review of 74 studies the research explored the implementation of WHWPs and their effects on psychological health or psychological wellbeing, including primary, secondary and tertiary interventions such as work redesign and behaviour change programs, mindfulness training, and talking therapies.

The review found that the 3 factors associated with successful WHWP implementation were:

1. Continuity of effort – e.g. regular communication with workers and managers, problem solving to overcome barriers and embedding practices into everyday activities
2. Learning – e.g. procedures for capturing lessons learned from implementation, workshops and training
3. Effective governance – e.g. regular steering committee meetings that involve worker and human resources representatives

The research suggests for employers these findings can be used to inform the implementation planning and strategy for WHWPs to ensure return on investment and support better health and wellbeing outcomes for workers.

For more information about workplace mental health and wellbeing visit the Comcare website. Comcare also has information about the benefits of safe and healthy work that highlights the importance of getting work health and safety right in the workplace.

Description of Evidence Levels Definitions Used in this Review

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

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

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

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

Fostering Work Participation

Return to Work

Return to work a bumpy road: a qualitative study on experiences of work ability and work situation in individuals with chronic whiplash-associated disorders

Background: Work resumption is a big challenge in the rehabilitation process for individuals with whiplash-associated disorders (WAD). To better meet the needs of individuals with WAD in their return to work process, more knowledge on their experiences and perspectives is needed. The aim of this study was to explore the experiences of work ability and the work situation of individuals who participated in a neck-specific exercise programme for chronic WAD. **Methods:** This qualitative study has an exploratory and descriptive design based on data collected through open-ended interviews with 17 individuals with chronic WAD. Data were analysed inductively using conventional content analysis. **Results:** Analysis of the data yielded the following five categories related to the participants' narratives on their experiences of work ability and their work situation: Return to work - a process of setbacks and bureaucracy; The need to be understood by health care professionals, and to receive a treatment plan; Individual resources are important for work ability; The consequences of reduced work ability; and Working conditions are important for work ability. **Conclusion:** Individuals with chronic WAD often struggle to return to work. Emotional and practical support from stakeholders is imperative and needs to be strengthened. Participating in a neck-specific exercise programme, including being acknowledged and receiving information about WAD, could positively affect the work ability of WAD sufferers. This study has provided management strategies to improve the ability to work for individuals with chronic WAD, and highlights the need to incorporate a healthy and sustainable return to work in the rehabilitation of individuals with WAD, thereby making their return to work a success.

Peolsson et al. 2021.

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

Keywords: neck pain; occupational health; qualitative research; return to work; whiplash injuries.

Evidence Level: 5A

Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10821-w

Is the "Brainwork Intervention" effective in reducing sick leave for non-permanent workers with psychological problems? Results of a controlled clinical trial

Background: Both the presence of psychological problems and the absence of an employment contract are related to long-term sickness absence, prolonged work disability and unemployment. Studies researching the effectiveness of return-to-work interventions on these non-permanent workers, including unemployed and temporary agency workers and workers with an expired fixed-term contract, are lagging behind. Therefore, a return-to-work intervention called "Brainwork" was developed. The aim of this study was to assess the effectiveness of the 'Brainwork Intervention' in reducing the duration of sick leave compared to usual care over a 12-month follow-up. **Methods:** In a multicenter controlled clinical trial, using a quasi-randomization procedure, we compared the Brainwork Intervention (n = 164) to usual care (n = 156). The primary outcome was the duration of sick leave. Secondary outcomes were the duration of sick leave starting from Social Security Agency transfer; the proportion of workers returned to work; the number of hours of paid employment during the follow-up period; the degree of worker participation; the level of psychological complaints; and the self-efficacy for return to work. Protocol adherence (Brainwork Intervention) was considered sufficient when at least three of the five protocol steps were followed. Cox regressions, linear and ordinal regression, and Mixed Model analyses were performed. **Results:** All 320 participants were analyzed. The Brainwork Intervention resulted in a non-significant reduction of the duration of sick leave compared to usual care (269 days versus 296 days; HR = 1.29; 95% CI 0.94-1.76; p = 0.11). For those working (46%) during the 12-month follow-up, the mean number of hours of paid employment was non-significantly higher in the usual care group (682 h versus 493 h; p = 0.053). No significant differences were found for other secondary outcomes. Protocol adherence was 10%. **Conclusions:** The Brainwork Intervention as performed with a low protocol adherence did not result in a

significant reduction of the duration of sick leave compared to usual care. It remains unclear what the results would have been if the Brainwork Intervention had been executed according to protocol.
Audhoe et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Counselling; intervention; participation; psychological problems; return-to-work; sick leave; unemployment; vocational rehabilitation.
Evidence Level: 2A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10704-0

Relationship between workers' return to work, job retention and income in industrial accidents in Korea: a longitudinal study
Objective: This study aims to compare workers' income before and after an occupational injury, with regard to return to work and job retention, over a period of 5 years. **Design:** This study was designed as a longitudinal study. **Setting:** The Panel Study of Workers' Compensation Insurance (PSWCI) survey targeted workers involved in industrial accidents for which medical care was terminated in the year 2012. **Participants:** The panel study was conducted on a final sample of 2000 workers who were selected proportionally by region (nine regions) after priority assignment by disability rating (six levels). A total of 1458 workers were finally included in this study. **Methods:** This study used data from the first to fifth PSWCI. To identify the effect on income after occupational injury considering return to work and job retention, we used the generalised estimating equation. **Results:** In regard to workers' return to work, the OR that income after an occupational injury would be higher than that before an occupational injury was 3.17 (2.41-4.17) for those who returned to original work and 2.32 (1.81-2.97) for those re-employed as compared with who did not return to work and 1.27 (1.07-1.15) for those who retained their job as compared with those who did not. The ORs were 2.91 (2.26-3.75) for those who were re-employed and retained jobs and 2.96 (2.15-4.08) for those who returned to original work and did not retain jobs as compared with those who did not return to work and did not retain jobs. **Conclusions:** It is important for accident victims to retain their jobs to maintain their economic status.
Bae et al. 2021.
BMJ Open, vol. 11, no. 4.

Keywords: Health & safety; health economics; occupational & industrial medicine.
Evidence Level: 4B
Link: https://bmjopen.bmj.com/content/11/4/e039948.long

Presenteeism and Absenteeism

Health and motivation as mediators of the effects of job demands, job control, job support, and role conflicts at work and home on sickness presenteeism and absenteeism
Purpose: The first objective was to contribute to a better understanding of the contrasting and paradoxical results in studies of work environment factors and sickness presence and sickness absence. A second objective was to examine if, and under what conditions, employees choose to replace sickness absence with sickness presence, i.e., so-called substitution. **Methods:** The study utilizes a large body of cross-sectional questionnaire data (n = 130,161) gathered in Sweden from 2002 to 2007 in connection with a comprehensive health promotion initiative. Health and motivation were analyzed as mediators of the effects of five job factors, job control, job support, job demand, role conflict and "work to family conflict" on sickness presence and absence. **Results:** The results concerning job demands indicate substitution in that increased job demands are associated with increased presenteeism and reduced absenteeism. The direct effect of higher job support was increased absenteeism, but via the health and motivation paths, the total effect of more social support was health-promoting and associated with a reduction in sickness absence and sickness presence. High job control emerged as the most pronounced health-promoting factor, reducing sickness presenteeism as well as absenteeism. More role conflicts and work-to-family

conflicts were directly and indirectly associated with decreased health and increased absenteeism as well as presenteeism. earlier research. **Conclusion:** The mediation analyzes shed light on some of the paradoxes in research on sickness presenteeism and sickness absenteeism, especially regarding job demands and job support. The substitution effect is important for workplace policy and occupational health practice.
Aronsson et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Job demands; job resources; job support; mediation; sickness absence; sickness presenteeism.
Evidence Level: 4B
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01591-w

Workplace flexibility important for part-time sick leave selection-an exploratory cross-sectional study of long-term sick listed in Norway
Background: Part-time sick leave (PTSL) where sick-listed individuals work a percentage corresponding to their remaining work capabilities is often used to promote return to work. The effects of PTSL are uncertain due to participant selection on personal and social factors, which are not easily captured by evaluations that primarily rely on register-data. More knowledge of health-related, workplace and personal characteristics that influence the propensity to utilize PTSL is needed. The objective of the present study was to explore whether individuals on PTSL and full-time sick leave (FTSL) differ in terms of self-reported health, workplace resources and psychological resilience while also considering known sociodemographic factors that influence PTSL selection. **Methods:** The study utilized a cross-sectional sample of 661 workers sick listed for 8 weeks with a 50-100% sick-listing degree. Differences between those on PTSL and FTSL with regard to current self-reported health, previous long-term sick leave, workplace adjustment latitude, psychosocial work environment, work autonomy, coping with work demands, and psychological resilience were examined and adjusted for known selection factors (age, education, gender, sector, diagnosis, and physical work) using logistic regression. **Results:** An inverse U-shaped curvilinear association between self-reported health and PTSL was identified. Those on PTSL also reported greater workplace adjustment latitude and better psychosocial work environment than those on FTSL. These differences persisted after adjusting for previously known selection factors. Furthermore, the PTSL group reported more work autonomy and poorer coping with work demands, but these differences were more uncertain after adjustment. The groups did not differ in terms of previous long-term sick leave or psychological resilience. **Conclusion:** The present study found differences between those on PTSL and FTSL with regards to self-reported health, workplace adjustment latitude and psychosocial work environment that were independent of differences identified in previous research. These results are important for future evaluations of the effect of PTSL on RTW, suggesting more attention should be paid to self-reported health status and workplace characteristics that are not captured using register data.
Standal et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Graded leave; psychological resilience; psychosocial work environment; work activation; work autonomy; workplace adjustment latitude.
Evidence Level: 4B
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10778-w

Sickness absence and disability pension among women with breast cancer: a population-based cohort study from Sweden
Background: Women's return to work after diagnosis of breast cancer (BC) is becoming more prevalent. However, register-based national investigation on sickness absence (SA) and disability pension (DP) in BC women is lacking. The aim of the study was to explore SA and DP before and after a first BC diagnosis and the possibility to predict new cancer-related SA by using disease-related and sociodemographic factors. **Methods:** A longitudinal register study of the 3536 women in Sweden aged 19-64 with a first BC diagnosis in 2010 was conducted by linkage of five nationwide registers. Particularly, detailed information on SA and DP was obtained from the National Social Insurance Agency. Descriptive statistics on SA and DP 2 years

before through 3 years after the BC diagnosis were performed. The risk of having a new SA spell due to BC or BC-related diagnoses was modeled using logistic regression. **Results:** The proportion of women with SA increased during the year following the BC diagnosis date and declined over the next 2 years to proportions before diagnosis. At the time of BC diagnosis, half of the women began a new SA spell > 14 days with cancer, cancer-related, or mental diagnosis. Disease-related and sociodemographic factors including occupational sector, living area, age, cancer stage, educational level, and number of previous SA days showed statistical significance ($p < 0.05$) in predicting a new SA around BC diagnosis. By using these factors, it was possible to correctly predict 67% of the new SA spell. **Conclusions:** SA among women with BC was elevated mainly in the first year after diagnosis. New SA following BC diagnosis can accurately be predicted.
Kvillemo et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Breast cancer; cohort-study; diagnosis specific; insurance medicine; predictive model; real-world data; sick leave.
Evidence Level: 4B
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10703-1

Average lost work productivity due to non-fatal injuries by type in the USA
Objective: To estimate the average lost work productivity due to non-fatal injuries in the USA comprehensively by injury type. **Methods:** The attributable average number and value of lost work days in the year following non-fatal emergency department (ED)-treated injuries were estimated by injury mechanism (eg, fall) and body region (eg, head and neck) among individuals age 18-64 with employer health insurance injured 1 October 2014 through 30 September 2015 as reported in MarketScan medical claims and Health and Productivity Management databases. Workplace, short-term disability and workers' compensation absences were assessed. Multivariable regression models compared lost work days among injury patients and matched controls during the year following injured patients' ED visit, controlling for demographic, clinical and health insurance factors. Lost work days were valued using an average US daily market production estimate. Costs are 2015 USD. **Results:** The 1-year per-person average number and value of lost work days due to all types of non-fatal injuries combined were approximately 11 days and US$1590. The range by injury mechanism was 1.5 days (US$210) for bites and stings to 44.1 days (US$6196) for motorcycle injuries. The range by body region was 4.0 days (US$567) for other head, face and neck injuries to 19.8 days (US$2787) for traumatic brain injuries. **Conclusions and relevance:** Injuries are costly and preventable. Accurate estimates of attributable lost work productivity are important to monitor the economic burden of injuries and help to prioritise cost-effective public health prevention activities.
Peterson et al. 2021.
Injury Prevention, vol. 27, no. 2.

Keywords: Barell matrix; costs; mechanism; public health.
Evidence Level: 5B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7609459/

Working Hours

Safety incidents associated with extended working hours. A systematic review and meta-analysis
Objective: We performed a systematic review to assess potential consequences of extended working hours on accidents, near-accidents, safety incidents and injuries (incidents) by considering the overall certainty of evidence. **Methods:** We searched five databases systematically (Medline, Embase, PsycINFO, Web of Science, and Proquest Health and safety Science Abstract) and identified 10072 studies published until December 2020. Twenty-two studies met the inclusion criteria. We followed a systematic approach to evaluate risk of bias and synthesize results in a meta-analysis. The certainty of evidence was determined by a modified version of The Grading of Recommendations Assessment, Development and Evaluation

(GRADE). **Results:** Our analyses indicated an association between working >12 hours/day (RR: 1.24, 95%CI: 1.11, 1.40), or working >55 hours/week (RR: 1.24, 95%CI: 0.98, 1.57), and elevated risk of incidents. The certainty of evidence evaluated as low. Weak or no associations were observed for other exposure contrasts: working >8 hours/day (RR: 0.93, 95%CI: 0.72, 1.19), or working overtime (RR: 1.08, 95%CI: 0.75, 1.55), working 41-48 hours/week (RR: 1.02, 95%CI: 0.92, 1.13) or 49-54 hours/week (RR: 1.02, 95%CI: 0.97, 1.07). The certainty of evidence was evaluated as low (very low for 41-48 hours/week). **Conclusions:** Daily working hours >12 hours and weekly working hours exceeding 55 hours was associated and increased risk of incidents. The level of evidence was low. Hence, further high-quality research is warranted to elucidate these associations.
Matre et al. 2021.
Scandinavian Journal of Work, Environment & Health

Keywords: Safety; accidents; working hours
Evidence Level: 1A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3958

Building Employer Capability

Wellness Programs

Implementing practices focused on workplace health and psychological wellbeing: A systematic review
Rationale: Workplace health and wellbeing practices (WHWPs) often fail to improve psychological health or wellbeing because of implementation failure. Thus, implementation should be evaluated to improve the effectiveness of WHWPs. **Objective:** We conducted a systematic review to identify critical success factors for WHWP implementation and gaps in the evidence. Doing so provides a platform for future theoretical development. **Methods:** We reviewed 74 separate studies that assessed the implementation of WHWPs and their effects on psychological health or psychological wellbeing. Most studies were from advanced industrial Western democracies (71). Intervention types included primary (e.g., work redesign, 37 studies; and health behavior change, 8 studies), secondary (e.g., mindfulness training, 11 studies), tertiary (e.g., focused on rehabilitation, 9 studies), and multifocal (e.g., including components of primary and secondary, 9 studies). **Results:** Tangible changes preceded improvements in health and wellbeing, indicating intervention success cannot be attributed to non-specific factors. Some interventions had beneficial effects through mechanisms not planned as part of the intervention. Three factors were associated with successful WHWP implementation: continuation, learning, and effective governance. **Conclusions:** The review indicates future research could focus on how organizations manage conflict between WHWP implementation and existing organizational processes, and the dynamic nature of organizational contexts that affect and are affected by WHWP implementation. This systematic review is registered [PROSPERO: the International Prospective Register of Systematic Reviews ID: CRD42019119656].
Daniels et al. 2021.
Social Sciences and Medicine, vol. 277.

Keywords: Organizing processes; systematic review; wellbeing; workplace health and wellbeing practices.
Evidence Level: 1A
Link: https://www.sciencedirect.com/science/article/pii/S0277953621002203?via%3Dihub

Can a 'rewards-for-exercise app' increase physical activity, subjective well-being and sleep quality? An open-label single-arm trial among university staff with low to moderate physical activity levels
Background: This study examined the impact of a 'rewards-for-exercise' mobile application on physical activity, subjective well-being and sleep quality among 148 employees in a UK university with low to moderate physical activity levels. **Methods:** A three-month open-label single-arm trial with a one-year follow-up after the end of the trial. Participants used the Sweatcoin application which converted their

outdoor steps into a virtual currency used for the purchase of products available at the university campus' outlets, using an in-app marketplace. The primary outcome measure was self-reported physical activity. Secondary measures included device-measured physical activity, subjective well-being (i.e., life satisfaction, positive affect, negative affect), and self-reported sleep quality. **Results:** The findings show an increase in self-reported physical activity (d = 0.34), life satisfaction (d = 0.31), positive affect (d = 0.29), and sleep quality (d = 0.22) during the three-month trial period. **Conclusion:** The study suggests that mobile incentives-for-exercise applications might increase physical activity levels, positive affect, and sleep quality, at least in the short term. The observed changes were not sustained 12 months after the end of the trial.
Lemola et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Behaviour change; extrinsic incentives; mobile applications; physical activity; sleep quality; subjective well-being.
Evidence Level: 3A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10794-w

Job Design

How self leadership enhances normative commitment and work performance by engaging people at work?
Leadership and its connection with social sustainability are frequently prescribed for effective management. Integrating self-leadership among the employees is an emerging area to focus on empowering an organization. The principal objective of this study was to empirically investigate the impact of self-leadership on normative commitment and work performance through the mediating role of work engagement. This phenomenon of self-leadership was explained by using the theoretical lens of the social cognitive theory and intrinsic motivation theory. Data was collected from 318 employees who worked in the telecom sector in Pakistan and analyzed using Structural Equation Modeling (SEM) AMOS. The findings revealed that in the presence of self-leadership, employee's work engagement, commitment to the organization, and overall work performance elevated significantly. Furthermore, the results also illustrated the occurrence of two significant mediating paths. First, the mediating role of work engagement in the relationship between self-leadership and normative commitment, and second, the mediation of work engagement in the relationship between self-leadership and work performance. The findings of the study significantly contribute practically, and theoretically to the existing literature.
Inam et al. 2021.
Current Psychology

Keywords: Intrinsic motivation theory; normative commitment; self leadership; social cognitive theory; work engagement; work performance.
Evidence Level: 5B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8043442/

Outdoor office work - An interactive research project showing the way out
The physical boundaries of office work have become increasingly flexible. Work is conducted at multiple locations outside the office, such as at clients' premises, at home, in cafés, or when traveling. However, the boundary between indoor and outdoor environment seems to be strong and normative regarding how office work is performed. The aim of this study was to explore how office work may be conducted outdoors, understanding how it is being experienced by office employees and identifying its contextual preconditions. Based on a two-year interactive research project, the study was conducted together with a Swedish municipality. Fifty-eight participants engaged in the collaborative learning process, including 40 half-day workshops and reflective group discussions, co-interviews, and participants' independent experimentation of bringing work activities outdoors. Data was collected via interviews, group discussions and a custom-made mobile application. The results showed that a wide range of work activities could be

done outdoors, both individually and in collaboration with others. Outdoor work activities were associated with many positive experiences by contributing to a sense of well-being, recovery, autonomy, enhanced cognition, better communication, and social relations, but also with feelings of guilt and illegitimacy. Conditions of importance for outdoor office work to happen and function well were found in the physical environment, where proximity to urban greenspaces stood out as important, but also in the sociocultural and organizational domains. Of crucial importance was managers' attitudes, as well as the overall organizational culture on this idea of bringing office work outdoors. To conclude, if working life is to benefit from outdoor office work, leaders, urban planners and policymakers need to collaborate and show the way out.
Petersson et al. 2021.
Frontiers in Psychology

Keywords: Human nature interactions; interactive research; outdoor office work; sustainable working life; urban greenspaces; work norms.
Evidence Level: 5A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8072124/

Shift Work

Effect of long work hours and shift work on high-sensitivity C-reactive protein levels among Korean workers
Objective: We aimed to investigate the association between low-grade inflammation as indicated by high-sensitivity C-reactive protein (hsCRP) level and organizational factors, such as work hours and shift work. **Methods**: We evaluated 7470 young and middle-aged workers who participated in the Korea National Health and Nutrition Examination Surveys from 2015-2018. Work hours were determined from self-reported questionnaires. Shift work was defined as a non-daytime fixed work schedule. An interaction effect between shift work and long work hours on the hsCRP level was estimated using relative excess risk due to interaction (RERI) and attributable proportion (AP) with 95% confidence intervals (CI). **Results**: Increased hsCRP levels were prevalent in 25.2% of the study population. There was a significant association between long work hours and increased hsCRP, especially among middle-aged men [odds ratio (OR) 1.50 (95% CI 1.20-1.87) for moderately increased hsCRP and OR 1.62 (95% CI 1.14-2.30) for highly increased hsCRP]. There was a significant interaction effect between long work hours and shift work on increased hsCRP among middle-aged workers. The RERI were 0.03 (95% CI 0.02-0.04) and 0.56 (95% CI 0.45-0.68) among middle-aged men and women, respectively. The AP were 0.02 (95% CI 0.01-0.03) and 0.36 (95% CI 0.31-0.40) among middle-aged men and women, respectively. **Conclusion**: There was no significant association between shift work and the level of hsCRP. Long work hours were related to low-grade inflammatory processes, but only in middle-aged workers. There was an interaction effect between long work hours and shift work for increased hsCRP, especially in middle-aged women.
Lee et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 47, no. 3.

Keywords: Work hours; high-reactivity; C-reactive protein levels; shift work; Korean
Evidence Level: 4B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3933

Association of sleep duration and working hours with suicidal ideation in shift workers: the Korean national health and nutrition examination survey 2007-2018
Objective: This study investigated whether sleep duration and working hours were associated with the risk of suicidal ideation. **Methods:** Data from 13,628 shift workers (age ≥19) were obtained from the nationwide cross-sectional Korea National Health and Nutrition Examination Surveys conducted in 2007-2018. We included healthy shift workers without depressive disorders and chronic medical illnesses. Sleep duration, working hours, and suicidal ideation were assessed using a self-reported questionnaire. Logistic

regressions were used to examine the association of sleep duration and working hours with the risk of suicidal ideation. We examined interactions between sleep duration and working hours in association with suicidal ideation. In addition, interactions of sex or age were also analyzed. **Results:** Shift workers sleeping for <6 and ≥10 hours/day were associated with suicidal ideation compared with those sleeping for 7 to <9 hours/day. Individuals working >52 hours/week had a higher risk of suicidal ideation compared with those working ≤40 hours/week. In terms of interaction by sex or age groups in the association between working hours and the risk of suicidal ideation, the relationship was stronger for men than for women and for those aged <45 years than for those aged ≥45 years.
Conclusion: Shorter or longer sleep durations, and long working hours were associated with a higher risk of suicidal ideation. Under long working hours, male shift workers or those aged <45 years were more vulnerable to suicidal ideation.
Kim et al. 2021.
Psychiatry Investigation

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

Work Ability

Industry mobility and disability benefits in heavy manual jobs: A cohort study of Swedish construction workers
Objectives: This study aimed to investigate whether change from the construction industry to work in other industries at age 45-55 years lowered risks of disability benefits (DB) later in life (60-64 years of age). We hypothesized that risks would be lowered the most among those changing from the heaviest occupations. **Methods**: The study included men employed in the construction industry during 1971-1993. We selected workers from the largest occupational groups in heavy (concrete workers and painters) and less heavy (drivers, electricians and foremen) occupations. The occurrence of DB in 1990-2015 was retrieved from national registers. Regression analyses were used to calculate relative risks (RR) of DB at 60-64 years, comparing those working in other industries to those still in the construction industry at the age of 45, 50 and 55 years. **Results**: Shifting out of from the construction industry was related to lowered DB risks at 60-64 years in all selected occupations. Effects were most pronounced among those who, at 55 years of age, worked in an industry other than construction, with significantly reduced RR for DB among concrete workers [RR 0.63, 95% confidence interval (CI) 0.51-0.77], electricians (RR 0.61, 95% CI 0.47-0.77) and foremen (RR 0.78, 95% 0.63-0.96). **Conclusions**: Risks for DB at 60-64 years of age were reduced among those who changed from construction work to other industries. Notable reductions were observed among workers originating from both heavy and less heavy occupations, and future studies should explore other factors, in addition to heavy workload, as motivators for leaving the construction industry.
Söderberg et al. 2021.
Scandinavian Journal of Work, Environment & Health, vol. 47, no. 3.

Keywords: Mobility; disability; heavy manual jobs; labour; construction industry
Evidence Level: 4B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3932

Predictive validity of general work ability assessments in the context of sickness insurance
Objective: The activity ability assessment is a Swedish method for assessing general work ability, based on self-reports combined with an examination by specially trained physicians, and, if needed, extended assessments by occupational therapists, physiotherapists and/or psychologists. The aim of this study was to analyse the predictive validity of the activity ability assessment in relation to future sick leave.
Design: Analysis of assessments in 300 case files, in relation to register data on sick leave. **Subjects:** People

on sick leave (n =300, 32% men, 68% women; mean age 48 years; assessment at mean sick leave day 249). **Methods:** Univariate and multivariate statistics. **Results:** Self-rated work ability was the only factor with predictive value related to future sick leave. Physicians' evaluations lacked predictive value, except where the person had a limitation in vision, hearing or speech that was predictive of future decisions by the Social Insurance Agency. No sex differences were identified. **Conclusion:** The predictive value of the activity ability assessment for future sick leave is limited, and self-rated work ability is more accurate compared with an extensive insurance medical assessment. Self-rated work ability may be more holistic compared with insurance medicine assessments, which may be overly focused on individual factors. A practical implication of this is that the inclusion of contextual factors in assessment procedures needs to be improved.
Ståhl et al. 2021.
Journal of Rehabilitation Medicine, vol. 53, no. 4.

Keywords: Return to work; sick leave; social security.
Evidence Level: 5A
Link: https://www.medicaljournals.se/jrm/content/abstract/10.2340/16501977-2798

Adapting to the Future of Work

Technology

The social and health implications of digital work intensification. Associations between exposure to information and communication technologies, health and work ability in different socio-economic strata
Purpose: Older employees are often thought to be vulnerable to negative effects of information and communication technology (ICT). Our study aims to examine associations between work-related ICT exposure (i.e. ICT use or digital work intensification), physical health, mental health and work ability (WA). We examine whether these associations are modified by socio-economic position (SEP). **Methods:** We analysed cross-sectional data from 3180 participants (born in 1959 and 1965) in wave 3 of the representative German lidA cohort study. We performed hierarchical multiple regression to assess the distinct associations of ICT use and digital work intensification with mental and physical health and WA. We stratified analyses by SEP and controlled for age, sex, and digital affinity. **Results:** 92% of participants reported ICT use at work. Almost 20% reported high levels of digital work intensification, while a similar proportion did not experience digital work intensification. In bivariate analyses, ICT use by itself was not significantly associated with mental health or WA in the total sample or when stratified. Digital work intensification displayed negative associations with mental health and WA. In hierarchical multiple regressions, digital work intensification showed consistently negative associations with mental health and work ability of similar strength across SEP. **Conclusion:** Our results suggest that ICT use, per se, does not negatively impact older workers. Digital work intensification may be associated with worse mental health and work ability. Research on health and social implications of work-related ICT should differentiate patterns of ICT exposure and assess modifications by SEP to better gauge the ambiguous effects of ICT.
Zobel et al. 2021.
International Archives Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Ageing workers; digital divide; job requirement level; occupational status; technostress; workplace well-being.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01588-5

The burden of the digital environment: a systematic review on organization-directed workplace interventions to mitigate physician burnout
Objective: To conduct a systematic review identifying workplace interventions that mitigate physician burnout related to the digital environment including health information technologies (eg, electronic health

records) and decision support systems) with or without the application of advanced analytics for clinical care. **Materials and methods:** Literature published from January 1, 2007 to June 3, 2020 was systematically reviewed from multiple databases and hand searches. Subgroup analysis identified relevant physician burnout studies with interventions examining digital tool burden, related workflow inefficiencies, and measures of burnout, stress, or job satisfaction in all practice settings. **Results:** The search strategy identified 4806 citations of which 81 met inclusion criteria. Thirty-eight studies reported interventions to decrease digital tool burden. Sixty-eight percent of these studies reported improvement in burnout and/or its proxy measures. Burnout was decreased by interventions that optimized technologies (primarily electronic health records), provided training, reduced documentation and task time, expanded the care team, and leveraged quality improvement processes in workflows. **Discussion:** The contribution of digital tools to physician burnout can be mitigated by careful examination of usability, introducing technologies to save or optimize time, and applying quality improvement to workflows. **Conclusion:** Physician burnout is not reduced by technology implementation but can be mitigated by technology and workflow optimization, training, team expansion, and careful consideration of factors affecting burnout, including specialty, practice setting, regulatory pressures, and how physicians spend their time.
Thomas Craig et al. 2021.
The Journal of the American Medical Informatics Association, vol. 28, no. 5.

Keywords: Burnout; electronic health records; quality improvement; team-based care; workflow.
Evidence Level: 1A
Link: https://academic.oup.com/jamia/article/28/5/985/6104341

Guiding and Supporting Mental Health and Wellbeing

Mental Health

Work stress on rise? Comparative analysis of trends in work stressors using the European working conditions survey
Objective: The rapid transformation of labor markets has been accompanied by the belief of rising stress at work. However, empirical evidence on such trends based on reliable survey data is scarce. This study analyzes long-term trends in well-established measures of work stressors across Europe, as well as potential occupational differences. **Methods:** We use repeated cross-sectional data of 15 European countries from waves 1995, 2000, 2005, 2010, and 2015 of the European Working Conditions Surveys. We apply three-way multilevel regressions (with employees nested in country-years, which are in turn nested in countries) to analyze trends in work stressors measured according to the demand-control and effort-reward imbalance models. Trends by occupational groups are also assessed. **Results:** Our findings suggest that work stress generally increased from 1995 to 2015, and that the increase was mostly driven by psychological demands. People working in lower-skilled occupations had generally higher levels of job strain and effort-reward imbalance, as well as they tend to have a steeper increase in job strain than people working in higher-skilled occupations. Most of the change occurred from 1995 to 2005.
Conclusion: Our results indicate that work stress has been on rise since 1995, specifically for people working in disadvantageous occupations. This directs the attention to the vulnerable position of the least skilled and also to the use of preventive measures to counteract some of the disadvantages experienced by this occupational group.
Rigó et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Cross-national study; effort-reward imbalance; job strain; occupational disparities; trends; work stressors.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01593-8

Effect modification by workplace social capital on the association between depression and workplace and family stress: the Japanese civil servant study

Background: Mental health problems among workers have become an issue in Japan. The working environment for civil servants is becoming excessively stressful, and there is a need to prevent the onset of depression. In addition to stress at the workplace and at home, social capital has been reported as a factor associated with depression. This study examined whether workplace social capital reduces the association between depression and work-related stress or depression and home-related stress. **Methods:** A total of 3015 Japanese civil servants (1867 men and 1148 women) from Toyama Prefecture were included in this study. Data on depression and workplace social capital, work status, work stress, work-life balance, and physical health were collected. **Results:** The odds ratio for depression was higher for both men and women with low workplace social capital. For those with low workplace social capital, the adjusted odds ratio for depression was 2.93 (95% confidence interval [CI], 2.16-3.98) for men and 2.46 (95% CI, 1.74-3.49) for women. After adjusting for workplace social capital, the associations between depression and low job position, low job support, and moderate family-to-work conflict declined in men and were no longer significant. For women, the strength of the association between depression and unmarried status along with moderate control at work decreased and also lost significance. When the ORs for depression were stratified by high and low workplace social capital and compared with the ORs before stratification, the ORs for depression of long working hours and work-to-family conflict increased for both men and women in the low workplace social capital group. **Conclusions:** Workplace social capital mitigated the effect of workplace and family stress leading to depression in both men and women.

Nakahori et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Depression; gender; Japanese civil servants study; workplace social capital.
Evidence Level: 4B
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10767-z

Long working hours and psychiatric treatment: A Danish follow-up study

Objective This study aimed to estimate prospective associations between long working hours and (i) redeemed prescriptions for psychotropic drugs and (ii) psychiatric hospital treatment due to mood, anxiety or stress-related disease, among full-time employees in Denmark. **Methods** Full-time employees who participated in the Danish Labor Force Survey sometime in the period 2000-2013 (N=131 321] were followed for up to five years in national registers for redeemed prescriptions for psychotropic drugs and psychiatric hospital treatment due to mood, anxiety or stress-related disease. Rate ratios (RR) were estimated for 41-48 versus 32-40 and >48 versus 32-40 working hours a week. The analyses were controlled for sex, age, night shift work, calendar time of the interview and socioeconomic status (SES). Prevalent cases were excluded in primary analyses. **Results** The RR for psychotropic drugs were estimated at 0.94 [99% confidence interval (CI) 0.88-1.01] for 41-48 versus 32-40 working hours a week and 1.08 (99% CI 0.99-1.18) for >48 versus 32-40 working hours a week. The corresponding RR for psychiatric hospital treatments were estimated at 0.90 (95% CI 0.75-1.08) and 0.96 (95% CI 0.76-1.21). We did not find any statistically significant interaction between weekly working hours and age, sex, SES or night shift work. **Conclusion** Long working hours as they occur in in the general working population of Denmark are not an important predictor of mental ill health.

Hannerz et al. 2021.
Scandinavian Journal of Work and Environmental Health, vol. 47, no. 3.

Keywords: Long working hours; psychotropic drugs; psychiatric hospital treatment; mood; anxiety; stress-related disease; employees.
Evidence Level: 4A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3936

Associations between depressive complaints and indicators of labour participation among older Dutch employees: a prospective cohort study

Purpose: European policy measures have led to an increased net labour participation of older employees. Yet, via different routes (for instance disability schemes) employees still often leave the labour market early. Mental health may be an important factor hindering labour participation. Aims of this study are twofold: first, to examine the relationship between mental health-particularly depressive complaints-and indicators of labour participation among older employees over a 2-year follow-up period and second, to explore the impact of different work contexts when studying this relation. **Methods:** A subsample of older employees (aged > 45 years; n = 1253) from the Maastricht Cohort Study was studied. Depressive complaints were assessed using the Hospital Anxiety and Depression scale. Logistic and Cox regression analyses covered 2 years of follow-up and were also stratified for relevant work-related factors. **Results:** Employees with mild depressive complaints showed statistically significantly higher risks for poor mental workability (HR 2.60, 95% CI 1.14-5.92) and high psychological disengagement levels (HR 2.35, 95% CI 1.21-4.57) over time compared to employees without depressive complaints. Within various work contexts, for instance in which employees perform physically demanding work or have high psychological job demands, significantly stronger associations were found between depressive complaints and poor mental workability over time. **Conclusions:** This study shows strong longitudinal associations between depressive complaints and indicators of labour participation, also within different work contexts over time. Results provide valuable input for developing preventive measure aiming to enhance sustainable labour participation of older employees.

Jennen et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Depressive complaints; labour participation; longitudinal; older workers; work context.
Evidence Level: 4B
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01584-9

Proactive psychological programs designed to mitigate posttraumatic stress injuries among at-risk workers: a systematic review and meta-analysis

Background: Public safety personnel and frontline healthcare professionals are at increased risk of exposure to potentially psychologically traumatic events (PPTE) and developing posttraumatic stress injuries (PTSI, e.g., depression, anxiety) by the nature of their work. PTSI are also linked to increased absenteeism, suicidality, and performance decrements, which compromise occupational and public health and safety in trauma-exposed workers. Evidence is lacking regarding the effectiveness of "prevention" programs designed to mitigate PTSI proactively. The purpose of this review is to measure the effectiveness of proactive PTSI mitigation programs among occupational groups exposed to PPTE on measures of PTSI symptoms, absenteeism, and psychological wellness. **Methods:** Five electronic databases were searched per PRISMA guidelines for English or French peer-reviewed studies from 2008 to 2019 evaluating PTSI and psychological wellness in adults exposed to occupational PPTE. The risk of bias was assessed using the Newcastle-Ottawa Scale. **Results:** We identified 42 studies evaluating 3182 public safety and frontline healthcare professionals, PPTE-exposed educational staff, and miners. Significant overlap was found across program themes that included mindfulness, psychoeducation, resilience promotion, and stress management strategies. Post-program effect sizes were small (SMD < 0.5) to moderate (SMD < 0.8) for reductions in PTSI symptoms and for promoting measures of well-being as indicated by a meta-analysis on 36 studies. There was no evidence for significant reductions in substance use, absenteeism, or biomarkers of distress except for heart rate. Subgroup analyses indicated that multimodal programs effectively improved general psychological health, while resilience programs improved measures of depression, burnout, coping, and resilience. Effect sizes for resilience, depression, and general psychological health improvements were greatest immediately or 1-month post-training, while improvements in PTSD symptoms and coping were larger at longer follow-up. Studies were of moderate quality and risk of bias. **Conclusions:** The current results showcase modest evidence for time-limited reductions in PTSI following participation in holistic programs that promote resilience, stress, and emotion regulation among at-risk

workers. Implications for organizational implementation of proactive PTSI mitigation programs and areas of future research are discussed.
Nota et al. 2021.
Systematic Reviews, vol. 10, no. 1.

Keywords: Emergency personnel; essential workers; healthcare; mental health training; meta-analysis; occupational health; organizational stress; posttraumatic stress injuries; public safety; resilience.
Evidence Level: 1A
Link: https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-021-01677-7

Major depressive disorder in detention officers
Objective: To identify factors associated with major depressive disorder (MDD) in detention officers. **Methods:** This cross-sectional study included all detention officers from the largest prison complex in the state of Bahia, Brazil. A self-reported questionnaire collected sociodemographic, occupational and health data. The outcome variable - MDD - was evaluated by the Patient Health Questionnaire-9 (PHQ-9) and classified by the cut-off point ≥ 10 method and the algorithm method. The association measure used was the prevalence ratio (PR). Following Cox multivariate regression, the variables were divided into two blocks: sociodemographic characteristics and work, in that order. Only variables with adjusted PR (PRadj) ≥ 1.30 were selected to compose the final models. **Results:** The MDD prevalence by the cut-off point ≥ 10 (simple) and algorithm method in the 401 officers investigated was 18.8% and 9.3%, respectively. MDD prevalence by cut-off point ≥ 10 was higher in female officers (PRadj = 2.77), who suffered threat from factions (PRadj = 2.05), did not report institutional training for the position (PRadj = 1.38), stated that the environment and working conditions interfered in their physical health (PRadj = 3.51) and performed stress-generating activities (PRadj in increasing gradient). MDD prevalence by the algorithm method was higher in female agents (PRadj = 3.45), with tertiary education (PRadj = 1.71), who stated that the environment and working conditions interfered in their physical health (PRadj = 6.33), suffered threat from factions (PRadj = 2.14), did not report institutional training (PRadj = 1.50) and have frequent contact with inmates at work (PRadj = 1.48). **Conclusion:** The high MDD prevalence in these detention officers was associated with sociodemographic factors and, especially, aspects of their work.
Santos et al. 2021.
Revista de Saúde Pública

Keywords: Major Depressive Disorder; detention officers; factors; prison
Evidence Level: 4B
Link: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102021000100205&lng=en&nrm=iso&tlng=en

Psychosocial Issues

Computer mouse movements as an indicator of work stress: Longitudinal observational field study
Background: Work stress affects individual health and well-being. These negative effects could be mitigated through regular monitoring of employees' stress. Such monitoring becomes even more important as the digital transformation of the economy implies profound changes in working conditions. **Objective:** The goal of this study was to investigate the association between computer mouse movements and work stress in the field. **Methods:** We hypothesized that stress is associated with a speed-accuracy trade-off in computer mouse movements. To test this hypothesis, we conducted a longitudinal field study at a large business organization, where computer mouse movements from regular work activities were monitored over 7 weeks; the study included 70 subjects and 1829 observations. A Bayesian regression model was used to estimate whether self-reported acute work stress was associated with a speed-accuracy trade-off in computer mouse movements. **Results:** There was a negative association between stress and the two-way interaction term of mouse speed and accuracy (mean -0.32, 95% highest posterior density interval -0.58 to -0.08), which means that stress was associated with a speed-accuracy trade-off. The

estimated association was not sensitive to different processing of the data and remained negative after controlling for the demographics, health, and personality traits of subjects. **Conclusions:** Self-reported acute stress is associated with computer mouse movements, specifically in the form of a speed-accuracy trade-off. This finding suggests that the regular analysis of computer mouse movements could indicate work stress.
Banholzer et al. 2021.
Journal of Medical Internet Research, vol. 23, no. 4.

Keywords: Computer mouse movements; human-computer interactions; psychological stress; stress indicator; work stress.
Evidence Level: 4A
Link: https://www.jmir.org/2021/4/e27121/

Emotions, emotion management and emotional intelligence in the workplace: Healthcare professionals' experience in emotionally-charged situations
This perspective article is grounded in a cognitive and context-dependent view on emotions. By considering emotions as socially embedded and constructed, the different but related concepts of Emotion Management and Emotional Intelligence can be introduced. Yet, research juxtaposing and applying them within the healthcare sector to explain healthcare professionals' multifaceted emotional experiences at work is still scarce. Hence, this article contributes to the literature on emotions by offering an overarching perspective on how the juxtaposition of Emotion Management and Emotional Intelligence may help healthcare professionals to bridge the developmental transition between these two crucial abilities which, in turn, can help them overcome emotional difficulties in complex situations. Such integration would positively influence individuals' behavioral and mental health, as well as the overall quality of the healthcare system.
Carminati et al. 2021.
Frontiers of Psychology, vol. 6.

Keywords: Emotion management; emotional intelligence; emotions; healthcare professionals; well-being.
Evidence Level: 6A
Link: https://www.frontiersin.org/articles/10.3389/fsoc.2021.640384/full

Enabling Healthy and Safe Workplaces

Health and Wellbeing

Associations of sustained smoking and smoking cessation with work-related outcomes: a longitudinal analysis
Purpose: The aim of this study was to assess the association between sustained smoking and quitting with work-related outcomes among older workers. **Methods:** We categorized a sample of older employees into non-smokers, sustained smokers and quitters. Multivariable regression models were used to test longitudinal associations of sustained smoking and smoking cessation with sickness absence, productivity loss and work ability. **Results:** We included 3612 non-smokers, 673 sustained smokers and 246 quitters. Comparing sustained smokers to non-smokers, we found higher (but not statistically significant) sickness absence for sustained smokers [1.01, 95% confidence interval (CI) - 0.16-2.17]. We did not find differences in productivity loss (OR 0.82, 95% CI 0.60-1.13) and work ability (0.05, 95% CI -0.05-0.15). For employees with a relatively high physical health at baseline, comparing quitters to sustained smokers, we found higher (but not statistically significant) productivity loss for quitters (OR 2.23, 95% CI 0.94-5.31), and no difference in sickness absence (0.10, 95% CI - 2.67-2.87), and work ability (- 0.10, 95% CI - 0.36-0.16). For employees with a relatively low physical health at baseline, comparing quitters to sustained smokers, we found a statistically significant lower work ability (- 0.31, 95% CI - 0.57-0.05), and no difference in sickness absence (2.53, 95% CI - 1.29-6.34) and productivity loss (OR 1.26, 95% CI 0.66-2.39). **Conclusions:** We found no evidence that sustained smokers have less favorable work-related outcomes than non-smokers or that

quitters have more favorable work-related outcomes than sustained smokers. The benefits of smoking cessation for employers might take a longer time to develop.
Trolestra et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Older workers; sickness absence; smoking; smoking cessation; work ability; work productivity.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01598-3

Cardiorespiratory fitness, occupational aerobic workload and age: workplace measurements among blue-collar workers
Background: The knowledge, from laboratory studies dating back to the 1950s on the importance of the association between cardiorespiratory fitness and aerobic workload for workers health, is fundamental for promoting sustainable healthy employability among ageing blue-collar workers today. However, the association between cardiorespiratory fitness and aerobic workload has not yet been documented during daily work, and we do not know if it applies to the normal work of blue-collar workers in different age groups. We aim to investigate the association between cardiorespiratory fitness and aerobic workload among blue-collar workers using measurements of 24-h heart rate collected over consecutive working days. **Methods:** We analyzed baseline cardiorespiratory fitness, assessed using a sub-maximal cycle ergometer test, and 1-4 days of 24-h heart rate measurement from 497 blue-collar workers participating in the DPHACTO study. We investigated the association between cardiorespiratory fitness and aerobic workload defined as the average percentage of heart rate reserve (%HRR), maximum %HRR and the duration time spent at a high HRR (> 30%) during working hours. The association was assessed using multivariate linear regression models adjusted for age, sex, self-rated health, shift-work, prescription medication and occupation, as well as for different age strata. **Results:** Higher cardiorespiratory fitness was significantly associated with decreased mean %HRR -0.32 [95% CI -0.39 to -0.25], maximum %HRR -0.35 [95% CI -0.45 to -0.25] and time spent at ≥ 30% HRR; -1.8% [95% CI -2.2 to -1.5%]. These associations were evident across age groups, with slightly stronger associations for workers aged 46-51 (total range 18-68). **Conclusions:** Higher cardiorespiratory fitness was associated with the decreased aerobic workload during normal work across all age groups and levels of work intensity. Our findings highlight the importance of cardiorespiratory fitness when considering the workload and its relevance in the promotion of healthy sustainable employment.
Stevens et al. 2021.
International Archives of Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Heart rate reserve; objective measurement; physical work demands; recovery; sustainable employment.
Evidence Level: 3A
Link: https://pubmed.ncbi.nlm.nih.gov/33161441/

Occupational position and alcohol use disorders in Poland
Objectives: The following analysis covers the role of the occupational structure in the prevalence of alcohol use disorders (AUDs). The authors investigated whether the occupational position affected the prevalence of AUDs among men and women, and how this relationship varied in lifetime and past year periods.
Material and methods: Data were taken from the General Population Survey on Mental Health in Poland (EZOP) utilizing the *Composite International Diagnostic Interview* questionnaire (N = 2806). Binary and multiple regression models were employed to assess the risk of AUDs adjusted for the occupational structure and socio-demographic variables. **Results:** The occupational position affects the prevalence of AUDs in men, while it has no impact on AUDs in women. Skilled and non-skilled workers suffer from AUDs to a greater extent than those in higher occupational positions. However, the risk of alcohol harm in women seems to be equally distributed across the occupational structure. **Conclusions:** The uneven pattern of alcohol harm in men and women can be possibly explained by shifting working conditions and work

environments, as well as traditional gender roles affecting alcohol behaviors. The findings of the study support further development of the occupational position concept in alcohol research. The problem of harmful alcohol drinking in women across the occupational structure warrants a more in-depth inquiry.
Bujalski et al. 2021.
International Journal of Environmental Medicine and Occupational Health.

Keywords: Poland; alcohol; alcohol use disorders; gender; occupational status; occupational structure.
Evidence Level: 4B
Link: http://ijomeh.eu/Occupational-position-and-alcohol-use-disorders-in-Poland,131607,0,2.html

The prevalence of cigarette, e-cigarette and heated tobacco use among police employees in Poland: a 2020 cross-sectional survey
Objectives: Uniformed services such as police employees are exposed to acute and chronic stressful events at work that may lead to tobacco use. This study aimed to assess the prevalence of cigarette smoking, e-cigarette use and heated tobacco use among police employees in Poland, and to investigate personal characteristics associated with tobacco or e-cigarette use. **Material and methods:** This cross-sectional study was carried out in June-July 2020 on a randomly selected sample of 8789 police employees from the Mazowieckie Province, Poland. **Results**: Completed questionnaires were obtained from 5082 police employees (79.2% being police officers) with an overall response rate of 57.8%. Smoking ≥100 cigarettes or similar amounts of other tobacco products was declared by 54.6% of the respondents, with significant differences ($p < 0.001$) between males (56.8%) and females (50.3%). Daily cigarette smoking was declared by 19.5% of the respondents, and 13.4% were occasional cigarette smokers. Daily e-cigarette use was declared by 3.1% of the respondents, and 3.2% were occasional e-cigarette users. Daily heated tobacco use was declared by 2.6% of the respondents, and 2.9% were occasional heated tobacco users. Higher odds of occasional cigarette smoking were observed among men compared to women (OR = 1.254, 95% CI: 1.009-1.558), and among the participants aged 20-29 years (OR = 7.982, 95% CI: 3.066-20.775) or 30-44 years (OR = 3.730, 95% CI: 1.44-9.599) vs. those aged ≥60 years. Higher odds of occasional e-cigarette use were observed among the participants aged 20-29 years (OR = 4.554, 95% CI: 1.213-17.101) vs. those aged 60 years. Police employees with office-based work had lower odds of daily cigarette smoking vs. those with fieldwork (OR = 0.726, 95% CI: 0.55-0.946). Police officers had higher odds of daily heated tobacco use compared to civil workers (OR = 3.362, 95% CI: 1.325-8.534). **Conclusions**: The authors observed a marked proportion of police employees who declared occasional tobacco or e-cigarette use, which may indicate the common social smoking phenomenon in this occupational group.
Jankowski et al. 2021.
International Journal of Occupational Medicine and Environmental Health, vol. 16.

Keywords: E-cigarettes; epidemiology; heated tobacco use; police; smoking; tobacco.
Evidence Level: 4A
Link: http://ijomeh.eu/The-prevalence-of-cigarette-e-cigarette-and-heated-tobacco-use-among-police-employees,132844,0,2.html

Development and beta test of a smokeless tobacco cessation program for firefighters
Introduction: The prevalence of smokeless tobacco (SLT) use among firefighters is substantially higher than the general population and similar occupational groups. Despite the significant health risks associated with SLT and its impact on occupational readiness, there are no occupationally-tailored SLT education or treatment programs for the fire service. The purpose of this study was to beta test QUIT SPIT!, a self-help SLT cessation program that is culturally tailored for the US fire service and firefighters who are interested in quitting. **Methods:** After development and tailoring the QUIT SPIT! SLT cessation program for firefighters, the feasibility and acceptability of the program were evaluated in a sample of eleven SLT-using firefighters who wanted to quit. The primary outcome was a 7-day point prevalence of SLT abstinence measured at 4 and 12 weeks post-enrollment follow-up assessments. **Results:** Four firefighters reported having quit SLT (7-days point prevalence) at follow-up at 12 weeks. Those who did not achieve SLT abstinence reported

reductions in frequency and quantity in SLT use and demonstrated a decrease in nicotine dependence. Firefighters also reported being satisfied with the QUIT SPIT! cessation program. **Conclusions:** The results provide strong support for the feasibility and acceptability of the QUIT SPIT! in SLT-using firefighters interested in quitting. The findings provide critical information about the next steps for further development and evaluation of the QUIT SPIT! program.
Jitnarin et al. 2021.
Tobacco Prevention & Cessation, vol. 8.

Keywords: Behavioral intervention; fire service; firefighters; occupational health; smokeless tobacco; smokeless tobacco cessation.
Evidence Level: 3A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8029998/

Work Health and Safety

Neurotrauma biomarker levels and adverse symptoms among military and law enforcement personnel exposed to occupational overpressure without diagnosed traumatic brain injury
Importance: There is a scientific and operational need to define objective measures of exposure to low-level overpressure (LLOP) and concussion-like symptoms among persons with specialized occupations. **Objective:** To evaluate serum levels of neurotrauma biomarkers and their association with concussion-like symptoms reported by LLOP-exposed military and law enforcement personnel who are outwardly healthy and cleared to perform duties. **Design, setting, and participants:** This retrospective cohort study, conducted from January 23, 2017, to October 21, 2019, used serum samples and survey data collected from healthy, male, active-duty military and law enforcement personnel assigned to operational training at 4 US Department of Defense and civilian law enforcement training sites. Personnel aged 18 years or older with prior LLOP exposure but no diagnosed traumatic brain injury or with acute blast exposure during sampling participated in the study. Serum samples from 30 control individuals were obtained from a commercial vendor. **Main outcomes and measures:** Serum levels of glial fibrillary acidic protein, ubiquitin carboxyl hydrolase (UCH)-L1, neurofilament light chain, tau, amyloid β (Aβ)-40, and Aβ-42 from a random sample (30 participants) of the LLOP-exposed cohort were compared with those of 30 age-matched controls. Associations between biomarker levels and self-reported symptoms or operational demographics in the remainder of the study cohort (76 participants) were assessed using generalized linear modeling or Spearman correlations with age as a covariate. **Results:** Among the 30 randomly sampled participants (mean [SD] age, 32 [7.75] years), serum levels of UCH-L1 (mean difference, 4.92; 95% CI, 0.71-9.14), tau (mean difference, 0.16; 95% CI, -0.06 to 0.39), Aβ-40 (mean difference, 138.44; 95% CI, 116.32-160.56), and Aβ-42 (mean difference, 4.97; 95% CI, 4.10-5.83) were elevated compared with those in controls. Among the remaining cohort of 76 participants (mean [SD] age, 34 [7.43] years), ear ringing was reported by 44 (58%) and memory or sleep problems were reported by 24 (32%) and 20 (26%), respectively. A total of 26 participants (34%) reported prior concussion. Amyloid β-42 levels were associated with ear ringing ($F_{1,72}$ = 7.40; P = .008) and memory problems ($F_{1,72}$ = 9.20; P = .003). **Conclusions and relevance:** The findings suggest that long-term LLOP exposure acquired during occupational training may be associated with serum levels of neurotrauma biomarkers. Assessment of biomarkers and concussion-like symptoms among personnel considered healthy at the time of sampling may be useful for military occupational medicine risk management.
Boutte et al. 2021.
JAMA Network Open, vol. 4, no. 4.

Keywords: Neurotrauma biomarker levels; adverse symptoms; military; law enforcement; occupational overpressure; traumatic brain injury.
Evidence Level: 4A
Link: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2778573

Sun safety knowledge, practices and attitudes in rural Australian farmers: a cross-sectional study in Western New South Wales

Background: Rates of skin cancer in Australia are amongst the highest in the world, with Western New South Wales (NSW) exhibiting very high prevalence. There is a large proportion of outdoor workers, including farmers, in Western NSW who have high levels of sun exposure and hence are at greater risk of developing skin cancer. **Aims:** To characterise the current sun safety practices of farmers in Western NSW and explore their knowledge, attitudes and perceived barriers towards sun safety and its implementation. **Methods:** A cross-sectional survey study was conducted using a self-directed questionnaire. Participants were recruited at field days held in Western NSW and through surveys distributed at general practices, local stores and online. Eligibility criteria were aged 18 years and over and currently working on a farm in the study region. **Results:** Of the 144 participants, 89 (61.8%) were male with a mean age of 49 years. Knowledge of sun safety was relatively high with most questions answered correctly by greater than 80% of participants. Risk of developing skin cancer was underestimated in 58 (40.3%) participants. Of all participants, 89 (62.2%) identified one or more barriers to practicing sun safety. The most common barrier was forgetfulness in 62 (43.4%) participants. The identification of barriers was significantly associated with reduced engagement of sun safety practices (p = 0.009). **Conclusions:** Knowledge of sun safety among farmers was high. There was, however, underestimation of risk of developing skin cancer. Addressing perceived barriers to implementing sun safety could improve sun safety practices in this cohort.

D'Souza et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Farmers; melanoma; occupational exposure; skin cancer; sun protection.
Evidence Level: 4A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10777-x

Occupational lifting and risk of hypertension, stratified by use of anti-hypertensives and age - a cross-sectional and prospective cohort study

Background: Heavy occupational lifting is prevalent in the general working population and is sparsely reported to associate with hypertension, especially among older and hypertensive workers. We investigated if heavy occupational lifting is associated with hypertension and blood pressure (BP) in both cross-sectional and prospective study designs in the Copenhagen General Population Study, stratified by age, and use of anti-hypertensives. **Methods:** Participation was conducted following the declaration of Helsinki and approved by the ethical committee (H-KF-01-144/01). By multivariable logistic and linear regression models, we investigated the association between heavy occupational lifting and hypertension, in a cross-sectional design (n = 67,363), using anti-hypertensives or BP ≥140/≥90 mmHg as outcome, and in a prospective design (n = 7020) with an above-median change in systolic BP (SBP) from baseline to follow-up and/or a shift from no use to use of anti-hypertensives as outcome, with and without stratification by age and use of anti-hypertensives. **Results:** The odds ratio for hypertension was estimated at 0.97 (99% CI: 0.93-1.00) in the cross-sectional analysis, and at 1.08 (99% CI: 0.98-1.19) in the prospective analysis. The difference in SBP among workers with versus without heavy occupational lifting was estimated at - 0.29 mmHg (99% CI -0.82 - 0.25) in the cross-sectional and at 1.02 mmHg (99% CI -0.41 - 2.45) in the prospective analysis. No significant interaction between heavy occupational lifting and age, nor use of anti-hypertensives were shown. **Conclusions:** Only the prospective analysis indicated heavy occupational lifting to increase the risk of hypertension. Further research on the association between occupational lifting and hypertension are needed.

Korshøj et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Aging workers; blue-collar occupations; cardiovascular risk; ergonomics; occupational health.
Evidence Level: 4A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10651-w

Analysis of work-related accidents and ill-health in Brazil since the introduction of the accident prevention factor

Background: Since 2004, Brazil has had a national policy for occupational health and safety. This policy means companies' tax burden is altered according to the numbers of work-related accidents and ill-health amongst their workers. In 2010, a multiplication factor was introduced to this policy, called the Accident Prevention Factor. The idea of this new multiplication factor is to encourage individual employers to take initiatives to prevent accidents and ill health in the workplace. This study was designed to investigate the incidence of work-related accidents and ill-health in Brazil according to their causes, their severity, and the economic activity in which they occur, and to compare the data before and after the introduction of the Accident Prevention Factor. **Methods:** An ecological study was conducted by analyzing the time series of work-related accidents/ill-health between 2008 and 2014 from the Brazilian social security system (Previdência Social) statistical yearbooks. Incidences were calculated per cause, economic activity, and severity of the accident/ill-health. Data from before and after the introduction of the Accident Prevention Factor were compared using the Mann-Whitney test per cause and per economic activity. Statistical analyses were made using the SPSS software, with significance set at 5%. **Results:** A reduction in the incidence of work-related accidents/ill-health was found across all the groups of causes analyzed, except for the groups "external causes of morbidity and mortality" and "factors influencing health status and contact with health services." Greater reductions were found for diseases of the musculoskeletal system and connective tissue and diseases of the nervous system. Reductions in work-related accidents/ill-health were found in the different economic activities and in the different severity groups. The highest reduction after the introduction of the Accident Prevention Factor was in manufacturing and production ($p < 0.05$). **Conclusions:** Overall, the incidence of accidents/ill-health was found to be on decline, except those with external causes of morbidity and mortality and those involving factors influencing health status and contact with health services. The biggest reduction was found in manufacturing and production. However, generally speaking progress still needs to be made in accident prevention and occupational health across a whole range of work environments.

Shimizu et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Occupational accidents; Occupational health; Occupational injuries; Social security.
Evidence Level: 5B
Link: https://pubmed.ncbi.nlm.nih.gov/33853572/

Risk Assessment

Nonfatal occupational injuries to younger workers - United States, 2012-2018

Adolescents and young adults represent approximately 13% of the U.S. workforce (1). Compared with adult workers, young workers (aged 15-24 years) experience higher rates of job-related injury (2,3). To describe injuries among young workers and inform research and prevention activities, CDC's National Institute for Occupational Safety and Health (NIOSH) analyzed national data for 2012-2018 from the occupational supplement to the National Electronic Injury Surveillance System* (NEISS-Work) and for 2018 from the Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII).† During the 7-year period, an estimated 3.2 million (95% confidence interval [CI] = 2.6-3.7) nonfatal, job-related injuries to young workers were treated in hospital emergency departments (EDs). From 2012 to 2018, annual rates of work-related injuries§ treated in the ED (ED-treated injuries) declined overall across all age groups but ranged from 1.2 to 2.3 times higher for workers aged 15-24 years compared with those for adults aged 25-44 years. Workers aged 18-19 years had the highest rate of ED-treated injuries. In 2018, among all age groups, workers in service occupations¶ had the highest percentage of injuries requiring at least 1 day away from work. Among workers aged 15-17 years, those in the leisure and hospitality industry had the highest percentage of work-related injuries requiring at least 1 day away from work. Occupational injuries can have long-term impacts on health (4). The disproportionate risk of injury among young workers highlights the need for sustained, targeted public health efforts to prepare this population with essential workplace

safety and health competencies before they enter the workforce and to provide high-quality safety training and close supervision on the job. NIOSH and its partners developed a free curriculum to teach adolescents workplace safety and health competencies, which includes identification of workplace hazards and methods for addressing them, how to understand their rights and responsibilities as workers, and how to voice concerns about work safety issues (5).
Guerin et al. 2021.
MMWR Morbidity and Mortality Weekly Report, vol. 69, no. 35.
Keywords: Nonfatal occupational injuries; younger workers; adolescents; young adults.
Evidence Level: 5A
Link: https://www.cdc.gov/mmwr/volumes/69/wr/mm6935a3.htm?s_cid=mm6935a3_w

Decade of fatal injuries in workers in New Zealand: insights from a comprehensive national observational study
Introduction: Current priorities and strategies to prevent work-related fatal injury (WRFI) in New Zealand (NZ) are based on incomplete data capture. This paper provides an overview of key results from a comprehensive 10-year NZ study of worker fatalities using coronial records. **Methods:** A data set of workers, aged 15-84 years at the time of death who died in the period 2005-2014, was created using coronial records. Data collection involved: (1) identifying possible cases from mortality records using selected external cause of injury codes; (2) linking these to coronial records; (3) retrieving and reviewing records for work-relatedness; and (4) coding work-related cases. Frequencies, percentages and rates were calculated. Analyses were stratified into workplace and work-traffic settings. **Results:** Over the decade, 955 workers were fatally injured, giving a rate of 4.8 (95% CI 5.6 to 6.3) per 100 000 worker-years. High rates of worker fatalities were observed for workers aged 70-84 years, indigenous Māori and for males. Workers employed in mining had the highest rate in workplace settings while transport, postal and warehousing employees had the highest rate in work-traffic settings. Vehicle-related mechanisms dominated the mechanism and vehicles and environmental agents dominated the breakdown agencies contributing to worker fatalities. **Discussion:** This study shows the rates of worker fatalities vary widely by age, sex, ethnicity, occupation and industry and are a very serious problem for particular groups. Future efforts to address NZ's high rates of WRFI should use these findings to aid understanding where preventive actions should be prioritised.
Lilley et al. 2021.
Injury Prevention, vol. 27, no. 2.

Keywords: Driver; epidemiology; mortality; occupational injury; workplace.
Evidence Level: 4A
Link: https://injuryprevention.bmj.com/content/27/2/124.long

Chronic Health Issues

Disability, quality of life, productivity impairment and employer costs of migraine in the workplace
Background: Migraine is the leading cause of days lost due to disability in the world among people less than 50 years of age. There is a paucity of evidence on the impact of migraine and other headache disorders and the cost and productivity losses in the workplace.
Methods: Employee population survey assessed prevalence, characteristics, and disability of headache disorders at a Japanese information technology company. This study was supported by the World Health Organization Western Pacific Region Office and International Headache Society.
Results: 2458 (1963men, 495 women) out of 2494 responded to the survey that utilized ICHD-3 beta criteria. Among these, 13% (205 male/123 female) had migraine (M), 53% (1093 male/207 female) had tension-type headache (TTH) and 4% (61 male/27 female) had migraine and TTH (M/TTH). The number of days when productivity at work was reduced by half or more because of headache was significantly higher in migraine compared to TTH. The norm-based scoring of SF-12v2 was significantly lower in M/TTH and M

than TTH. The economic loss due to absenteeism for migraine was calculated to be $ 238.3US$/year/person for day-off and 90.2US$/year/person for half-day off using migraine disability assessment score (MIDAS). The economic loss due to presenteeism for migraine was calculated to be $ 375.4US$/year/person using MIDAS and 2217US$/year/person using work productivity and activity impairment questionnaire (WPAI). Furthermore, estimated cost of productivity loss associated with presenteeism using WPAI was calculated at 21.3 billion US$/year in Japan as a whole.
Conclusions: This study revealed a high prevalence and disease burden among employees with migraine that is associated with substantial losses in productivity and employer cost. These results support the development and implementation of workplace programs to improve migraine management in the workplace and reduce the burden and costs associated with lost workplace productivity.
Shimizu et al. 2021.
The Journal of Headache and Pain, vol. 22, no. 1.

Keywords: Absenteeism; disability; economic loss; impact; migraine; presenteeism; prevalence; stigma; work productivity; workplace.
Evidence Level: 4B
Link: https://thejournalofheadacheandpain.biomedcentral.com/articles/10.1186/s10194-021-01243-5

Cardiovascular disease subtypes, physical disability and workforce participation: A cross-sectional study of 163,562 middle-aged Australians
Background: Workforce participation is reduced among people with cardiovascular disease (CVD). However, detailed quantitative evidence on this is limited. We examined the relationship of CVD to workforce participation in older working-age people, by CVD subtype, within population subgroups and considering the role of physical disability. **Methods:** Questionnaire data (2006-2009) for participants aged 45-64 years (n = 163,562) from the population-based 45 and Up Study (n = 267,153) were linked to hospitalisation data through the Centre for Health Record Linkage. Prior CVD was from self-report or hospitalisation. Modified Poisson regression estimated adjusted prevalence ratios (PRs) for non-participation in the workforce in people with versus without CVD, adjusting for sociodemographic factors. **Results:** There were 19,161 participants with CVD and 144,401 without. Compared to people without CVD, workforce non-participation was greater for those with CVD (40.0% vs 23.5%, PR = 1.36, 95%CI = 1.33-1.39). The outcome varied by CVD subtype: myocardial infarction (PR = 1.46, 95%CI = 1.36-1.55); cerebrovascular disease (PR = 1.92, 95%CI = 1.80-2.06); heart failure (PR = 1.83, 95%CI = 1.68-1.98) and peripheral vascular disease (PR = 1.76, 95%CI = 1.65-1.88). Workforce non-participation in those with CVD versus those without was at least 21% higher in all population subgroups examined, with PRs ranging from 1.75 (95%CI = 1.65-1.85) in people aged 50-55 years to 1.21 (95%CI = 1.19-1.24) among those aged 60-64. Compared to people with neither CVD nor physical functioning limitations, those with physical functional limitations were around three times as likely to be out of the workforce regardless of CVD diagnosis; participants with CVD but without physical functional limitations were 13% more likely to be out of the workforce (PR = 1.13, 95%CI = 1.07-1.20). **Conclusions:** While many people with CVD participate in the workforce, participation is substantially lower, especially for people with cerebrovascular disease, than for people without CVD, highlighting priority areas for research and support, particularly for people experiencing physical functioning limitations.
Sayeed et al. 2021.
PLoS One, vol. 16, no. 4.

Keywords: Cardiovascular disease; physical disability; workforce participation.
Evidence Level: 4A
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249738

Dose-response relationship between working hours and hypertension: A 22-year follow-up study
Hypertension causes a substantial burden to society. Some studies found that hypertension was associated with the working type and working hours. The purpose of the current study is to assess the dose-response relationship between working hours and hypertension. Data of 12,080 adults aged 18 to 65 years who

attended the China Health and Nutrition Survey (CHNS) between 1989 and 2011 were analyzed. Hypertension was determined based on systolic and/or diastolic blood pressure measures, or having doctor-diagnosed hypertension. Multivariable Cox regression and restricted cubic spline to assess the dose-response relationship between working hours and hypertension. A total of 12,080 participants including 5852 females and 6228 males. By the last follow-up (2011), a total of 830 participants were hypertensive, with an incidence of 6.9%. After adjusting socio-demographic, lifestyle factors, as well as occupation type, compared with those who worked 35 to 49 hours per week, participants who worked no more than 34 hours per week (HR: 1.21, 95%CI: 1.03-1.41) and at least 56 hours per week (HR: 1.38, 95%CI: 1.19-1.59) had a higher risk of hypertension. The significant association between long working hours (at least 56 hours per week) and hypertension was observed among females (HR: 1.38, 95%CI: 1.16-1.64) and males (HR: 1.36, 95%CI: 1.04-1.78). Among manual workers, the relationship between long working hours and hypertension was observed (HR: 1.49, 95%CI: 1.10-2.02). The relationship between long working hours (HR: 1.21, 95%CI: 1.01-1.44) and short working hours (HR: 1.37, 95%CI: 1.16-1.61) and hypertension was observed among nonmanual workers. The hazard ratio of hypertension and working time displayed U-shape non-linear relationship (Ptrend < .001, non-linear P < .001). The non-linear response-dose relationship was found in manual worker, nonmanual worker, and male (Ptrend < .001, non-linear P < .001). The association between working time and hypertension showed U-shape relationship. Specifically, overtime work was an important occupational risk factors for adults, and short work time was related to hazard ratio of hypertension in nonmanual workers.

Cheng et al. 2021.

Medicine, vol. 100, no. 16.

Keywords: Working hours; hypertension; follow-up study; working type.

Evidence Level: 4A

Link: https://journals.lww.com/md-journal/Fulltext/2021/04230/Dose_response_relationship_between_working_hours.86.aspx

Occupational Exposure

Occupational exposure to glyphosate and risk of lymphoma: Results of an Italian multicenter case-control study

Background: The International Agency for Research on Cancer (IARC) recently classified glyphosate, the most used herbicide worldwide, as a probable human carcinogen. We inquired into the association between occupational exposure to glyphosate and risk of lymphoma subtypes in a multicenter case-control study conducted in Italy. **Methods:** The Italian Gene-Environment Interactions in Lymphoma Etiology (ItGxE) study took place in 2011-17 in six Italian centres. Overall, 867 incident lymphoma cases and 774 controls participated in the study. Based on detailed questionnaire information, occupational experts classified duration, confidence, frequency, and intensity of exposure to glyphosate for each study subject. Using unconditional regression analysis, we modelled risk of major lymphoma subtypes associated with exposure to glyphosate adjusted by age, gender, education, and study centre. **Results:** Very few study subjects (2.2%) were classified as ever exposed to glyphosate. Risk of follicular lymphoma (FL) was elevated 7-fold in subjects classified as ever exposed to glyphosate with medium-high confidence, 4.5-fold in association with medium-high cumulative exposure level, 12-fold with medium-high exposure intensity, and 6-fold with exposure for 10 days or more per year. Significant upward trends were detected with all the exposure metrics, but duration. The overall p-value for an upward trend with four independent metrics was 1.88×10^{-4}. There was no association with risk of lymphoma (any subtype), Non Hodgkin Lymphoma, B-cell lymphoma, or the major lymphoma subtypes other than FL. **Conclusions:** Our findings provide limited support to the IARC decision to classify glyphosate as Group 2A human carcinogen.

Meloni et al. 2021.

Environmental Health, vol. 20, no. 1.

Keywords: Follicular lymphoma; glyphosate; occupational cancer; occupational exposure; pesticides.
Evidence Level: 4B
Link: https://ehjournal.biomedcentral.com/articles/10.1186/s12940-021-00729-8

Biomonitoring of occupational exposure to bisphenol A, bisphenol S and bisphenol F: A systematic review

Bisphenol A (BPA) and its substitutes bisphenol S (BPS) and bisphenol F (BPF) are endocrine disrupting chemicals widely used in the production of polycarbonate plastics, epoxy resins and thermal papers. The aim of the review was to identify occupational studies using human biomonitoring (HBM) as a tool for bisphenol exposure assessment and to characterize research gaps on the topic as part of the HBM4EU project. Hence, a systematic literature search using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology was conducted for articles published between 2000 and 27th March 2020 across three databases (PubMed, Scopus and Web of Science). Thirty studies on the occupational HBM of BPA met the inclusion criteria. Regarding BPS and BPF, only 4 and 2 publications were retrieved, respectively. Fifty-seven percent (57%) of the studies selected for BPA were conducted in Asia whereas half of BPS and BPF studies were undertaken in Europe. Studies on BPA in plastic and epoxy resin sectors were infrequent in Europe while Asian data showed higher exposure when the substance is employed as raw material. The main data on BPS were among cashiers while BPF data were available from incinerator workers. Several research gaps have been identified: (i) shortage of HBM studies on occupational exposure, especially to BPS and BPF; (ii) different methodological designs making suitable comparisons between studies difficult; and (iii) only few studies conducted on the industrial applications of bisphenols outside Asia. This review highlights the lack of recent occupational HBM studies on bisphenols and the need for a harmonized approach to acquire reliable data. Considering the increasing replacement of BPA by BPS and BPF, it is of relevance to evaluate the exposure to these substances and the impact of the available risk management measures on workers exposure and possible health risk.

Bousoumah et al. 2021.
The Science of the Total Environment.

Keywords: Biomonitoring; bisphenols; endocrine disrupters; exposure assessment; occupational health.
Evidence Level: 1A
Link: https://www.sciencedirect.com/science/article/pii/S0048969721019756?via%3Dihub

Risk assessment of workers' exposure to BTEX and hazardous area classification at gasoline stations

Vaporization of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds pollutes the air and causes health hazards at gasoline stations. This study revealed the risk of BTEX exposure according to the hazardous area classification at gasoline stations. The risk assessment of gasoline workers from a representative group of 47 stations, which followed the United States Environmental Protection Agency-IRIS method of assessing BTEX exposure, was expressed as the hazard index (HI). A result of matrix multipliers of the hazardous exposure index and fire possibility from flammable gas classified hazardous area-I and area-II at the fuel dispensers. BTEX concentrations were actively sampled in ambient air and a flammable gas detector was used to measure the flammability level. Results showed that the BTEX concentrations from ambient air monitoring were in the range of 0.1-136.9, 8.1-406.0, 0.8-24.1 and 0.4-105.5 ppb for benzene, toluene, ethylbenzene, and xylene, respectively, which exceeded the NIOSH exposure limit of 100 ppb of benzene concentration. The risk assessment indicated that five stations reached an unacceptable risk of worker exposure to BTEX (HI>1), which correlated with the numbers of gasoline dispensers and daily gasoline sold. The risk matrix classified hazardous area-I at 4 meters and hazardous area-II at 4-8 meters in radius around the fuel dispensers. This study revealed the hazardous areas at gasoline stations and suggests that entrepreneurs must strictly control the safety operation practice of workers, install vapor recovery systems on dispenser nozzles to control BTEX vaporization and keep the hazardous areas clear of fire ignition sources within an eight-meter radius of the dispensers.

Chaiklieng et al. 2021.
PLoS One, vol. 16, no. 4.

Keywords: Risk assessment; workers'; exposure; benzene; toluene; ethylbenzene; BTEX; hazardous area classification; gasoline stations
Evidence Level: 5A
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249913

The impact of chronic co-exposure to different heavy metals on small fibers of peripheral nerves. A study of metal industry workers

Background: Chronic exposure to heavy metals affects various organs, among them the brain and peripheral nerves. Polyneuropathy is mainly length-dependent with predominantly sensory symptoms. There have been few studies on small fiber neuropathy due to heavy metal intoxication. **Methods:** We investigated 41 metal industry workers, mean age 51.3 ± 10.5 years, with at least 5 years' professional exposure to heavy metals, and 36 age- and sex-matched healthy controls. We performed neurological examinations, and assessed blood levels of cadmium, lead, and zinc protoporphyrin, urine levels of arsenic, standard, sensory and motor electrophysiological tests in the ulnar and peroneal nerves, sympathetic skin responses from the palm and foot, and quantitative sensation testing from dermatomes C8 and S1. **Discussion:** The results of standard conduction tests of all nerves significantly differed between groups. The latency of sympathetic skin responses achieved from the foot was also statistically significantly prolonged in the study group. Significant differences were seen in both C8 and S1 regions for temperature and pain thresholds, and for vibratory threshold only in the S1 region, while the dispersions of low and high temperatures were important exclusively in the C8 region. **Conclusions:** We can conclude that co-exposure to many heavy metals results in explicit impairment of peripheral nerves. The lesion is more pronounced within small fibers and is predominantly connected with greater impairment of temperature-dependent pain thresholds. The evaluation of small fiber function should be considered in the early diagnosis of toxic polyneuropathy or in low-dose exposure to heavy metals.
Koszewicz et al. 2021.
The Journal of Occupational Medicine and Toxicology, vol. 16, no. 1.

Keywords: Arsenic; cadmium; lead; polyneuropathy; small fibers.
Evidence Level: 5A
Link: https://occup-med.biomedcentral.com/articles/10.1186/s12995-021-00302-6

Parental occupational exposure and congenital heart diseases in a Hungarian case-control study

Purpose: Our study aimed to explore the effect of parental occupational exposure to endocrine disrupting chemicals (EDCs) on the development of congenital heart diseases (CHDs) in the offspring, and to compare job-exposure matrix (JEM)-assessed and self-reported occupational exposures with each other.
Methods: Live-born infants born in 2007-2008 were selected from the population-based Hungarian Case-Control Surveillance of Congenital Abnormalities Study. 577 cases with any CHDs were compared to 1731 matched controls. Parental periconceptional occupational exposure to EDCs was assessed by a JEM and by questionnaire-based self-reporting of parents. Multivariate conditional logistic regression analyses were conducted to explore associations between parental occupational exposure to EDCs and the entire spectrum of CHDs and by CHD subtypes in the offspring. Kappa statistics were also performed to determine the consistency among JEM-assessed and self-reported occupational exposure of parents. **Results:** JEM-assessed paternal exposure to polychlorinated organic substances, phthalates, biphenolic compounds, and solvents were significantly associated with the entire spectrum of CHDs. Ventricular septal defects were significantly associated with paternal self-reported exposure to pesticides, while atrial septal defects were significantly associated to paternal JEM-assessed phthalate exposure. Paternal solvent exposure was significantly associated with atrial septal defects and right ventricle outflow tract obstructions. JEM-assessed and self-reported exposures to pesticides, heavy metals, and solvents exhibited poor agreement for mothers and slight agreement for fathers. **Conclusion:** Even though parental occupational exposure to EDCs seems to have a minor impact on the occurrence of CHDs, the results of biological and environmental monitoring should be taken into consideration as well.
Fazekas-Pongor et al. 2021.

International Archies of Occupational and Environmental Health, vol. 94, no. 3.

Keywords: Congenital heart disease; endocrine disruptor; maternal exposure; occupational exposure; paternal exposure; retrospective exposure assessment.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01589-4

Metabolomic profiling identifies plasma sphingosine 1-phosphate levels associated with welding exposures
Background: Despite a number of known health hazards of welding fume exposure, it is unclear how exposure affects the human metabolome. **Objective:** We assessed the metabolic profiles of welders before and after a 6-hour welding shift, controlling for circadian rhythm of metabolism on a non-welding day. **Methods:** Welders were recruited from a training centre in Quincy, Massachusetts, in 2006 and 2010-2012 and donated blood samples on a welding shift day before and after work, as well as on a non-welding day spent in an adjacent classroom. In total, we collected 509 samples from 74 participants. Liquid chromatography-mass spectrometry quantified 665 metabolites from thawed plasmas. Metabolites with significant time (afternoon compared with morning) and day (welding/classroom) interactions were identified by two-way analysis of variance, and the overnight changes were evaluated. **Results:** Sphingosine 1-phosphate (S1P) and sphingasine 1-phosphate (SA1P) exhibited significant interaction effects between day and time with false discovery rate-adjusted p values of 0.03 and <0.01, respectively. S1P, SA1P and sphingosine shared similar trends over time: high relative levels in the morning of a non-welding day declining by afternoon, but with lower starting levels on a welding day and no decline. There was no obvious pattern related to current smoking status. **Conclusion:** S1P and SA1P profiles were different between welding day and classroom day. The S1P pathway was disrupted on the day of welding exposure. The levels of S1P, SA1P and sphingosine were highly correlated over time. S1P is a signalling lipid with many vital roles; thus, the underlying mechanism and clinical implications of this alteration need further investigation.
Gao et al. 2021.
Occupational and Environmental Medicine, vol. 78, no. 4.

Keywords: PM10-PM2.5-ultrafine; toxicology; welding.
Evidence Level: 5A
Link: https://oem.bmj.com/content/78/4/255.long

Lung cancer risk in painters: results from the SYNERGY pooled case-control study consortium
Objectives: We evaluated the risk of lung cancer associated with ever working as a painter, duration of employment and type of painter by histological subtype as well as joint effects with smoking, within the SYNERGY project. **Methods:** Data were pooled from 16 participating case-control studies conducted internationally. Detailed individual occupational and smoking histories were available for 19 369 lung cancer cases (684 ever employed as painters) and 23 674 age-matched and sex-matched controls (532 painters). Multivariable unconditional logistic regression models were adjusted for age, sex, centre, cigarette pack-years, time-since-smoking cessation and lifetime work in other jobs that entailed exposure to lung carcinogens. **Results:** Ever having worked as a painter was associated with an increased risk of lung cancer in men (OR 1.30; 95% CI 1.13 to 1.50). The association was strongest for construction and repair painters and the risk was elevated for all histological subtypes, although more evident for small cell and squamous cell lung cancer than for adenocarcinoma and large cell carcinoma. There was evidence of interaction on the additive scale between smoking and employment as a painter (relative excess risk due to interaction >0). **Conclusions:** Our results by type/industry of painter may aid future identification of causative agents or exposure scenarios to develop evidence-based practices for reducing harmful exposures in painters.
Guha et al. 2021.
Occupational and Environmental Medicine, vol. 78, no. 4.

Keywords: Cancer; epidemiology; painters; smoking.
Evidence Level: 4A
Link: https://oem.bmj.com/content/78/4/269.long

Asbestosis and Mesothelioma

Occupational and environmental asbestos exposure and the risk of lung cancer in Korea: A case-control study in South Chungcheong Province of Korea

Despite the use of large amounts of asbestos in the 1990s, few studies have been conducted in Korea on occupational and environmental asbestos exposure and lung cancer risk. The main aim of this study was to estimate the risk of lung cancer development caused by occupational and environmental asbestos exposures in residents of South Chungcheong Province, where about half of the asbestos mines in Korea operated. We conducted a case-control study, for which the information on asbestos exposure history and demographic characteristics was provided by the Environmental Health Center for asbestos of Soonchunhyang University Cheonan Hospital. After adjusting for all covariates, the odds ratios for lung cancer tended to increase with higher exposure probability for both occupational as well as environmental asbestos. The relative risk of occupational asbestos exposure was higher than that of environmental exposure; the interaction of co-exposure was not statistically significant. The estimated means of the latency period were significantly shorter in participants who were engaged in the production of asbestos-containing products and in those who lived near asbestos industries as compared to other groups.

Huh et al. 2021.
PLoS One, vol. 16, no. 4.

Keywords: Occupational; environmental; asbestos exposure; risk; lung cancer.
Evidence Level: 4B
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249790

Occupational asbestos exposure and kidney Cancer: Systematic review and meta-analysis of cohort studies

Objectives: An estimated 125 million workers are exposed to asbestos worldwide. Asbestos is classified by the International Agency for Research on Cancer as a Group 1 carcinogen. The association between occupational asbestos exposure and kidney cancer is not well established however. This study aimed to determine the mortality and incidence of kidney cancer in workers who have been exposed to asbestos. We performed a systematic review and meta-analysis to evaluate the association between occupational asbestos exposure and kidney cancer. **Methods:** Medline, EMBASE, and Web of Science were searched according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for articles on occupational asbestos exposure and kidney cancer. The studies reported the standardized mortality ratio (SMR) or standardized incidence ratio (SIR) of kidney cancer in workers exposed to asbestos. SMRs or SIRs with its 95% confidence interval (CI) were pooled using a fixed-effect model. **Results:** Forty-nine cohort studies involving 335 492 workers were selected for analysis. These studies included 468 kidney cancer deaths and 160 incident cases. The overall pooled-SMR of kidney cancer was 0.95 (95% CI: 0.86-1.05), with no significant heterogeneity (PQ = 0.09, I2 = 24.87%). The overall pooled-SIR of kidney cancer was 0.95 (95% CI: 0.79-1.11), with no significant heterogeneity (PQ = 0.68, I2 = 0.00%). Subgroup analysis did not find any increased association with occupational asbestos exposure. There was no evidence of publication bias with Egger's test P values of 0.08 for mortality studies and 0.99 for incidence studies. **Conclusions:** This systematic review and meta-analysis did not show evidence of association between occupational asbestos exposure and kidney cancer mortality or incidence.

Pang et al. 2021.
Annals of Work Exposures and Health, vol. 65, no. 3.

Keywords: Asbestos; kidney cancer; meta-analysis; occupational exposure; systematic review.
Evidence Level: 1A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8062011/

Sedentary Practices

Health, lifestyle and occupational risks in Information technology workers
Background: The Information technology (IT) workforce are rapidly expanding with potential occupational health implications. This study evaluated self-reported health, lifestyle and occupational risk factors for 10 931 IT workers compared to other workers in the UK. The study found that IT workers reported similar overall health, but lower lifestyle risk factors for smoking and obesity, had higher rates of sedentary work and were more likely to engage in computer screen-time outside work than all other employed participants. Conclusion: When designing workplace interventions for IT workers health, understanding risk factors can help inform to mitigate risk, improve health and increase work participation
Lalloo et al. 2021.
Occupational Medicine, vol. 71, no. 2.
Keywords: Behaviours; UK Biobank; computer professionals; information technology; lifestyle; occupational health.
Evidence Level: 5A
Link: https://academic.oup.com/occmed/article/71/2/68/6124582

Physical Activity

A 10-week judo-based exercise programme improves physical functions such as balance, strength and falling techniques in working age adults
Background: Falls and fall-related injuries are major threats not only for older adults but also for younger age groups such as working-age adults. It has been shown that it is possible to reduce the risk of falls and fall-related injuries, to some extent. However, interventions aiming at reducing both the risk of falls and mitigating fall-related injuries through teaching safe falling techniques are still sparsely investigated. The aim with this study was to investigate the effect of a 10-week workplace-based judo inspired exercise programme (Judo4Balance). The measures in the study include physical functions, fall-related self-efficacy and safe falling techniques. **Methods:** A total of 142 working-age adults participated in this non-randomised controlled study. The participants were allocated to the Judo4Balance group (n = 79), or to a waiting list control group (n = 63). The mean age was 47 years (18-68). The recruitment period was from May 2018 to October 2019. A total of 128 participants were included in the analysis. Logistic Regression models were used to analyse the outcomes: physical function, balance and fall-related self-efficacy as well as falling techniques (backwards and forwards). **Results:** At the 10-week follow-up, the results displayed significant differences between the two groups in all measurements, except for the fall-related self-efficacy with OR = 1.8. Techniques for falling forwards and backwards displayed the highest OR = 124.1 and OR = 98.9. Physical function and balance showed OR = 3.3 and OR = 6.4. **Conclusions:** This exercise programme under study displayed significant differences in strength, balance and safe falling techniques between the groups. It is suggested that these functions, which were studied here, can effectively be trained in working-age adults by using the Judo4Balace exercise programme. Thus, it may be beneficial to further investigate and include training in proper falling techniques when designing fall prevention exercise programmes. Furthermore, it may be a novel way of addressing fall-related injuries, which are of utmost importance to prevent in near future.
Arkkukangas et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Fall accidents; fall prevention; Judo; physical exercises; workplace.

Evidence Level: 3A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10775-z

Combining web-based gamification and physical nudges with an app (MoveMore) to promote walking breaks and reduce sedentary behavior of office workers: field study
Background: Sedentary behavior (SB) and lack of physical activity (PA) have been associated with poorer health outcomes and are increasingly prevalent in individuals working in sedentary occupations such as office jobs. Gamification and nudges have attracted attention as promising strategies to promote changes in health behavior. However, most effectiveness studies thus far lacked active controls, and few studies have tested interventions combining these strategies. **Objective**: This study investigates the effectiveness of combining a gamified digital app with physical nudges to increase PA and reduce SB in Dutch office workers. **Methods**: Employees in the municipality of Rotterdam (N=298) from two office locations were randomized at the location level to either a 10-week intervention, combining a 5-week gamification phase encompassing a gamified digital app with social support features and a 5-week physical nudges phase, or to an active control (ie, basic digital app with self-monitoring and goal setting). The primary outcome was the daily step count, objectively measured via accelerometers. Secondary outcomes were self-reported PA and SB measured at baseline and at 5, 10, and 14 weeks. Mixed effects models were used to analyze the effects of the intervention on the outcome measures. **Results**: A total of 78.5% (234/298) of participants completed the study and provided accelerometer data, whereas 36.9% (110/298) participants completed the self-report measures at 14 weeks. In the gamification phase, step count data were missing for 13.5% (473/3492) of observations in the control and 11.4% (445/3888) in the intervention condition; however, these percentages increased to 39.6% (1154/2910) and 59.6% (1932/3492) at follow-up, respectively. During the gamification phase, intervention participants increased their number of daily steps by 634 (95% CI 154.2-1113.8; P=.01) more than participants in the control group, after controlling for relevant factors. Improvements were not sustained during the physical nudges phase (P=.76) or follow-up (P=.88). **Conclusions**: A digital intervention with gamification and social support features significantly increased the step count of office workers compared with an active control. Physical nudges in the workplace were insufficient to promote the maintenance of behavioral changes achieved in the gamification phase. Future research should explore the long-term effectiveness of similar gamified digital interventions.
Mamede et al. 2021.
Journal of Medical Internet Research, vol. 23, no. 4.

Keywords: eHealth; internet; lifestyle; mHealth; mobile phone; multilevel analysis; obesity; physical exercise; social network.
Evidence Level: 3A
Link: https://www.jmir.org/2021/4/e19875/

Musculoskeletal Health

Factors associated with musculoskeletal symptoms in professionals working in sitting position
Objective: To estimate the prevalence of musculoskeletal symptoms and analyze their associated factors in professionals from administrative sectors working predominantly in sitting position. **Methods:** This is a cross-sectional study with data obtained from 451 workers from a federal public institution in Southern Brazil. The dependent variable was the number of musculoskeletal symptoms in the prior 12 months, measured using the Nordic Musculoskeletal Questionnaire. In the analyses, 19 independent variables were investigated, divided into four categories: sociodemographic, behavioral, occupational and health characteristics. Univariate analysis and multiple Poisson regression with robust variance were performed. The independent variables were inserted into blocks with stepwise backward criterion, considering the value for Wald statistics equal to 0.20. The effect measures were expressed in a relative increase (RI) in the mean value, and the data were analyzed for a 5% significance level. **Results:** The estimated prevalence of musculoskeletal symptoms in the prior 12 months was 90% (confidence interval - 95%CI 87-93). In the final model of regression analysis, the variables female gender (RI = 14.75%), low (RI = 100.02%) and moderate

(RI = 64.06%) work ability index, use of medications (RI = 48.06%) and waist circumference at risk (RI = 15.59%) had a significant association with the increase in the mean number of symptoms; schooling with technical education acted as a protective factor, reducing the mean by 36.46%. **Conclusions:** The high prevalence of musculoskeletal symptoms found and the associated factors indicate the need to propose specific actions and care for this population, such as immediate treatment of symptoms and changes in the organization and work environment, to achieve balance and harmony in the demands of prolonged sitting work and avoid its impact effect of this condition on public health.
Lopes et al. 2021.
Revista de Saúde Pública

Keywords: Musculoskeletal; sitting; administration.
Evidence Level: 4B
Link: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102021000100200&lng=en&nrm=iso&tlng=en

Prevalence of musculoskeletal pain and associated disability among professional bus drivers: a cross-sectional study
Purpose: Professional bus drivers risk developing musculoskeletal pain (MSP) and disability due to their working condition. The current study investigates the prevalence rate of MSP and disability among professional bus drivers. **Methods:** A cross-sectional study was conducted among 83 professional bus drivers. The prevalence rate of MSP was evaluated using a standardized Nordic musculoskeletal questionnaire. The disabilities due to the MSP were evaluated using neck disability index (NDI), Oswestry disability index (ODI) and shoulder pain and disability index (SPADI) tools. Prevalence of MSP was presented with 95% of confidence interval (CI) at an alpha level of 0.05. The 12 months and 7 days prevalence of MSP were tabulated for analysing the trend of MSP between the upper and lower body regions. **Results:** The drivers had a mean driving experience of 10.07 ± 7.26 years. The mean driving hours/week were 50.25 ± 12.82 h. Neck and back were the most affected regions with a prevalence rate of 81.9% (N = 68) and 80.7% (N = 67) at 12 months. Back region recorded the highest 7 days prevalence rate for MSP with 53% (N = 44). Approximately one fourth of the bus drivers population (23.9%, N = 16) had moderate disability in back region. More than half with MSP in the neck region presented mild disability (54.4%, N = 37).
Conclusion: The bus drivers reported a high prevalence rate of MSP in the neck, back and shoulder regions with mild to moderate disabilities. Appropriate health care and rehabilitation programs are necessary for the prevention and management of MSP among the bus drivers.
Kasemsan al. 2021.
International Archives of Occupational and Environmental Health

Keywords: Musculoskeletal pain; disability; bus drivers; working conditions.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-021-01683-1

Workers' compensation claim rates and costs for musculoskeletal disorders related to overexertion among construction workers - Ohio, 2007-2017
Overexertion is a leading cause of work-related musculoskeletal disorders (WMSDs) among construction workers. Nearly 90% of construction jobs require manual handling of materials for approximately one half of the worker's time (1). In 2015, overexertion from lifting and lowering materials caused 30% of WMSDs among construction workers; overexertion involving pushing, pulling, holding, carrying, and catching materials caused an additional 37% of WMSDs (1). This study examined the rate and cost of WMSD claims from overexertion among Ohio construction workers during 2007-2017. Workers' compensation claims related to overexertion that were submitted to the Ohio Bureau of Worker's Compensation (OHBWC) by workers in the construction industry for injuries and illnesses occurring during 2007-2017 were analyzed. Rates and costs of allowed claims were measured by age group. Workers aged 35-44 years experienced the highest claim rate: 63 per 10,000 full-time employees (FTEs) for WMSDs from overexertion. However, claims by workers aged 45-54 years and 55-64 years were more costly on average and resulted in more

days away from work. Ergonomic design improvements and interventions are needed to ensure that the majority of construction workers can safely perform jobs throughout their careers. Age-specific WMSD prevention and risk communication efforts also might be helpful.
Kaur et al. 2021.
The Morbidity and Mortality Weekly Report, vol. 70, no. 16.
Keywords: Workers compensation; musculoskeletal disorders; overexertion; construction workers
Evidence Level: 5B
Link: https://www.cdc.gov/mmwr/volumes/70/wr/mm7016a1.htm?s_cid=mm7016a1_w

COVID 19

Adapting to the Future of Work

Should homes and workplaces purchase portable air filters to reduce the transmission of SARS-CoV-2 and other respiratory infections? A systematic review
Respiratory infections, including SARS-CoV-2, are spread via inhalation or ingestion of airborne pathogens. Airborne transmission is difficult to control, particularly indoors. Manufacturers of high efficiency particulate air (HEPA) filters claim they remove almost all small particles including airborne bacteria and viruses. This study investigates whether modern portable, commercially available air filters reduce the incidence of respiratory infections and/or remove bacteria and viruses from indoor air. We systematically searched Medline, Embase and Cochrane for studies published between January 2000 and September 2020. Studies were eligible for inclusion if they included a portable, commercially available air filter in any indoor setting including care homes, schools or healthcare settings, investigating either associations with incidence of respiratory infections or removal and/or capture of aerosolised bacteria and viruses from the air within the filters. Dual data screening and extraction with narrative synthesis. No studies were found investigating the effects of air filters on the incidence of respiratory infections. Two studies investigated bacterial capture within filters and bacterial load in indoor air. One reported higher numbers of viable bacteria in the HEPA filter than in floor dust samples. The other reported HEPA filtration combined with ultraviolet light reduced bacterial load in the air by 41% (sampling time not reported). Neither paper investigated effects on viruses. There is an important absence of evidence regarding the effectiveness of a potentially cost-efficient intervention for indoor transmission of respiratory infections, including SARS-CoV-2. Two studies provide 'proof of principle' that air filters can capture airborne bacteria in an indoor setting. Randomised controlled trials are urgently needed to investigate effects of portable HEPA filters on incidence of respiratory infections.
Hammond et al. 2021.
PLoS One, vol. 16, no. 4.
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Keywords: Homes; workplaces; portable air filters; reduce transmission; SARS-CoV-2; respiratory infections.
Evidence Level: 1A
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0251049

Workload, techno overload, and behavioral stress during COVID-19 emergency: the role of job crafting in remote workers
The radical changes deriving from the COVID-19 emergency have heavily upset some of the most familiar routines of daily work life. Abruptly, many workers have been forced to face the difficulties that come with switching to remote working. Basing on the theoretical framework proposed by the Job Demands-Resources model, the purpose of this paper was to explore the effect of work overload (workload and techno overload), on behavioral stress, meant as an outcome linked to the health impairment process. Furthermore, the aim of the study was to explore the mediating role of job crafting, considered as a second-order construct consisting of two dimensions (increasing structural resources and increasing challenging demands) in the abovementioned relation. Participants were 530 workers experiencing remote working or work-from-home during the first COVID-19 lockdown in Italy (March-May 2020). Hypotheses

were explored by using three different latent variables, measured reflexively through indicators on a 5-point scale, extracted from validated questionnaires. Data analysis was performed through Structural Equation Modeling; to test the mediation, bootstrap validation was computed (n = 2,000). Results showed that the mediation of job crafting was partial. More specifically, the direct effect between work overload and behavioral stress was positive; moreover, the indirect, negative effect through the mediation of job crafting was also significant. Therefore, results showed that job crafting can play a crucial role as a protective factor supporting the activation and adjustment of suitable resources; these resources can be useful to deal with the negative effects of work overload, particularly under the condition of heavy remote working and use of technologies, on individual outcomes. Starting from the current global scenario of the pandemic that has not yet ceased its effects, the study suggested decisive theoretical and practical implications. Accordingly, findings extended the current trends in occupational health psychology research, with special reference to the mainstream topic "work and COVID-19" in the Italian context. Finally, results can give suggestions to companies engaged in managing change, recommending that they build a collaborative workplace at the individual and collective level to implement job crafting interventions and enrich the personal and organizational resources of workers, which is useful cope with the current demands.
Ingusci et al. 2021.
Frontiers in Psychology.

Keywords: COVID-19; behavioral stress; job crafting; job demands-resources model; remote working; techno-overload.
Evidence Level: 6B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8072041/

Guiding and Supporting Mental Health and Wellbeing

Covid-19 shelter-at-home and work, lifestyle and well-being in desk workers
COVID-19 pandemic and associated restrictions may affect wellbeing of the general population. This study explored the impact of COVID-19 on work practices, lifestyle and well-being among 112 desk workers during shelter-at-home restrictions. Negative effects included an increase in non-workday sedentary behaviour, worsening of sleep quality, increase in mood disturbance; reductions in quality of life, decrease in work-related health ($P < 0.05$). The authors concluded that employers should support healthy lifestyle and well-being among desk workers during pandemic-related social restrictions.
Gibbs et al. 2021.
Occupational Medicine, vol. 71, no. 2.
Keywords: Diet; mood; pandemic; physical activity; sedentary behaviour; sleep; work-related health.
Evidence Level: 4A
Link: https://academic.oup.com/occmed/article/71/2/86/6142944

Workplace interventions in response to COVID-19: an occupational health psychology perspective
COVID-19 has imposed significant threats to individuals' physical health and has altered the nature of our work and life. This paper takes an occupational health psychology (OHP) perspective to propose a framework of important areas for organizations to intervene in order to better protect workers' physical health and safety and to promote workers' psychological well-being.
Chang et al. 2021.
Occupational Health Science.
Keywords: COVID-19; intervention; occupational health psychology; prevention model; total worker health.
Evidence Level: 6A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8021486/

History for some or lesson for all? A systematic review and meta-analysis on the immediate and long-term mental health impact of the 2002-2003 Severe Acute Respiratory Syndrome (SARS) outbreak

Background: The aims of this systematic review and meta-analysis are to examine the prevalence of adverse mental health outcomes, both short-term and long-term, among SARS patients, healthcare workers and the general public of SARS-affected regions, and to examine the protective and risk factors associated with these mental health outcomes. **Methods:** We conducted a systematic search of the literature using databases such as Medline, Pubmed, Embase, PsycInfo, Web of Science Core Collection, CNKI, the National Central Library Online Catalog and dissertation databases to identify studies in the English or Chinese language published between January 2003 to May 2020 which reported psychological distress and mental health morbidities among SARS patients, healthcare workers, and the general public in regions with major SARS outbreaks. **Results:** The literature search yielded 6984 titles. Screening resulted in 80 papers for the review, 35 of which were included in the meta-analysis. The prevalence of post-recovery probable or clinician-diagnosed anxiety disorder, depressive disorder, and post-traumatic stress disorder (PTSD) among SARS survivors were 19, 20 and 28%, respectively. The prevalence of these outcomes among studies conducted within and beyond 6 months post-discharge was not significantly different. Certain aspects of mental health-related quality of life measures among SARS survivors remained impaired beyond 6 months post-discharge. The prevalence of probable depressive disorder and PTSD among healthcare workers post-SARS were 12 and 11%, respectively. The general public had increased anxiety levels during SARS, but whether there was a clinically significant population-wide mental health impact remained inconclusive. Narrative synthesis revealed occupational exposure to SARS patients and perceived stigmatisation to be risk factors for adverse mental health outcomes among healthcare workers, although causality could not be determined due to the limitations of the studies. **Conclusions:** The chronicity of psychiatric morbidities among SARS survivors should alert us to the potential long-term mental health complications of covid-19 patients. Healthcare workers working in high-risk venues should be given adequate mental health support. Stigmatisation against patients and healthcare workers should be explored and addressed. The significant risk of bias and high degree of heterogeneity among included studies limited the certainty of the body of evidence of the review.
Chau et al. 2021.
BMC Public Health, vol. 21, no. 1.

Keywords: Covid-19; healthcare workers; infectious disease; mental health; post-traumatic stress disorder; SARS.
Evidence Level: 1A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10701-3

Enabling Healthy and Safe Workplaces

A technical review of face mask wearing in preventing respiratory COVID-19 transmission
Since the outbreak of the COVID-19 pandemic, most countries have recommended their citizens to adopt social distance, hand hygiene, and face mask wearing. However, wearing face masks has not been well adopted by many citizens. While the reasons are complex, there is a general perception that the evidence to support face mask wearing is lacking, especially for the general public in a community setting. Face mask wearing can block or filter airborne virus-carrying particles through the working of colloid and interface science. This paper assesses current knowledge behind the design and functioning of face masks by reviewing the selection of materials, mask specifications, relevant laboratory tests, and respiratory virus transmission trials, with an overview of future development of reusable masks for the general public. This review highlights the effectiveness of face mask wearing in the prevention of COVID-19 infection.
Liao et al. 2021.
Current Opinion in Colloid & Interface Science, vol. 52.

Keywords: Aerosols; airborne colloids; fabric; face masks; fibers; filtering; porous materials; viral particles.
Evidence Level: 6A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7902177/

COVID-19 among workers in the seafood processing industry: Implications for prevention measures - Alaska, March-October 2020

Large COVID-19 outbreaks have occurred in high-density workplaces, such as food processing facilities (1). Alaska's seafood processing industry attracts approximately 18,000 out-of-state workers annually (2). Many of the state's seafood processing facilities are located in remote areas with limited health care capacity. On March 23, 2020, the governor of Alaska issued a COVID-19 health mandate (HM10) to address health concerns related to the impending influx of workers amid the COVID-19 pandemic (3). HM10 required employers bringing critical infrastructure (essential) workers into Alaska to submit a Community Workforce Protective Plan.* On May 15, 2020, Appendix 1 was added to the mandate, which outlined specific requirements for seafood processors, to reduce the risk for transmission of SARS-CoV-2, the virus that causes COVID-19, in these high-density workplaces (4). These requirements included measures to prevent introduction of SARS-CoV-2 into the workplace, including testing of incoming workers and a 14-day entry quarantine before workers could enter nonquarantine residences. After 13 COVID-19 outbreaks in Alaska seafood processing facilities and on processing vessels during summer and early fall 2020, State of Alaska personnel and CDC field assignees reviewed the state's seafood processing-associated cases. Requirements were amended in November 2020 to address gaps in COVID-19 prevention. These revised requirements included restricting quarantine groups to ≤10 persons, pretransfer testing, and serial testing (5). Vaccination of this essential workforce is important (6); until high vaccination coverage rates are achieved, other mitigation strategies are needed in this high-risk setting. Updating industry guidance will be important as more information becomes available.

Porter et al. 2021.

Morbidity and Mortality Weekly Report, vol. 70, no. 17.

Keywords: COVID-19; prevention; seafood processing industry; outbreaks

Evidence Level: 4B

Link: https://www.cdc.gov/mmwr/volumes/70/wr/mm7017a4.htm?s_cid=mm7017a4_w

COVID-19 deaths by occupation, Massachusetts, March 1-July 31, 2020

Background: Exposure to COVID-19 is more likely among certain occupations compared with others. This descriptive study seeks to explore occupational differences in mortality due to COVID-19 among workers in Massachusetts. **Methods:** Death certificates of those who died from COVID-19 in Massachusetts between March 1 and July 31, 2020 were collected. Occupational information was coded and age-adjusted mortality rates were calculated according to occupation. **Results:** There were 555 deaths among MA residents of age 16-64, with usable occupation information, resulting in an age-adjusted mortality rate of 16.4 per 100,000 workers. Workers in 11 occupational groups including healthcare support and transportation and material moving had mortality rates higher than that for workers overall. Hispanic and Black workers had age-adjusted mortality rates more than four times higher than that for White workers overall and also had higher rates than Whites within high-risk occupation groups. **Conclusion:** Efforts should be made to protect workers in high-risk occupations identified in this report from COVID-19 exposure.

Hawkins et al. 2021.

American Journal of Industrial Medicine, vol. 64, no. 4.

Keywords: Covid-19; mortality; occupation.

Evidence Level: 5A

Link: https://onlinelibrary.wiley.com/doi/10.1002/ajim.23227

No evidence for an effect of working from home on neck pain and neck disability among Swiss office workers: Short-term impact of COVID-19

Purpose: The aim of this study was to investigate the effect of working from home on neck pain (NP) among office workers during the COVID-19 pandemic. **Methods:** Participants from two Swiss organisations, aged 18-65 years and working from home during the lockdown (n = 69) were included. Baseline data collected in January 2020 before the lockdown (office work) were compared with follow-up data in April

2020 during lockdown (working from home). The primary outcome of NP was assessed with a measure of intensity and disability. Secondary outcomes were quality of workstation ergonomics, number of work breaks, and time spent working at the computer. Two linear mixed effects models were fitted to the data to estimate the change in NP. **Results:** No clinically relevant change in the average NP intensity and neck disability was found between measurement time points. Each working hour at the computer increased NP intensity by 0.36 points (95% CI: 0.09 to 0.62) indicating strong evidence. No such effect was found for neck disability. Each work break taken reduced neck disability by 2.30 points (95% CI: - 4.18 to - 0.42, evidence). No such effect was found for NP intensity. There is very strong evidence that workstation ergonomics was poorer at home. **Conclusion:** The number of work breaks and hours spent at the computer seem to have a greater effect on NP than the place of work (office, at home), measurement time point (before COVID-19, during lockdown) or the workstation ergonomics. Further research should investigate the effect of social and psychological factors.

Aegerter et al. 2021.

European Spine Journal.

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Keywords: COVID-19; neck disability; neck pain; pandemic; working from home.

Evidence Level: 4B

Link: https://link.springer.com/article/10.1007/s00586-021-06829-w

COVID-19 as an occupational disease

The impact of coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 permeates all aspects of society worldwide. Initial medical reports and media coverage have increased awareness of the risk imposed on healthcare workers in particular, during this pandemic. However, the health implications of COVID-19 for the global workforce are multifaceted and complex, warranting careful reflection and consideration to mitigate the adverse effects on workers worldwide. Accordingly, our review offers a framework for considering this topic, highlighting key issues, with the aim to prompt and inform action, including research, to minimize the occupational hazards imposed by this ongoing challenge. We address respiratory disease as a primary concern, while recognizing the multisystem spectrum of COVID-19-related disease and how clinical aspects are interwoven with broader socioeconomic forces.

Carlsten et al. 2021.

American Journal of Industrial Medicine, vol. 64, no. 4.

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Keywords: COVID-19; occupational; respiratory disease.

Evidence Level: 6A

Link: https://onlinelibrary.wiley.com/doi/10.1002/ajim.23222

The low-wage essential worker: Occupational concerns and needs in the COVID-19 pandemic - A round table

Background: Planning occupational health and wellness services and support directed toward low-wage, essential workers in the COVID-19 pandemic has posed a number of challenges across work settings. This article explores the concerns and needs of low-wage essential workers as understood by experts in the field. **Methods:** Leading experts in the areas of occupational health and safety, risk management, insurance, and professional education/training were identified and invited to participate in a Round Table discussion. Questions posed to experts were based on literature that addressed COVID-19, essential workers, low-wage workers, infection transmission, education/training, and social justice. **Findings:** Experts agreed that special considerations must be in place to address the concerns and needs of the low-wage essential worker. These special considerations should address not only the worker's occupational experience but their family and home environment, fears and anxieties, and the economic impact of the COVID-19 restrictions and requirements. **Conclusion/application to practice:** The occupational health

professional is a key resource to employers charged with addressing the concerns and needs of low-wage, essential workers during the COVID-19 pandemic.
Gallagher et al. 2021.
Workplace Health Safety, vol. 69, no. 4.

Keywords: COVID-19; disease transmission; essential worker; low-wage worker; occupational health and safety; social justice; underserved.
Evidence Level: 6A
Link: https://journals.sagepub.com/doi/full/10.1177/2165079920988682

Shift work is associated with positive COVID-19 status in hospitalised patients
Introduction: Shift work is associated with lung disease and infections. We therefore investigated the impact of shift work on significant COVID-19 illness. **Methods:** 501 000 UK Biobank participants were linked to secondary care SARS-CoV-2 PCR results from Public Health England. Healthcare worker occupational testing and those without an occupational history were excluded from analysis. **Results:** Multivariate logistic regression (age, sex, ethnicity and deprivation index) revealed that irregular shift work (OR 2.42, 95% CI 1.92 to 3.05), permanent shift work (OR 2.5, 95% CI 1.95 to 3.19), day shift work (OR 2.01, 95% CI 1.55 to 2.6), irregular night shift work (OR 3.04, 95% CI 2.37 to 3.9) and permanent night shift work (OR 2.49, 95% CI 1.67 to 3.7) were all associated with positive COVID-19 tests compared with participants that did not perform shift work. This relationship persisted after adding sleep duration, chronotype, premorbid disease, body mass index, alcohol and smoking to the model. The effects of workplace were controlled for in three ways: (1) by adding in work factors (proximity to a colleague combined with estimated disease exposure) to the multivariate model or (2) comparing participants within each job sector (non-essential, essential and healthcare) and (3) comparing shift work and non-shift working colleagues. In all cases, shift work was significantly associated with COVID-19. In 2017, 120 307 UK Biobank participants had their occupational history reprofiled. Using this updated occupational data shift work remained associated with COVID-19 (OR 4.48 (95% CI 1.8 to 11.18). **Conclusions:** Shift work is associated with a higher likelihood of in-hospital COVID-19 positivity. This risk could potentially be mitigated via additional workplace precautions or vaccination.
Maidstone et al. 2021.
Thorax

Keywords: COVID-19; infection control; occupational lung disease; respiratory infection; viral infection.
Evidence Level: 5B
Link: https://thorax.bmj.com/content/early/2021/03/30/thoraxjnl-2020-216651.long