Australian Government
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Emerging Evidence Alert January 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. As the COVID-19 pandemic continues and the evidence base grows, the Emerging Evidence Alert now includes an expanded section highlighting the latest research relating to the impact of COVID-19 on workers and workplaces. Collated articles were published in November and December 2020 only.

Contents

Sedentary behaviours linked to COVID-19

For many Australian workers and employers, COVID-19 paved the way for increased remote work, flexible working and working from home. While there are some benefits, including the possibility for greater work-life balance and more time to spend with family, there is a risk of increased sedentary behaviours such as more sitting and increased screen time.

In a new US study, a survey of 2,303 adults explored the link between changes in employment during the pandemic and such sedentary behaviours. All participants were in employment prior to the pandemic and were either working from home (54%), had lost their job (13%) or their employment remained unchanged (34%).

The data found changes in employment were associated with greater sitting and screen time when compared to those whose employment remained unchanged. The research highlighted the importance of employers supporting physical health and wellbeing as workers transition to new working arrangements, especially if these working arrangements continue in the future.

Sedentary behaviour is also the focus of other articles in this edition, including evidence behind the WHO's new global guidelines on sedentary behaviour and health for adults; Sedentary lifestyle: overview of updated evidence; and Rise and recharge: Effects on activity outcomes of an e-health smartphone intervention.

For more information: Comcare is supporting a national trial of evidence-based program BeUpstanding that encourages workers to sit less and move more using an online toolkit. This free resource is a good starting point for employers in addressing sedentary behaviours of desk-based workers.

Latest COVID-19 research and guidance

In this edition, you will find emerging COVID-19 research exploring remote working, sedentary behaviours, mental health, protective measures and managing occupational heat stress in the healthcare and industrial sectors.

The research on remote working includes a study of Chinese workers that explores key challenges facing workers in the early days of the pandemic, including work-home interference, ineffective communication, procrastination, and loneliness. It also found that some characteristics of remote working, including social support, job autonomy, workload, and monitoring by managers, were important factors for workers in managing these challenges.

For more guidance and the latest work health and safety information on COVID-19, visit the Comcare website.

For industry specific COVID-19 information, visit the Safe Work Australia website.

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

Do work- and home-related demands and resources differ between women and men during return-to-work? A focus group study among employees with common mental disorders

Background: Common mental disorders present the main reason for registered sick leave in Sweden today, and women are at a higher risk of such sick leave than men. The aim of our study was to explore how the experiences of work- and home-related demands as well as resources influence return-to-work among employees sick-listed for common mental disorders in Sweden. Specifically, we aimed to explore similarities and differences in patterns of experiences among women and men. **Methods:** A qualitative design with semi-structured focus group interviews was applied. One pilot interview and six additional focus groups, with a total of 28 participants, were conducted. The focus group discussions were audiotaped and transcribed verbatim. Data was analyzed with conventional content analysis. **Results:** The analysis resulted in four main categories and eight sub-categories. While the study aim was to explore aspects of work and home, additional considerations related to internal demands and involved actors were also found. The main and sub-categories were "Home-related demands and resources" (sub-categories: "Not on sick leave for home-related demands", "Feeling responsible for relationships and the well-being of others", "An affected economy" and "Finding energizing activities and creating routines"), "Work-related demands and resources" (sub-categories: "Encountering tough emotions and an over-bearing feeling of responsibility at work", "Continued work-related demands create un-certainty about the future", "Loss of boundaries" and "(Desired) support from managers and colleagues"), "Internal demands and resources" and "Demands and resources linked to involved actors". The experiences described among women and men were similar in some categories while patterns of experiences differed in others. **Conclusions:** Home-related demands and resources influence return-to-work among women and men sick-listed for common mental disorders in Sweden, also when work-related demands are experienced as the main reason for the sick leave period. Furthermore, several of these aspects were described differently among women and men, which highlights the need to consider possible gender differences in relation to return-to-work, while maintaining attention to individual variations.

Nybergh et al. 2020.
BMC Public Health, vol. 20, no. 1.

Keywords: Common mental disorders; focus group; gender; home-related demands; qualitative study; return-to-work; Sweden; work-related demands.
Evidence Level: 5B
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-10045-4

The predictive value of return to work self-efficacy for return to work among employees with cancer undergoing chemotherapy

Purpose The aim of the present study was to examine the predictive value of Return to Work Self-efficacy (RTWSE) on Return to Work (RTW) among employees undergoing chemotherapy for cancer and to examine the relative contribution of RTWSE as predictor variable compared to personal, health-related, illness- and treatment-related and work-related factors. **Methods** A sample of 114 sickness absent employees with various cancers (age 18-62) included in the study on average 33 days after initiating chemotherapy were followed for 15 months. Data sources included patient questionnaires (RTWSE, depression, fatigue, performance status), sociodemographic factors (age, sex, job type, and perceived support from the workplace), patient records (type of cancer, treatment intention, number of treatment modalities, time since diagnosis and time since initiation of chemotherapy), and Danish national registries (RTW and education). Associations between RTWSE at baseline and weeks until full RTW during 15-months follow-up were analyzed using Cox proportional hazards regression. Results In the univariate analysis, high RTWSE was associated with shorter time to RTW (Hazard Ratio (HR) 1.84, 95% confidence interval (CI) 1.12-3.03). In the multivariate model, RTWSE failed to reach statistical significance (HR 1.12, 95% CI 0.62-2.02), whereas female sex (HR 0.30, 95% CI 0.15-0.60) and receiving palliative treatment (HR 0.15, 95% CI 0.05-

0.44) were significantly associated with later RTW. **Conclusion** Compared to other factors of significance, RTWSE was not the strongest predictor of RTW when examined among employees undergoing chemotherapy for cancer. Before using the RTWSE questionnaire to identify employees with cancer at risk of late RTW, it is important to recognize that the predictive value of RTWSE may be different for employees on sick leave due to cancer than for other sickness absence populations.
Rosbjerg et al. 2020.
Journal of Occupational Rehabilitation, vol. 30, no. 4.

Keywords: Cancer; prediction; return to work; self-efficacy; work ability.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs10926-020-09882-2

Employment/Unemployment

Differences in the impact of precarious employment on health across population subgroups: a scoping review
Aim: Precarious employment is known to be detrimental to health, and some population subgroups (young individuals, migrant workers, and females) are at higher risk of precarious employment. However, it is not known if the risk to poor health outcomes is consistent across population subgroups. This scoping review explores differential impacts of precarious employment on health. **Methods:** Relevant studies published between 2009 and February 2019 were identified across PubMed, OVID Medline, PsycINFO, and Scopus. Articles were included if (1) they presented original data, (2) examined precarious employment within one of the subpopulations of interest, and (3) examined health outcomes. **Results:** Searches yielded 279 unique results, of which 14 met the eligibility criteria. Of the included studies, 12 studies examined differences between gender, 3 examined the health impacts on young individuals, and 3 examined the health of migrant workers. Mental health was explored in nine studies, general health in four studies, and mortality in two studies. **Conclusion:** Mental health was generally poorer in both male and female employees as a result of precarious employment, and males were also at higher risk of mortality. There was limited evidence that met our inclusion criteria, examining the health impacts on young individuals or migrant workers.
Gray et al. 2020.
Perspectives of Public Health, vol. 141, no. 1.

Keywords: Employment; inequalities; precarious; review; wider determinants.
Evidence Level: 6A
Link: https://journals.sagepub.com/doi/full/10.1177/1757913920971333

Work changes and individual, cancer-related, and work-related predictors of decreased work participation among African American cancer survivors
African American cancer survivors disproportionately experience financial difficulties after cancer. Decreased work participation (going from being employed full time to part time or from employed to not employed) can contribute to financial hardship after cancer but employment outcomes among African American cancer survivors have not been well described. This study estimates the prevalence of work changes and identifies factors associated with decreased work participation among African American cancer survivors. We analyzed data from 916 African American breast, colorectal, lung, and prostate cancer survivors who participated in the Detroit Research on Cancer Survivors (ROCS) cohort and were employed before their cancer diagnosis. Modified Poisson models estimated prevalence ratios of decreased work participation and work changes, including changes to hours, duties, or schedules, between diagnosis and ROCS enrollment controlling for sociodemographic and cancer-related factors. Nearly half of employed survivors made changes to their schedules, duties, or hours worked due to cancer and 34.6% took at least one month off of work, including 18% who took at least one month of unpaid time off. More survivors employed full time (vs. part time) at diagnosis were on disability at ROCS enrollment (18.7% vs. 12.6%, P <

0.001), while fewer were unemployed (5.9% vs. 15.7%, P < 0.001). Nearly half (47.5%) of employed survivors decreased work participation. Taking paid time off was not associated with decreased work participation; however, taking unpaid time off and making work changes were associated with prevalence ratios of decreased work participation of 1.29 (95% CI: 1.03, 1.62) and 1.37 (95% CI: 1.07, 1.75), respectively. Employment disruptions are common after a cancer diagnosis. Survivors who take unpaid time off and make other work changes may be particularly vulnerable to experiencing decreased work participation.

Hastert et al. 2020.

Cancer Medicine, vol. 9, no. 23.

Keywords: African American; cancer survivors; employment.

Evidence Level: 5B

Link: https://onlinelibrary.wiley.com/doi/10.1002/cam4.3512

Presenteeism and Absenteeism

Workplace Stress, presenteeism, absenteeism, and resilience amongst university staff and students in the COVID-19 lockdown

Background: This study explored how the COVID-19 outbreak and arrangements such as remote working and furlough affect work or study stress levels and functioning in staff and students at the University of York, UK. **Methods:** An invitation to participate in an online survey was sent to all University of York staff and students in May-June 2020. We measured stress levels [VAS-scale, Perceived Stress Questionnaire (PSQ)], mental health [anxiety (GAD-7), depression (PHQ-9)], physical health (PHQ-15, chronic medical conditions checklist), presenteeism, and absenteeism levels (iPCQ). We explored demographic and other characteristics as factors which may contribute to resilience and vulnerability for the impact of COVID-19 on stress. **Results:** One thousand and fifty five staff and nine hundred and twenty five students completed the survey. Ninety-eight per cent of staff and seventy-eight per cent of students worked or studied remotely. 7% of staff and 10% of students reported sickness absence. 26% of staff and 40% of the students experienced presenteeism. 22-24% of staff reported clinical-level anxiety and depression scores, and 37.2 and 46.5% of students. Staff experienced high stress levels due to COVID-19 (66.2%, labeled vulnerable) and 33.8% experienced low stress levels (labeled resilient). Students were 71.7% resilient vs. 28.3% non-resilient. Predictors of vulnerability in staff were having children [OR = 2.23; CI (95) = 1.63-3.04] and social isolation [OR = 1.97; CI (95) = 1.39-2.79] and in students, being female [OR = 1.62; CI (95) = 1.14-2.28], having children [OR = 2.04; CI (95) = 1.11-3.72], and social isolation [OR = 1.78; CI (95) = 1.25-2.52]. Resilience was predicted by exercise in staff [OR = 0.83; CI (95) = 0.73-0.94] and in students [OR = 0.85; CI (95) = 0.75-0.97]. **Discussion:** University staff and students reported high psychological distress, presenteeism and absenteeism. However, 33.8% of staff and 71.7% of the students were resilient. Amongst others, female gender, having children, and having to self-isolate contributed to vulnerability. Exercise contributed to resilience. **Conclusion:** Resilience occurred much more often in students than in staff, although psychological distress was much higher in students. This suggests that predictors of resilience may differ from psychological distress *per se*. Hence, interventions to improve resilience should not only address psychological distress but may also address other factors.

Feltz-Cornelis et al. 2020.

Frontiers of Psychology, vol. 11.

Keywords: COVID-19; absenteeism; mental health; presenteeism; resilience; study stress; vulnerability; workplace stress.

Evidence Level: 5A

Link: https://www.frontiersin.org/articles/10.3389/fpsyt.2020.588803/full

Using qualitative methods for a conceptual analysis of measures of health status and presenteeism prior to a mapping study

Objectives: The inclusion of productivity in economic evaluations is a contentious issue. Methods are currently being developed to assess how it may feasibly be included for specific interventions, such as workplace interventions (WPIs), where productivity is a key outcome. Mapping (also called cross-walking or prediction modelling) may offer a solution. Prior to producing a mapping algorithm, it is recommended that the conceptual validity between 'source' and 'target' measures be understood first. This study aimed to understand the conceptual validity of two existing measures of health status (EQ-5D; SF-6D) and presenteeism to inform the potential for a subsequent mapping algorithm. **Methods:** A purposive sample of individuals who were currently working and had either rheumatoid arthritis (RA), ankylosing spondylitis (AS) or psoriatic arthritis (PsA). Individuals were recruited through support groups. Semi-structured telephone interviews were conducted until data saturation (no new emerging themes) was reached. Deductive and inductive framework analysis methods were used to identify key aspects of the conditions (themes) that impact on presenteeism (working at reduced levels of health). **Results:** Twenty-two (RA = 10; AS = 9; PsA = 3) employed individuals were interviewed. Deductive analysis identified evidence which confirmed the domains included in the EQ-5D and SF-6D capture those key aspects of RA, AS and PsA that increase presenteeism. Inductive analysis identified an additional theme; mental clarity, not captured by the EQ-5D or SF-6D, was also found to have a direct impact on presenteeism. **Conclusions:** The results of the study indicate conceptual validity of both health status measures to predict presenteeism. The next step is to develop a mapping algorithm for presenteeism.

Jones et al. 2020.

Quality of Life Research, vol.29, no.11.

Keywords: Autoimmune; conceptual validity; health status; health-related quality of life; mapping; prediction; presenteeism; qualitative.

Evidence Level: 5B

Link: https://link.springer.com/article/10.1007%2Fs11136-020-02570-x

Psychosocial determinants predicting long-term sickness absence: a register-based cohort study

Background: This study assessed the psychosocial determinants as explanatory variables for the length of the work disability period. The aim was to estimate the predictive value of a selected set of psychosocial determinants from the Quickscan questionnaire for the length of the sick leave period. A comparison was also made with the most common biomedical determinant: diagnosis. **Methods:** In a cohort study of 4 981 insured Belgian patients, the length of the sick leave was calculated using Kaplan-Meier. Predictive psychosocial determinants were selected using backward conditional selection in Cox regression and using concordance index values (C-index) we compared the predictive value of the biomedical to the psychosocial model in a sample subset. **Results:** Fourteen psychosocial determinants were significantly ($p<0.10$) related to the length of the sick leave: health perception of the patient, physical workload, social support management, social support colleagues, work-health interference, psychological distress, fear of colleagues' expectations, stressful life-events, autonomy, learning and development opportunities, job satisfaction, workload, work expectations and expectation to return to work. The C-index of this biopsychosocial model including gender, age and labour status was 0.80 (CI: 0.78; 0.81) (n=4 981). In the subset of 2 868 respondents with diagnostic information, the C-index for the same model was .73 (CI: 0.71; 0.76) compared with 0.63 (CI: 0.61; 0.65) for the biomedical model. **Conclusions:** A set of 14 psychosocial determinants showed good predictive capacity (C-index: 0.80). Also, in a subset of the sample, the selected determinants performed better compared with diagnostic information to predict long-term sick leave (>6 months).

Goorts et al. 2020.

Journal of Epidemiology and Community Health, vol.74, no.11.

Keywords: Disability; epidemiology; health services; public health.

Evidence Level: 4A

Link: https://jech.bmj.com/content/74/11/913.long

Estimating the potential reduction in future sickness absence from optimizing group-level psychosocial work characteristics: a prospective, multicenter cohort study in German industrial settings
Background: Absence from work due to sickness impairs organizational productivity and performance. Even in organizations with perfect work conditions, some inevitable baseline sickness absence exists amongst working populations. The excess sickness absence observed above this baseline rate has become the focus of traditional health promotion efforts, addressing preventable physical illness, health behavior and mental health at the personal level. However, a health and safety approach following the TOP-rule would consider work-group psychosocial work characteristics as a potential risk factor amenable to organizational measures. To date, there is a scarcity of studies relating psychosocial work characteristics to possible reduction of excess sickness-absence rates. **Methods:** We aimed to estimate the potentially avoidable excess fraction of absence attributable to work-group psychosocial characteristics. We considered work-group averaged perception of psychosocial work characteristics as a proxy to the methodologically elusive objective assessment of organizational characteristics. Participants were recruited from multiple sites of a German automotive manufacturer with individuals nested within work groups. We predicted 12-month follow-up work-group sickness absence rates using data from a baseline comprehensive health examination assessing work characteristics, health behavior, and biomedical risk factors. We considered the quartile of work-groups yielding favorable psychosocial work characteristics as a realistic existing benchmark. Using the population attributable fraction method we estimated the potentially amenable sickness absence from improving work-group psychosocial characteristics.
Results: Data from 3992 eligible participants from 29 work groups were analyzed (39% participation rate, average age 41.4 years (SD = 10.3 years), 89.9% males and 49% manual workers.). Work-group absence rates at follow up varied from 2.1 to 8.9% (mean 5.1%, 11.7 missed days). A prediction model of seven psychosocial work characteristics at the work group level explained 70% of the variance of future absence rates. The estimated reduction from improving psychosocial work characteristics to the benchmark level amounted to 32% of all sickness absence, compared to a 31% reduction from eliminating health behavioral and medical risk factors to the benchmark target. **Conclusions:** Psychosocial characteristics at the work-group level account for a relevant proportion of all sickness absence. Health promotion interventions should therefore address psychosocial characteristics at the work group level.
Fischer et al. 2020.
Journal of Occupational Medicine and Toxicology, vol. 15, no. 1.

Keywords: Cardiovascular risk; health behavior; multilevel cohort study; population attributable fraction; predictability; prospective study; psychosocial work characteristics; sickness absence.
Evidence Level: 4A
Link: https://occup-med.biomedcentral.com/articles/10.1186/s12995-020-00284-x

Building Employer Capability

Wellness Programs

Socio-economic inequalities in the effectiveness of workplace health promotion programmes on body mass index: An individual participant data meta-analysis
This individual participant data meta-analysis assessed the effectiveness of workplace health promotion programmes on body mass index (BMI) across socio-economic groups and whether study and intervention characteristics explained inequalities in effectiveness. Studies were eligible if they assessed the effect of a workplace health promotion programme on BMI in the Netherlands, included workers of at least two different socio-economic positions (SEPs) and had a study design with premeasurement and postmeasurement and control condition. Data of 13 studies presenting 16 interventions (5183 participants) were harmonized. In a two-stage meta-analysis, the interaction between intervention and SEP on BMI was tested with linear mixed models for each study. Subsequently, the interaction terms were pooled. The influence of study and intervention characteristics on the effectiveness of workplace health promotion programmes was evaluated using meta-regression analyses. Compared with control conditions, workplace health promotion programmes overall showed a statistically non-significant 0.12 kg/m^2 (95% CI: -0.01, 0.25)

decrease in BMI, which did not differ across SEP. Interventions evaluated within randomized controlled trials, agentic interventions, those that focused on high-risk groups, included a counselling component, consisted of more than five sessions, or were offered at the individual level did statistically significantly reduce BMI. No evidence was found for intervention-generated SEP inequalities.
Robroek et al. 2020.
Obesity Reviews, vol. 21, no.11.

Keywords: Inequity; obesity; socio-economic inequalities; workplace.
Evidence Level: 1A
Link: https://onlinelibrary.wiley.com/doi/10.1111/obr.13101

Effects of a participatory organisational, core work task focused workplace intervention on employees' primary healthcare consultations: secondary analysis of a cluster RCT
Objectives: We aimed to examine whether a participatory organisational workplace intervention focusing on core tasks at work resulted in lower primary healthcare utilisation of employees. **Methods:** The cluster randomised controlled trial included 78 preschools, 44 allocated to the intervention group (1745 employees) and 34 allocated to the control group (1267 employees). The intervention aimed to involve employees in improving the psychosocial work environment while focusing on core tasks at work. Using Poisson regression, we tested the rate ratios (RRs) of consultations in the intervention compared with the control group in terms of all consultations in primary healthcare and general practitioner (GP) consultations, respectively, per person-year during 31 months of follow-up. The fully adjusted model included adjustment for sex, age, job group, workplace type and size, and previous primary healthcare utilisation. **Results:** During the follow-up, intervention group employees had 11.0 consultations/person-year, while control group employees had 11.6 consultations/person-year (RR 0.97, 95% CI 0.92 to 1.01). Employees in the intervention group had 7.5 GP consultations/person-year, while control group employees had 8.2 GP consultations/person-year (RR 0.95, 95% CI 0.90 to 0.99). Post hoc analyses indicated that the effect of the intervention was particularly strong in employees in preschools with a moderate or high level of implementation. **Conclusions:** The participatory organisational workplace intervention focusing on core tasks at work among preschool employees had a small, statistically non-significant effect on overall primary healthcare utilisation and a small, statistically significant effect on GP consultations. These results suggest a beneficial effect of the participatory organisational intervention on employees' health.
Framke et al. 2020.
Occupational and Environmental Medicine, vol. 3.

Keywords: Primary health care; workplace intervention; employee; consultations
Evidence Level: 1B
Link: https://oem.bmj.com/content/early/2020/11/03/oemed-2020-106558

Eight-year health risks trend analysis of a comprehensive workplace health promotion program
Research has shown that workplace health promotion (WHP) efforts can positively affect employees' health risk accumulation. However, earlier literature has provided insights of health risk changes in the short-term. This prospective longitudinal quasi-experimental study investigated trends in health risks of a comprehensive, eight-year WHP program (n = 523-651). Health risk data were collected from health risk assessments in 2010-2011, 2013-2014, and 2016-2017, applying both a questionnaire and biometric screenings. Health risk changes were investigated for three different time-periods, 2010-2013, 2014-2017, and 2010-2017, using descriptive analyses, t-tests, and the Wilcoxon Signed Rank and McNemar's test, where appropriate. Overall health risk transitions were assessed according to low-, moderate-, and high-risk categories. Trend analyses observed 50-60% prevalence for low-, 30-35% for moderate-, and 9-11% high-risk levels across the eight years. In the overall health risk transitions of the three time-periods, 66-73% of participants stayed at the same risk level, 13-15% of participants improved, and 12-21% had deteriorated risk level across the three intervention periods. Our findings appear to indicate that the

multiyear WHP program was effective in maintaining low and moderate risk levels, but fell short of reducing the total number of health risks at the population level.
Aikas et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Effectiveness; health risks; implementation; program evaluation; risk management; workplace health promotion.
Evidence Level: 4A
Link: https://www.mdpi.com/1660-4601/17/24/9426

Changes in risk factors for non-communicable diseases associated with the 'Healthy choices at work' programme, South Africa
Background: Globally 71% of deaths are attributed to non-communicable diseases (NCD). The workplace is an opportune setting for health promotion programs and interventions that aim to prevent NCDs. However, much of the current evidence is from high-income countries. **Objective:** The aim of this study was to evaluate changes in NCD risk factors, associated with the Healthy Choices at Work programme (HCWP), at a commercial power plant in South Africa. **Methods:** This was a before-and-after study in a randomly selected sample of 156 employees at baseline and 137 employees at 2-years. The HCWP focused on food services, physical activity, health and wellness services and managerial support. Participants completed questionnaires on tobacco smoking, harmful alcohol use, fruit and vegetable intake, physical activity, psychosocial stress and history of NCDs. Clinical measures included blood pressure, total cholesterol, random blood glucose, body mass index, waist circumference and waist-to-hip ratio. The 10-year cardiovascular risk was calculated using a validated algorithm. Sample size calculations evaluated the power of the sample to detect meaningful changes in risk factors. **Results:** Paired data was obtained for 137 employees, the mean age was 42.7 years (SD 9.7) and 64% were male. The prevalence of sufficient fruit and vegetable intake increased from 27% to 64% ($p < 0.001$), those meeting physical activity guidelines increased from 44% to 65% ($p < 0.001$). Harmful alcohol use decreased from 21% to 5% ($p = 0.001$). There were clinical and statistically significant improvements in systolic and diastolic blood pressure (mean difference -10.2 mmHg (95%CI: -7.3 to -13.2); and -3.9 mmHg (95%CI: -1.8 to -5.8); $p < 0.001$) and total cholesterol (mean difference -0.45 mmol/l (-0.3 to -0.6)). There were no significant improvements in BMI. Psychosocial stress from relationships with colleagues, personal finances, and personal health improved significantly. The cardiovascular risk score decreased by 4.5% (> 0.05). **Conclusion:** The HCWP was associated with clinically significant reductions in behavioural, metabolic and psychosocial risk factors for NCDs.
Schouw et al. 2020.
Global Health Action, vol. 13, no. 1.

Keywords: Non-communicable diseases; cardiovascular disease; risk factors; risky behaviour; workplace health promotion.
Evidence Level: 4B
Link: https://www.tandfonline.com/doi/full/10.1080/16549716.2020.1827363

Organisational Issues

Understanding the effects of colleague participation and public cause proximity on employee volunteering intentions: the moderating role of power distance
Many organizations encourage their employees to participate in charitable activities as part of their corporate social responsibility strategies. As a result, there has been an increased research interest in employee volunteering behavior. However, while previous research on employee volunteering decisions has focused on both individual-level and organizational-level factors, there has been less focus on peer involvement and volunteer cause proximity. To go some way to filling this research area, this paper conducted two studies to examine the possible effects of colleague participation, colleague position and public cause proximity on employee volunteering intentions. Study 1 found that colleague participation and

public cause proximity had significant effects on employee volunteering, and Study 2 found that power distance played a moderating role in the relationship between colleague position and employee volunteering. This study contributes to theoretical research on employee volunteering and provides some information to assist firms retain engaged volunteers.
Hou et al. 2020.
Frontiers in Psychology, vol.11

Keywords: Colleague participation; colleague position; employee volunteering intentions; power distance; public cause proximity.
Evidence Level: 5B
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.552867/full

Towards a HR framework for developing a health-promoting performance culture at work: A Norwegian health care management case study
The Norwegian Institute of Public Health (NIPH) states that Norway faces several major health challenges. Sick leave is at 6% and costs employers approximately EUR 1.75 billion annually. The NIPH proposes, with the support of the Public Health Act and the national strategy HealthCare21, that preventive measures should be developed to address negative lifestyle factors in order to decrease the number of new cases in the related disease groups (e.g., stroke, high blood pressure, type 2 diabetes, osteoporosis, obesity). The purpose of this article is to answer why and how organisations should develop a health-promoting performance culture and to provide a conceptual model displaying the importance of this type of culture for organisational performance. To boost the national health standard as a consequence of employee physical activity at work, I suggest additional occupational safety and health (OSH) directives. Based on cross-disciplinary theorizing, I propose a definition of a health-promoting performance culture. This kind of culture consists of dimensions such as health objectives, shared health values, supportive health environment, goal-oriented and value-based behaviour of leaders and employees, and a winning mindset. In addition, the article underscores the importance of related individual HR drivers like fun at work, engagement, physical and mental health for increasing organisational performance. The company cases used in this paper, Schibsted, Gjensidige, Findus and Wilhelmsen, and findings from five in-depth interviews, indicate that health-promoting activities are the result of either an HR strategy or individuals' initiative and voluntariness among the companies' sports enthusiasts. The case of Findus exemplifies an ongoing development toward a health-promoting performance culture and the importance of leaders' participation. The findings support several elements of the conceptual model showing the relations between a health-promoting performance culture, individual HR drivers and organisational performance. A framework for developing a health-promoting performance culture in practice is presented.
Bjerke et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: HR-strategy; employee mental and physical health; health care management; health-promoting performance culture; organizational drivers.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/24/9164

Work safety climate. Comparison of selected occupational groups
Implementation of effective programs to improve occupational safety should be linked to an understanding of the specific nature of the given job. The aim of the research was to compare occupational groups with different job-related specificities: industrial production line workers, retail workers and mine rescuers, in terms of their assessment of the work safety climate. The survey covered 2,995 respondents with diversified demographic characteristics. The study used an abridged version of the Safety Climate Questionnaire by Znajmiecka-Sikora (2019) to assess 10 separate safety climate dimensions. The results of the MANOVA multivariate analysis, Wilks' multivariate F-tests and univariate F tests prove that there is a statistically significant difference between the respondents representing the three occupational groups collectively in terms of global assessment of all work safety climate dimensions, and also indicate significant

differences between workers belonging to the three occupational groups in terms of their assessment of the individual dimensions of the work safety climate, except the organization's occupational health and safety management policy as well as technical facilities and ergonomics, which may be due to the universality of the requirements set for organizations with regard to these two aspects of safe behavior. The differences observed in the assessment of the remaining work safety climate dimensions induces one to promote more differentiated and individualized activities, taking into account the work specificity and the nature of the threats occurring in the respective working environment of the representatives of the different occupations. The difference in assessment of the work safety climate found in the research encourages one to create practical programs for safety, not only in the procedural and technical dimension, but also in the social and psychological one.
Stasila-sieradzka et al. 2020.
PLoS One, vol. 15, no. 12.

Keywords: Work; safety; climate; occupational groups; occupational safety.
Evidence Level: 5B
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0243056

Job Design

Stress-related responses to alternations between repetitive physical work and cognitive tasks of different difficulties
Alternating between physical and cognitive tasks has been proposed as an alternative in job rotation, allowing workers to recover from the physical work while still being productive. However, effects of such alternations on stress have not been investigated. This controlled experiment aimed at determining the extent to which stress-related responses develop during alternating physical and cognitive work, and to determine the extent to which cognitive task (CT) difficulty influences these responses. Fifteen women performed three sessions of 10 consecutive work bouts each including a seven-minute repetitive physical task (pipetting) and a three-minute CT (*n*-back) at one of three difficulty levels. Stress was assessed in terms of changes in heart rate variability, blood pressure, salivary alpha-amylase, salivary cortisol, perceived stress, and cognitive performance. The work session did not result in any marked stress response, and CT difficulty did not significantly influence stress, apart from alpha-amylase being higher at the easiest CT ($F = 5.34$, $p = 0.02$). Thus, according to our results, alternating between repetitive physical tasks and cognitive tasks may be a feasible alternative to classic job rotation between physical tasks only, even if the cognitive task is quite difficult. Future studies should address possible effects of the temporal pattern of alternations, and combine even other occupationally relevant tasks, preferably for extended periods of time.
Mixter et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.22.

Keywords: Job rotation; mental task; physical task; recovery; repetitive work; women.
Evidence Level: 3A
Link: https://www.mdpi.com/1660-4601/17/22/8509

Team member work role performance: The organizational benefits from performance-based horizontal pay dispersion and workplace benign envy
In the context of the current uncertain, complex, and interdependent work systems, teams have become organizations' substantial working unit, which in turn challenges the traditional view of employee performance and ultimately results in the emergence of team member work role performance. Employee team-oriented work role behaviors with proficiency, adaptivity, and proactivity, which are integrated by the new construct, are so crucial to team effectiveness that many organizations keenly expect to achieve team member work role performance through implementing a dispersed pay-for-performance plan within a team. This study seeks to address the organizational practitioners' main concern that whether pay dispersion among team members (i.e., horizontal pay dispersion, HPD) could actually help realize team member work role performance and further examines why and when an employee could respond to HPD

within a team by engaging in team member work role behaviors from the perspective of the performance-shaping basis and team member's workplace benign envy. Drawing on emotion-related theory, social comparison theory, legitimacy theory, expectation theory, and relative deprivation theory, it proposes that performance-based HPD could not only positively impact team member work role performance via workplace benign envy but also exert a direct-positive effect. Moreover, the activating effect of performance-based HPD on workplace benign envy and the mediating role are much stronger when a team member's pay position is higher. The multi-source data including objective information and subjective perception among 362 ordinary employees within 66 Chinese organizational teams primarily supported the moderated mediation model. Yet, the direct-positive effect was not established.
Zhang et al. 2020.
Frontiers of Psychology, vol. 3, no. 11.

Keywords: Moderated mediation; pay position; performance-based HPD; team member work role performance; workplace benign envy.
Evidence Level: 5B
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.566979/full

Interactions of approach and avoidance job crafting and work engagement: A comparison between employees affected and not affected by organizational changes
Job crafting describes proactive employee behaviors to improve the design of their work and working conditions, and to adapt their job to better suit their abilities and needs. During organizational changes, employees may use job crafting to adjust to the changes in their work and protect their well-being and motivation, i.e., work engagement. However, research shows that although the effects of job crafting strategies that expand the design of work (approach job crafting) have been positive on work engagement, the effects of job crafting strategies that diminish the scope of work (avoidance job crafting) have often been negative. This study investigated the effects of the interactions between different job crafting strategies on work engagement, an aspect that has not thus far been studied. Specifically, we hypothesized that avoidance job crafting is not harmful for work engagement when it is conducted in combination with approach job crafting, particularly during times of organizational change. A two-wave, 18-month follow-up study was conducted among public sector workers who either experienced (n = 479) or did not experience (n = 412) changes in their work. Latent moderated structural equation modeling revealed that avoidance job crafting did not reduce work engagement when combined with approach job crafting behaviors. Moreover, job crafting best benefited work engagement when it was combined with these opposing strategies. However, job crafting was beneficial for work engagement only among employees who were affected by organizational changes, that is, among employees whose job design had changed. Practically, organizations implementing changes could encourage proactive job redesign approaches among their employees-particularly both approach and avoidance types of job crafting strategies.
Seppala et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: Job crafting; longitudinal; occupational well-being; organizational changes; work engagement.
Evidence Level: 4A
Link: https://www.mdpi.com/1660-4601/17/23/9084

Job crafting among American workers with disabilities
Purpose Job crafting is an informal, employee-initiated approach to job re-design that has not been tested among people with disabilities, thus far. The purpose of this study is to examine crafting behaviors of workers with disabilities and individual factors associated with crafting behaviors. **Methods** We conducted a survey of employees with disabilities who were 18-64 years old and had at least 1 year of work experience. Bivariate and multivariate methods were used to: (1) compare the use of job crafting behaviors between our sample and published results from a sample of the general population; (2) identify individual characteristics associated with job crafting for workers with disabilities. **Results** Persons with disabilities engage in job crafting behaviors, albeit at lower levels than that reported in a broader sample (Int J

Wellbeing, https://doi.org/10.5502/ijw.v3i2.1 , 2013). Education, and disability type (visual and mobility impairment) were associated with certain types of crafting behaviors. **Conclusions** As job crafting can be associated with higher levels of engagement and career growth among persons without disabilities, findings from this research can be utilized to design programs and policies that support the career goals of people with disabilities beyond labor force participation.
Brucker et al. 2020.
Journal of Occupational Rehabilitation, vol. 30, no. 4.

Keywords: Disability; employment; job crafting; work.
Evidence Level: 5A
Link: https://link.springer.com/article/10.1007%2Fs10926-020-09889-9

Cumulated and most recent job control and risk of disability pension in the Danish Work Life Course Cohort (DaWCo)
Background: Previous studies have found low job control to be associated with a higher risk of disability pension (DP). Most studies have measured job control only at one time-point, and there is a lack of knowledge regarding the role of exposure duration. This study examines the prospective association between job control and DP measuring exposure both cumulated throughout work life and most recent. **Methods:** We included 712 519 individuals (about 4.5 million person-years) from The Danish Work Life Course Cohort which follows young employees in Denmark from their entry into the labour market. Job control was assessed with a job exposure matrix and DP with register data on public transfer payments. We adjusted for several potential life course confounders, including physical demands at work and parental socioeconomic position and psychiatric and somatic diagnoses. **Results:** Employees in occupations with low job control had a higher risk of DP. There were effects of both cumulated and most recent job control when mutually adjusted. Fully adjusted hazard ratios (HRs) were 1.14 [95% confidence intervals (CIs) 1.11-1.17] and 1.15 (95% CI 1.02-1.29) for cumulated and most recent job control, respectively. Without mutual adjustment, estimates were 1.15 (95% CI 1.13-1.18) and 1.55 (95% CI 1.39-1.72) for cumulated and most recent low job control, respectively. **Conclusions:** Low job control predicts a higher risk of DP, even after adjustment for physical demands at work. The results indicate both gradual and short-term effects of low job control on DP risk.
Framke et al. 2020.
European Journal of Public Health, vol. 30, no. 6.

Keywords: Job control; risk; disability pension; work life.
Evidence Level: 4B
Link: https://academic.oup.com/eurpub/article/30/6/1212/5870969

Shift Work

Relationships among shift work, hair cortisol concentration and sleep disorders: a cross-sectional study in China
Objective: The present study was designed to demonstrate the relationships among shift work, hair cortisol concentration (HCC) and sleep disorders. **Design:** A cross-sectional study. **Setting:** Three petroleum administrations in Karamay city of Xinjiang, China. **Participants:** 435 individuals including 164 males and 271 females participated in the research. **Outcome measures:** Information on shift work was collected by a self-administered questionnaire. HCC was determined using an automatic radioimmunoassay instrument. Sleep quality was measured on the Pittsburgh Sleep Quality Index scale. **Results:** Shiftwork was associated with an increased prevalence of sleep disorders compared with the fixed day shift (two shifts: OR 3.11, 95% CI 1.57 to 6.19; three shifts: OR 2.87, 95% CI 1.38 to 5.98; four shifts: OR 2.22, 95% CI 1.17 to 4.18; others: OR 3.88, 95% CI= 1.36 to 11.08). Workers with different shift patterns had higher HCC levels than day workers ((fixed day shift: geometric mean±geometric SD=2.33±1.65; two shifts: 3.76±1.47; three shifts: 3.15±1.64; four shifts: 3.81±1.55; others: 3.60±1.33) ng/g hair, η^2=0.174) and high HCC was associated with

the higher prevalence of sleep disorders (OR 4.46, 95% CI 2.70 to 7.35). The mediating effect of HCC on the relationship between shift work and sleep disorders was 0.25 (95% CI 0.09 to 0.41). **Conclusion:** We found that, when compared with the fixed day shift, shiftwork was associated with both the higher HCC, and also with an increased risk of sleep disorders. High HCC was associated with the occurrence of sleep disorders. In addition, HCC had mediating effect in shift work and sleep disorders. Thus, HCC can be considered as an early marker of shiftwork circadian disruption to early detection and management of sleep disorders.
Zhang et al. 2020.
BMJ Open, vol. 10, no. 11.

Keywords: Epidemiology; occupational & industrial medicine; sleep medicine.
Evidence Level: 4B
Link: https://bmjopen.bmj.com/content/10/11/e038786.long

Shift work, work time control, and informal caregiving as risk factors for sleep disturbances in an ageing municipal workforce
Objectives This study aimed to examine the contribution of shift work, work time control (WTC) and informal caregiving, separately and in combination, to sleep disturbances in ageing employees. **Methods** Survey data were obtained from two prospective cohort studies with repeated measurements of working conditions, informal caregiving, and sleep disturbances. We used fixed-effect conditional logistic regression analysis to examine whether within-individual changes in shift work, WTC and informal caregiving were associated with changes in sleep. Secondary analyses included between-individuals comparison using standard logistic regression models. **Results** from the two cohorts were pooled using meta-analysis. Results Low WTC and informal caregiving were associated with sleep disturbances in within-individual analyses [odds ratios (OR) ranging between 1.13 (95% confidence interval 1.01-1.27) and 1.48 (95% CI 1.29-1.68)] and in between-individuals analyses [OR 1.14 (95% CI 1.03-1.26) to 1.33 (1.19-1.49)]. Shift work alone was not associated with sleep disturbances, but accumulated exposure to shift work, low WTC and informal caregiving was associated with higher risk of sleep disturbances (OR range 1.21-1.76). For some of the sleep outcomes, informal caregiving was related to a higher risk of sleep disturbances when WTC was low and a lower risk when WTC was high. **Conclusions** Informal caregiving and low WTC are associated with risk of sleep disturbances among ageing employees. The findings also suggest that low WTC in combination with informal caregiving may increase the risk of sleep disturbances whereas high WTC may alleviate the adverse impact of informal caregiving on sleep.
Virtanen et al. 2020.
Scandinavian Journal of Work and Environmental Health, vol. 3937.

Keywords: Shift work; work time control; informal caregiving; risk factors; sleep disturbances; ageing; municipal workforce.
Evidence Level: 4A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3937

Night shift work is associated with an increased risk of asthma
Introduction: Shift work causes misalignment between internal circadian time and the external light/dark cycle and is associated with metabolic disorders and cancer. Approximately 20% of the working population in industrialised countries work permanent or rotating night shifts, exposing this large population to the risk of circadian misalignment-driven disease. Analysis of the impact of shift work on chronic inflammatory diseases is lacking. We investigated the association between shift work and asthma. **Methods:** We describe the cross-sectional relationship between shift work and prevalent asthma in >280000 UK Biobank participants, making adjustments for major confounding factors (smoking history, ethnicity, socioeconomic status, physical activity, body mass index). We also investigated chronotype. **Results:** Compared with day workers, 'permanent' night shift workers had a higher likelihood of moderate-severe asthma (OR 1.36 (95% CI 1.03 to 1.8)) and all asthma (OR 1.23 (95% CI 1.03 to 1.46)). Individuals doing any type of shift work had higher adjusted odds of wheeze/whistling in the chest. Shift workers who never or rarely worked on nights and people working permanent nights had a higher adjusted likelihood of having reduced lung function

(FEV_1 <80% predicted). We found an increase in the risk of moderate-severe asthma in morning chronotypes working irregular shifts, including nights (OR 1.55 (95% CI 1.06 to 2.27)). **Conclusions:** The public health implications of these findings are far-reaching due to the high prevalence and co-occurrence of both asthma and shift work. Future longitudinal follow-up studies are needed to determine if modifying shift work schedules to take into account chronotype might present a public health measure to reduce the risk of developing inflammatory diseases such as asthma.
Maidstone et al. 2020.
Thorax, vol. 76, no.1.

Keywords: Asthma; asthma epidemiology.
Evidence Level: 4A
Link: https://thorax.bmj.com/content/76/1/53.long

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. 2020.
Scandinavian Journal of Work and Environmental Health, vol. 17.

Keywords: Shift work; C-reactive proteins; inflammation; long hours
Evidence Level: 5B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3933

Shift work, and burnout and distress among 7798 blue-collar workers
Objective: This study aimed to investigate the association between shift work, and burnout and distress, and differences by degree of satisfaction with shift schedule and its impact on private life.
Methods: Population 4275 non-shift factory workers and 3523 rotating 5-shift workers. Workers participated between 2009 and 2016 one to three times in the companies' periodical occupational health checks. Burnout was measured using the distance, exhaustion and competence subscales of the Dutch Maslach Burnout Inventory and distress by the subscale of the Four-Dimensional Symptom Questionnaire (scale: 0-100). Multiple-adjusted linear mixed models were used to assess between- and within-subject associations between shift work and outcomes, and differences by age, years of shift work, and satisfaction with and impact of shift schedule. **Results:** Shift work was significantly associated with lower scores on burnout distance (B - 1.0, 95% - 1.8 to 0.3), and among those aged < 48 years with burnout exhaustion (range B - 1.3 to - 1.6). However, the effect sizes were small. Compared to non-shift workers, shift workers dissatisfied with their schedule and those experiencing a high impact on private life had significantly higher burnout (range B 1.7-6.3) and distress levels (range B 4.9-6.1). In contrast, satisfied shift workers and those experiencing a low impact of shift schedule had lower burnout (range B - 0.2 to - 2.2) and no difference in

distress levels (P ≥ 0.05). No clear pattern by years of shift work was observed. **Conclusions:** Shift work was associated with burnout and distress in those who were dissatisfied with or who had perceived high impact on the private life of their shift schedule.
Hulsegge et al. 2020.
International Archives of Occupational and Environmental Health, vol.93, no.8.

Keywords: Job satisfaction; job stress; night work; rotating shift system; work-family conflict.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01536-3

The impact of a meal, snack, or not eating during the night shift on simulated driving performance post-shift
Objective: The commute home following a night shift is associated with an increased risk for accidents. This study investigated the relationship between food intake during the night shift and simulated driving performance post-shift. **Methods:** Healthy non-shift working males (N=23) and females (N=16), aged 18-39 years (mean 24.5, standard deviation 5.0, years) participated in a seven-day laboratory study and underwent four simulated night shifts. Participants were randomly allocated to one of three conditions: meal at night (N=12; 7 males), snack at night (N=13; 7 males) or no eating at night (N=14; 9 males). During the night shift at 00:30 hours, participants either ate a large meal (meal at night condition), a snack (snack at night condition), or did not eat during the night shift (no eating at night condition). During the second simulated night shift, participants performed a 40-minute York driving simulation at 20:00, 22:30, 01:30, 04:00, and 07:30 hours (similar time to a commute from work). **Results:** The effects of eating condition, drive time, and time-on-task, on driving performance were examined using mixed model analyses. Significant condition×time interactions were found, where at 07:30 hours, those in the meal at night condition displayed significant increases in time spent outside of the safe zone (percentage of time spent outside 10 km/hour of the speed limit and 0.8 meters of the lane center; P<0.05), and greater lane and speed variability (both P<0.01) compared to the snack and no eating conditions. There were no differences between the snack and no eating conditions. **Conclusion:** Driver safety during the simulated commute home is greater following the night shift if a snack, rather than a meal, is consumed during the shift.
Gupta et al. 2020.
Scandinavian Journal of Work, Environment and Health, vol.47, no.1.

Keywords: Performance; night shift; snacking; nutrition; post-shift performance
Evidence Level: 5A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3934

How to schedule night shift work in order to reduce health and safety risks
Objectives: This discussion paper aims to provide scientifically based recommendations on night shift schedules, including consecutive shifts, shift intervals and duration of shifts, which may reduce health and safety risks. Short-term physiological effects in terms of circadian disruption, inadequate sleep duration and quality, and fatigue were considered as possible links between night shift work and selected health and safety risks, namely, cancer, cardio-metabolic disease, injuries, and pregnancy-related outcomes. **Method:** In early 2020, 15 experienced shift work researchers participated in a workshop where they identified relevant scientific literature within their main research area. **Results:** Knowledge gaps and possible recommendations were discussed based on the current evidence. The consensus was that schedules which reduce circadian disruption may reduce cancer risk, particularly for breast cancer, and schedules that optimize sleep and reduce fatigue may reduce the occurrence of injuries. This is generally achieved with fewer consecutive night shifts, sufficient shift intervals, and shorter night shift duration. **Conclusions:** Based on the limited, existing literature, we recommend that in order to reduce the risk of injuries and possibly breast cancer, night shift schedules have: (i) ≤3 consecutive night shifts; (ii) shift intervals of ≥11 hours; and (iii) ≤9 hours shift duration. In special cases - eg, oil rigs and other isolated workplaces with better possibilities to adapt to daytime sleep - additional or other recommendations may apply. Finally, to reduce risk of miscarriage, pregnant women should not work more than one night shift in a week.

Garde et al. 2020.
Scandinavian Journal of Work, Environment and Health, vol.46, no.6.

Keywords: Night shift; safety; risk; health; sleep.
Evidence Level: 6A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3920

The association between shift work and health-related productivity loss due to either sickness absence or reduced performance at work: A cross-sectional study of Korea
Background: The purpose of the present study was to investigate the association between shift work and health-related productivity loss (HRPL) due to either sickness absence or reduced performance at work. **Methods:** From January 2020 to February 2020, data were collected using the web-based questionnaire. Workers in Korea (n = 4197) were selected with the convenience sampling method. To evaluate HRPL, the Korean version of the "Work Productivity and Activity Impairment Questionnaire" was used. The nonparametric association between shift work and HRPL was determined. To estimate productivity loss by shift work, generalised linear models were used, and the productivity loss of workers who did not do shift work was used as the reference. Contrasts between the reference (non-shift work) and shift work, including the shift work subtype, were demonstrated. In the adjusted model, age, gender, and occupation were included as covariates. To test whether there were differences in this association by gender, a gender-stratified analysis was conducted. **Results:** Shift work significantly reduced productivity (2.5% points; 95% CI: 0.2-4.6). The fixed night shift had the largest productivity loss (7.7% points; 95% CI: 1.8-13.7), and the relationship between HRPL and shift work was more prominent among female workers. **Conclusions:** Shift work is related to an increase in HRPL, and there are gender differences in this association. Our study further indicated that a fixed night shift is most detrimental to workers' health and productivity.
Cho et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 22.

Keywords: Absenteeism; gender difference; presenteeism; productivity loss; shift work.
Evidence Level: 4B
Link: https://www.mdpi.com/1660-4601/17/22/8493

Different exposure metrics of rotating night shift work and hyperhomocysteinaemia among Chinese steelworkers: a cross-sectional study
Objective: To examine the associations of rotating night shift work with hyperhomocysteinaemia (HHcy) odds by different exposure metrics. **Design:** Cross-sectional study. **Setting:** Occupational physical examination centre for steel production workers, Tangshan, China. **Participants:** A total of 6846 steelworkers, aged 22-60 years, from the baseline survey of a Chinese occupational cohort. **Primary and secondary outcome measures:** Different exposure metrics of night shift work, including current shift status, duration of night shifts (years), cumulative number of night shifts (nights), cumulative length of night shifts (hours), average frequency of night shifts (nights/month), average length of night shifts (hours/night) and percentage of hours on night shifts, were used to examine the effects of past and current night shift work on HHcy odds. The total homocysteine concentration in the plasma above 15 µmol/L was defined as HHcy. **Results:** Compared with those who never worked night shifts, current night shift workers had elevated odds of HHcy (OR 1.23, 95% CI 1.06 to 1.44). Considering a person's lifetime work schedule and compared with individuals who never worked night shifts, duration of night shifts >28 years (OR 1.35, 95% CI 1.12 to 1.61), average frequency of night shifts >7 nights/month (OR 1.25, 95% CI 1.07 to 1.47) and percentage of hours on night shifts >30% (OR 1.23, 95% CI 1.05 to 1.43) were associated with higher HHcy odds. The duration of night shifts >20 years and the average frequency of night shifts >7 nights/month could significantly increase the odds of HHcy regardless of whether the average length of night shifts was greater than 8 hours/night. After stratification by sex, no significant association was found in female workers between different exposure metrics of night shift work and HHcy. **Conclusions:** Long duration and high frequency of night shift work are associated with higher HHcy odds among male steelworkers.

Zhang et al. 2020.
BMJ Open, vol. 10, no. 12.

Keywords: Epidemiology; occupational & industrial medicine; public health.
Evidence Level: 4B
Link: https://bmjopen.bmj.com/content/10/12/e041576.long

Rotating night shift work, exposure to light at night, and glomerular filtration rate: Baseline results from a Chinese occupational cohort
The misalignment between the circadian clock and behavioral cycles has been implicated in pathogenesis of many diseases. The main purpose of this study is to examine the association between rotating night shift work, exposure to light at night, and glomerular filtration rate among steelworkers in north China. A total of 6869 steelworkers, aged 22 to 60 years, were included in this study. Multivariable logistic regression was used to examine the association between night shift work, the brightness of bedroom ambient light at night (LAN), and estimated glomerular filtration rate (eGFR), with adjustment for potential confounders. Mediation analysis was performed to examine the mediation effect of potential mediators on the association of duration of night shifts and eGFR. Long duration of night shift work (≥29 years) had elevated odds of decreased eGFR (≤89 mL/min/1.73 m^2) (odds ratio (OR), 1.37, 95% confidence interval (CI) 1.09-1.73) compared with day work after adjustment for potential confounders. The association between duration of night shifts and eGFR (continuous) was partially modified by diastolic blood pressure (average causal mediation effect (ACME), -0.077, 95% CI -0.134 to -0.030, $p < 0.001$). No significant associations were observed among the different brightness of bedroom ambient light levels: middle level (OR, 0.90, 95% CI 0.77-1.05), lightest level (OR, 0.94, 95% CI 0.75-1.18), and decreased eGFR compared with the darkest level. Long-term night-shift work, rather than the brightness of bedroom ambient LAN, is associated with early stage of renal dysfunction in steelworkers, and blood pressure may mediate the relationship between night shift work and decreased eGFR.
Zhang et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: Light at night; night shift work; renal function.
Evidence Level: 4B
Link: https://www.mdpi.com/1660-4601/17/23/9035

Body fat indicators for cardiometabolic risk screening among shift workers
Background: In view of the costly methods currently available for the assessment of body adiposity, anthropometric obesity indicators have proven effective in predicting cardiovascular risk. **Objective:** To investigate the discriminatory power of body fat indicators for cardiovascular risk screening among shift workers. **Methods:** Cross-sectional study with male employees of an iron ore extraction company. The predictive power of body fat indicators relative to cardiovascular risk was analyzed based on the Framingham risk score and metabolic syndrome by means of receiver operating characteristic curves, sensitivity, specificity, positive and negative predictive values, area under the receiver operating characteristic curve and Youden's index. **Results:** The prevalence of cardiovascular risk was 14.2% in the metabolic syndrome risk model. According to the Framingham score, 95.0%, 4.1% and 0.9% of the participants exhibited low, moderate and high risk, respectively. All the analyzed body fat indicators exhibited satisfactory discriminatory power for the tested cardiovascular risk models. **Conclusion:** Waist-height ratio exhibited the highest ability to predict cardiometabolic risk in both risk models.
Diniz et al. 2020.
Revista Brasileira de Medicina do Trabalho, vol. 18, no. 2.

Keywords: Anthropometry; body weight; circadian rhythm; obesity.
Evidence Level: 4A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7732043/

The impact of shift work and long work hours on employers' health care costs
Objective: To estimate the additional health care costs incurred by two U.S. manufacturing companies due to their policies related to shift work and long work hours. **Methods:** We applied risk ratios from the published literature to data on 2647 workers from Company A and 1346 workers from Company B to estimate the excess cases of several chronic conditions in the worker population due to shift work and long work hours. We estimated the annual health care costs incurred by the companies by applying Medicare cost data. **Results:** Excess annual health care costs related to shift work totaled $1,394,365 and $300,297 for Companies A and B, respectively. Excess annual costs related to long work hours totaled $231,293 and $107,902 for Companies A and B, respectively. **Conclusions:** Excess health care costs related to shift work and long work hours is substantial, but may not be large enough to compel companies to alter their work scheduling policies.
McHugh et al. 2020.
Journal of Occupational and Environmental Medicine, vol. 62, no. 12.

Keywords: Shift work; long work hours; employers; health care; costs.
Evidence Level: 5B
Link:
https://journals.lww.com/joem/Fulltext/2020/12000/The_Impact_of_Shift_Work_and_Long_Work_Hours_on.5.aspx

Impact of decreased night work on workers' musculoskeletal symptoms: A quasi-experimental intervention study
A possible association between night shift work and musculoskeletal disorder has been suggested. This study aimed to evaluate the impact of decreased night work on musculoskeletal pain. Difference-in-difference estimation was used to compare changes in musculoskeletal pain between shift workers (*N* = 122) and non-shift workers (*N* = 170) in a manufacturing company before and after the introduction of a new shift system eliminating overnight work. Musculoskeletal pain was measured by a questionnaire asking if workers had symptoms in specific body parts, including the neck, shoulder, arm/elbow, wrist/hand, back, and leg/foot, over the past year. Generalized estimating equation models were used to estimate changes in pre- versus post-intervention musculoskeletal pain rates between the treated and control group. In the difference-in-difference (DID) models, prevalence of musculoskeletal pain for shoulder (-10.3%), arm (-12.9%), all sites combined (-9.2%), and upper extremity combined (-14.8%) showed significant decreases from pre- to post-intervention among the treated group (shift workers) compared to the control group (non-shift workers) after controlling for age and weekly working hours. Decreasing night work was related to improvement in musculoskeletal pain in shift workers.
Lee et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: South Korea; difference-in-difference; musculoskeletal; night shift work; organizational intervention.
Evidence Level: 3B
Link: https://www.mdpi.com/1660-4601/17/23/9092

Work Ability

An assessment of the work ability, disability and quality of life of working people of pre-retirement and retirement age in poland - a cross-sectional pilot study
Objectives: The aim of this work was to assess the work ability, health status, disability and quality of life of working people of pre-retirement and retirement age, as well as to analyze factors affecting the ability to perform work in older age. **Material and methods:** A cross-sectional pilot study was conducted in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in randomly selected workplaces of intellectual nature. It was carried out by means of direct interviews in the workplace of the surveyed people, using the

Work Ability Index, a questionnaire based on the WHO Disability Assessment Schedule 2.0, the WHO Quality of Life-BREF questionnaire, the Geriatric Depression Scale, and the Visual Analogue Scale (VAS). The criteria for inclusion were: age 55-75 years and informed consent to participate in the study. Overall, 201 complete questionnaires were included in the analysis. Demographic data is presented using descriptive statistics measurements. The logistic regression model was used to identify factors related to work ability. **Results:** The vast majority (69.66%) of employees performing intellectual work had moderate or poor work ability. The average level of general disability in the studied group was mild (20.65), and the quality of life was quite good (64.73). A significant problem among the surveyed people was a quite high average level of pain (VAS = 3.99), the occurrence of depression (73.63%), as well as musculoskeletal (64.18%) and cardiovascular diseases (52.24%). The most important factor contributing to a better work ability was the adaptation of the workplace to functional and healthrelated needs (OR = 7.79). Psychological well-being (OR = 1.12), cognitive performance (OR = 0.97) and a smaller number of chronic diseases (OR = 0.58) were also important factors. **Conclusions:** Preparation of elderly people for professional activity should be conducted in 2 different ways, i.e., by means of education and implementation of an active, healthy lifestyle, and increasing control over one's own health and factors determining it, as well as by the proper organization of working space, and quick access to treatment and rehabilitation, especially in the case of musculoskeletal and cardiovascular diseases.

Cwirlej-Sozanska et al. 2020.

International Journal of Occupational Medicine and Environmental Health.

Keywords: Work Ability Index; disability; older workers; pre-retirement and retirement age; quality of life; work ability.

Evidence Level: 4B

Link: http://ijomeh.eu/An-assessment-of-the-work-ability-disability-and-quality-of-life-of-working-people,126620,0,2.html

Occupational differences in disability retirement due to a shoulder lesion: do work-related factors matter?

Objective: To identify occupations with a high risk of disability retirement due to a shoulder lesion and to examine the effect of physical and psychosocial work-related factors on occupational differences in disability retirement. **Methods:** We followed Finnish wage earners aged 30-59 years (n = 1,135,654) from 2005 to 2014 for full disability retirement due to a shoulder lesion. The work-related exposures were assessed with job exposure matrices. We calculated age-adjusted incidence rates and hazard ratios to test for the association between occupation and disability retirement due to a shoulder lesion. We also examined the contribution of work-related exposures to the excess risk of disability retirement. **Results:** As compared to professionals, the age-adjusted risk of disability retirement was increased among men in all occupational groups except managers and customer service clerks and among women in several occupational groups. Adjustment for education attenuated the occupational differences considerably, particularly among women. The physical work-related factors fully explained the excess risk of disability retirement due to a shoulder lesion among male finance and sales associate professionals and administrative secretaries as well as among agricultural and fishery workers. In women, the physical work-related factors fully explained the excess risk among construction workers, electricians and plumbers. For both genders, the contribution of psychosocial factors to excess risk of disability retirement was modest and seen for monotonous work only. **Conclusions:** A reduction of the level of physical work load factors as well as monotonousness of work has a potential to prevent work disability due to a shoulder lesion.

Siren et al. 2020.

International Archives of Occupational and Environmental Health, vol. 93, no. 8.

Keywords: Disability retirement; occupation; physical work load factors; psychosocial factors; shoulder disease; work disability.

Evidence Level: 4B

Link: https://link.springer.com/article/10.1007%2Fs00420-020-01549-y

Same involvement, different reasons: How personality factors and organizations contribute to heavy work investment

The academic literature has drawn a clear distinction between a positive form (i.e., work engagement) and a negative form (i.e., workaholism) of heavy work investment (HWI). Nevertheless, the different weight of individual and situational factors contributing to their development was not thoroughly explored. This study aims to investigate the role of individual variables (i.e., obsessive-compulsive traits, achievement orientation, perfectionism, and conscientiousness) and situational factors (i.e., job demands and overwork climate) regarding engagement and workaholism simultaneously. Hypotheses were tested using a sample of 523 Italian employees. Results of structural equation modeling revealed that overwork climate and job demands were conversely related to engagement and workaholism, with job demand reporting the strongest association with workaholism. Furthermore, fear of failure was the only individual factor showing a significant and opposite relationship with workaholism and engagement. In contrast, perfectionism was positively associated with both forms of HWI. These results shed light on the potential effectiveness of intervention strategies focused on the employees and organizations in preventing workaholism and promoting engagement.

Mazzetti et al. 2020.

International Journal of Environmental Research and Public Health, vol.17, no. 22.

Keywords: Engagement; job demands; organizational climate; overwork; personality; workaholism.

Evidence Level: 5B

Link: https://www.mdpi.com/1660-4601/17/22/8550

Perceived work stress, overcommitment, balance in everyday life, individual factors, self-rated health and work ability among women and men in the public sector in Sweden - a longitudinal study

Background: The aim was to investigate whether perceived work stress, overcommiment, balance in everyday life, individual factors and self-rated health in combination predict work ability among women and men in the public sector in Sweden. **Methods:** A sample was randomly selected from the employee records of the participating public health care organisation in Western Sweden. In total, 2223 employees were included and answered a postal survey twice, at a 2 year interval. The survey included questions about work ability, perceived work stress, overcommitment, balance in everyday life, individual factors and self-rated health. Odds ratios with 95% confidence intervals for work ability were estimated using logistic regression. **Results:** Imbalance in everyday life and overcommitment predicted reduced work ability in women and imbalance in everyday life and low educational level predicted reduced work ability in men. However, when poor self-rated health was added to the models this was the strongest predictor of work ability for both genders. **Conclusion:** A combination of poor self-rated health, imbalance in everyday life, and overcommitment predicted reduced work ability. This multifactorial nature of work ability should be taken into account in health promotion programmes.

Hakansson et al. 2020.

Archives of Public Health, vol. 78, no. 1.

Keywords: Imbalance in everyday life; overcommitment; work ability.

Evidence Level: 4A

Link: https://archpublichealth.biomedcentral.com/articles/10.1186/s13690-020-00512-0

Psychosocial predictors of work ability in morbidly obese patients: Results of a cross-sectional study in the context of bariatric surgery

Background: Obesity is associated with a higher risk of work disability and premature early retirement. **Objective:** The aim of this study was to examine psychosocial predictors for work ability prior to surgery. **Methods:** Based on a sample of 197 surgery-seeking obese patients (preoperative body mass index [BMI] above 35 kg/m2) from a German bariatric surgery unit, the present cross-sectional study examined based on standardized self-rating measures whether depressive symptoms, dysfunctional eating behaviors, relationship satisfaction, and life satisfaction have a predictive value for work ability. **Results:** Considerable impairment of work ability was found in 51.8% of morbidly obese participants (n = 102). Multiple regression

analyses revealed that older age, greater depressive symptoms, and lower life satisfaction were significant predictors of preoperative work ability. BMI, gender, relationship satisfaction, and dysfunctional eating behaviors did not predict work ability. **Conclusions:** Our findings might indicate the use of further psychosocial measures following bariatric surgery to increase work ability.
Kohler et al. 2020.
Obesity Facts.

Keywords: Bariatric surgery; obesity; psychosocial predictors; work ability.
Evidence Level: 4A
Link: https://www.karger.com/Article/FullText/511735

Management and Leadership

Multi-level effects of humble leadership on employees' work well-being: The roles of psychological safety and error management climate
Employees' work well-being (WWB) is vital to employees' performance and organizations' sustainable development. This study aims to explore the role of psychological safety and error management climate (EMC) between humble leadership and WWB in Chinese organizations. Drawing upon social information processing theory, a multi-level study was conducted to test the underlying mechanisms between humble leadership and employees' WWB. A time-lagged data of 221 team members was collected from 12 small and medium sized companies in China. Results showed that team-level humble leadership was positively related to WWB. Psychological safety and EMC both played a partial mediating role linking humble leadership and WWB. EMC positively moderated the relationship between humble leadership and psychological safety. This paper contributes to revealing the multi-level effects of humble leadership on work well-being. These findings also provide some important implications for managerial practices.
Zhang et al. 2020.
Frontiers of Psychology, vol. 11.

Keywords: Error management climate; humble leadership; multi-level effect; psychology safety
Evidence Level: 4B
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.571840/full

The diminishing effect of transformational leadership on the relationship between task characteristics, perceived meaningfulness, and work engagement
The topic of employee work engagement in the public sector has attracted broad attention because it is critical to the efficiency and effectiveness of public services. Based on the Job Characteristics Model (JCM) and the Integrative Theory of Employee Engagement (ITEE), the present research adopts a multilevel design to examine a moderated mediation model in which task characteristics (i.e., task autonomy and task significance as level-1 predictors) and social context (i.e., transformational leadership as a level-2 moderator) jointly impact employee work engagement *via* individual perception of meaningfulness in work. A total of 349 grassroots police officers from 35 police substations were invited to anonymously complete a survey *via* mobile app. After performing the cross-sectional analysis, the results indicated that in contrast to task significance, the conditional effect of task autonomy on work engagement *via* perceived meaningfulness was more positive at a lower level of transformational leadership. Implications, limitations, and future research directions are discussed.
Meng et al. 2020.
Frontiers of Psychology, vol.25 .

Keywords: Meaningfulness in work; task autonomy; task significance; transformational leadership; work engagement.
Evidence Level: 4B
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.585031/full

The moderating effect of managerial roles on job stress and satisfaction by employees' employment type
The roles of managers affect job stress and satisfaction. As irregular employees increase globally, more research is needed on the effects of managerial roles. This study analyzed job stress (subfactors: job autonomy and demand), job satisfaction, and managerial roles by employment type. Data comprised 33,420 cases from the fifth Korean Working Condition Survey. Regular employees had higher job autonomy and satisfaction fewer lower demands than irregular employees. For both, job autonomy positively and job demand negatively affected job satisfaction; the interaction of job autonomy and managerial roles negatively affected the relationship between job autonomy and satisfaction. In the relationship between job demand and satisfaction, the interaction of job demand and managerial roles had positive and negative effects for regular and irregular employees, respectively. The moderating effect of the interaction between job stress and managerial roles differed by employment type. Thus, managerial roles should differ by employment type. Guaranteed autonomy and minimal managerial intervention positively affect job satisfaction regardless of employment type. Appropriate managerial intervention relieves job stress and increases satisfaction for regular employees; managerial intervention negatively impacts irregular employees' satisfaction. Irregular employees should be provided with clear job expectations from the start, with minimal managerial intervention.
Kim et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.21.

Keywords: Employees; employment type; job satisfaction; job stress; manager role.
Evidence Level: 4B
Link: https://www.mdpi.com/1660-4601/17/21/8259

Adapting to the Future of Work

Aging Workforce

Joint association of physical work demands and leg pain intensity for work limitations due to pain in senior workers: cross-sectional study
Background: Leg pain, especially of the knees and hips, is common among senior workers and may limit the ability to perform physically demanding work. In light of the aging workforce, this study determined the joint association of physical work demands and leg pain intensity for work-limiting pain in senior workers. **Methods:** Currently employed senior workers (≥50 years) participated in the SeniorWorkingLife study in 2018 (n = 12,879). Associations between the combination of physical work demands and leg pain intensity (interaction) with work-limiting pain (outcome) were modeled using binary logistic regression analyses while controlling for potential covariates. **Results:** We found a significant interaction (P < 0.001) between physical work demands and leg pain intensity for work-limiting pain. The combination of higher physical work demands and higher leg pain intensity had the worst outcome in terms of the odds of experiencing work-limiting pain. For example, 70% of those with the combination of high physical work demands and leg pain intensity ≥7 (scale 0-10) experienced that the pain limited them to at least some degree in their work. **Conclusions:** The combination of high physical work demands and high leg pain intensity are associated with limited ability to perform work among senior workers. These findings highlight the importance of prioritizing the physical work environment in physically demanding occupations, particularly among senior workers, for prolonging working life. Thus, adjusting the work demands, e.g. through use of assistive devices, and lowering the pain, e.g. through physical rehabilitation, may be necessary to sustain work ability to a high age in this group of workers.
Skovlund et al. 2020.
BMC Public Health, vol. 20, no. 1.

Keywords: Ergonomics; manual labour; musculoskeletal diseases; occupational medicine; sustainable employment; work ability; workplace.
Evidence Level: 4A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09860-6

Age management practices toward workers aged 45 years or older: an integrative literature review
Age management practices refer to the development and implementation of workplace strategies to support and improve the health and productivity of workers aged 45 years or older. The objective of this study was to analyze the scientific evidence available to support age management practices toward older workers. An integrative review was conducted, with the following databases searched in February 2019: LILACS, MEDLINE, Web of Science, and SCOPUS. Inclusion criteria consisted of original primary studies with full-text availability, published in Portuguese, English or Spanish. Secondary studies were excluded. No restrictions were imposed on publication dates given the paucity of literature on this topic. The final sample consisted of 11 primary studies published between 2006 and 2017, which addressed the following age management practices: workplace health promotion; employment exit and transition to retirement; knowledge transfer, training and lifelong learning; career development; flexible working time practices; and occupational safety and health management. Age management practices are promising tools to promote a work environment that is adequate to the needs of older workers.
Pedro et al. 2020.
Revista Brasileira de Medicina do Trabalho, vol. 18, no. 2.

Keywords: Aging; health management; occupational health.
Evidence Level: 6B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7732046/

Work environment

Envisioning the future of work to safeguard the safety, health, and well-being of the workforce: A perspective from the CDC's National Institute for Occupational Safety and Health
The future of work embodies changes to the workplace, work, and workforce, which require additional occupational safety and health (OSH) stakeholder attention. Examples include workplace developments in organizational design, technological job displacement, and work arrangements; work advances in artificial intelligence, robotics, and technologies; and workforce changes in demographics, economic security, and skills. This paper presents the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health's Future of Work Initiative; suggests an integrated approach to address worker safety, health, and well-being; introduces priority topics and subtopics that confer a framework for upcoming future of work research directions and resultant practical applications; and discusses preliminary next steps. All future of work issues impact one another. Future of work transformations are contingent upon each of the standalone factors discussed in this paper and their combined effects. Occupational safety and health stakeholders are becoming more aware of the significance and necessity of these factors for the workplace, work, and workforce to flourish, merely survive, or disappear altogether as the future evolves. The future of work offers numerous opportunities, while also presenting critical but not clearly understood difficulties, exposures, and hazards. It is the responsibility of OSH researchers and other partners to understand the implications of future of work scenarios to translate effective interventions into practice for employers safeguarding the safety, health, and well-being of their workers.
Tamers et al. 2020.
American Journal of Industrial Medicine, vol. 63, no. 12.

Keywords: Total Worker Health; future of work; occupational safety and health; worker well-being.
Evidence Level: 6B
Link: https://onlinelibrary.wiley.com/doi/10.1002/ajim.23183

Does active design influence activity, sitting, wellbeing and productivity in the workplace? A systematic review
Active design is an emerging concept to incorporate physical activity into daily life through thoughtful design, and is often implemented in new building designs. It is, however, not known what evidence base

there is to support the claims. Through this systematic review, the current evidence for active design was investigated. Seven databases were searched. A range of search terms relating to active design, physical activity, sitting, performance and wellbeing were used. After title and abstract screening of 1174 papers and full-text screening, 17 were selected for inclusion. The papers provided promising evidence of active design aiding a reduction in sitting and increase in standing time. Limited evidence was found for physical activity; a few studies reported an increase in step counts. Musculoskeletal effects were investigated in few studies, but there is some evidence of benefits to lower back pain. There was consistent evidence for better light and air quality, but no evidence for other features of the workplace environment. No conclusive evidence was found on associations between active design features and work performance. There is hence some evidence to support the benefit of active design on physical health; however, the dearth and heterogeneity of the study designs, measures and findings warrant further research.
Engelen et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Active design; health; office; physical activity; review.
Evidence Level: 1A
Link: https://www.mdpi.com/1660-4601/17/24/9228

Guiding and Supporting Mental Health and Wellbeing

Mental Health

Effects of a work-related stress model based mental health promotion program on job stress, stress reactions and coping profiles of women workers: a control groups study
Background: Work-related stress and its detrimental effects on human health have rapidly increased during the past several years. It causes many different stress reactions, related diseases and unhealthy behavior among workers, but especially women workers. Thus, the aim of this study was to examine the effects of the work-related stress model based Workplace Mental Health Promotion Programme on the job stress, social support, reactions, salivary immunoglobulin A and Cortisol levels, work absenteeism, job performance and coping profiles of women workers. **Methods:** This study had a "pre-test post-test non-equivalent control groups" design and included 70 women workers (35 in each study group) selected by randomized sampling from two factories. The programme was delivered as an intervention including 12 weeks of follow-up. Reminder messages, videos, and WhatsApp texts were used at the follow-up stage. The research measurements were; the assessment form, the Brief Job Stress Questionnaire, the Brief Coping Profile Scale, salivary ELISA kits, and a self-reported check-list. **Results:** There were no differences in sociodemographic characteristics, general health or working conditions between the Intervention and control groups($p > .05$). Three months after the intervention, there was a significant decrease in job stress($p \leq .001$), physical and mental reactions' scores($p \leq .001$) and work absenteeism($p < .05$), and there was an increase in job performance($p < .05$), social support($p \leq .001$) among the intervention group. The programme showed positive effects on coping profiles($p < .05$). After the intervention salivary-cortisol and IgA levels showed a statistically significant decrease($p < .05$). A majority of effect sizes were very large ($\eta_p^2 > .14$). **Conclusions:** Work-ProMentH was found to be effective and useful in job stress management and promotion of effective coping profiles. It enables its users to holistically assess worker stress and to plan and examine intervention programmes via a systematic approach. There is a need for more empirical studies that may support the data of the present study, but it is thought that the intervention can be maintained for the long-term. We recommend that occupational health professionals at workplaces should consider using this model-based cost-effective intervention, which seems easy and practical to apply in real-life situations.
Ornek et al. 2020.
BMC Public Health, vol.20, no.1.

Keywords: Coping profiles; cortisol; immunoglobulin A; job stress; occupational stress; women workers; work related stress model.

Evidence Level: 3A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09769-0

External validation of a prediction model and decision tree for sickness absence due to mental disorders
Purpose: A previously developed prediction model and decision tree were externally validated for their ability to identify occupational health survey participants at increased risk of long-term sickness absence (LTSA) due to mental disorders. **Methods:** The study population consisted of N = 3415 employees in mobility services who were invited in 2016 for an occupational health survey, consisting of an online questionnaire measuring the health status and working conditions, followed by a preventive consultation with an occupational health provider (OHP). The survey variables of the previously developed prediction model and decision tree were used for predicting mental LTSA (no = 0, yes = 1) at 1-year follow-up. Discrimination between survey participants with and without mental LTSA was investigated with the area under the receiver operating characteristic curve (AUC). **Results:** A total of n = 1736 (51%) non-sick-listed employees participated in the survey and 51 (3%) of them had mental LTSA during follow-up. The prediction model discriminated (AUC = 0.700; 95% CI 0.628-0.773) between participants with and without mental LTSA during follow-up. Discrimination by the decision tree (AUC = 0.671; 95% CI 0.589-0.753) did not differ significantly (p = 0.62) from discrimination by the prediction model. **Conclusion:** At external validation, the prediction model and the decision tree both poorly identified occupational health survey participants at increased risk of mental LTSA. OHPs could use the decision tree to determine if mental LTSA risk factors should be explored in the preventive consultation which follows after completing the survey questionnaire.
Van Hoffen et al. 2020.
International Archives of Occupational and Environmental Medicine, vol. 93, no. 8.

Keywords: Health surveys; mental health; ROC analysis; reproducibility of results; validation studies.
Evidence Level: 4A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01548-z

Psychosocial job characteristics and mental health: Do associations differ by migrant status in an Australian working population sample?
Migrant workers may experience higher burdens of occupational injury and illness compared to native-born workers, which may be due to the differential exposure to occupational hazards, differential vulnerability to exposure-associated health impacts, or both. This study aims to assess if the relationships between psychosocial job characteristics and mental health vary by migrant status in Australia (differential vulnerability). A total of 8969 persons from wave 14 (2014-2015) of the Household Income and Labour Dynamics in Australia Survey were included in the analysis. Psychosocial job characteristics included skill discretion, decision authority and job insecurity. Mental health was assessed via a Mental Health Inventory-5 score (MHI-5), with a higher score indicating better mental health. Migrant status was defined by (i) country of birth (COB), (ii) the combination of COB and English/Non-English dominant language of COB and (iii) the combination of COB and years since arrival in Australia. Data were analysed using linear regression, adjusting for gender, age and educational attainment. Migrant status was analysed as an effect modifier of the relationships between psychosocial job characteristics and mental health. Skill discretion and decision authority were positively associated with the MHI-5 score while job insecurity was negatively associated with the MHI-5 score. We found no statistical evidence of migrant status acting as an effect modifier of the psychosocial job characteristic-MHI-5 relationships. With respect to psychosocial job characteristic-mental health relationships, these results suggest that differential exposure to job stressors is a more important mechanism than differential vulnerability for generating occupational health inequities between migrants and native-born workers in Australia.
Liu et al. 2020.
PLoS One, vol. 15, no. 11.

Keywords: Psychosocial; mental health; migrants; Australia
Evidence Level: 5A

Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242906

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. 2020.
Scandinavian Journal of Work, Environment and Health, vol.17
User License: *Creative Commons Attribution (CC BY 4.0) (https://creativecommons.org/licenses/by/4.0/)*
Keywords: Psychiatry; working hours; Danish; stress; mood; psychotropic drugs; anxiety
Evidence Level: 4B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3936

Effect of work-related events on depressive symptoms in Japanese employees: a web-based longitudinal study
While a number of work-related events have been proposed as risk factors for depression, a majority of studies have focused only on a few events in a single study. Therefore, we conducted a web-based longitudinal study to comprehensively investigate the impact of various work-related events on depressive symptoms. Ten thousand Japanese workers representing the Japanese working population were recruited online and questioned on their experiences of 36 work-related events in the past year. Their depressive symptoms were also assessed based on the Center for Epidemiologic Studies Depression Scale. Two years later, 3,098 participants responded to a follow-up study. By excluding 1,030 participants who were classified as being depressed in the baseline survey, data of 2,068 participants were analyzed. Odds ratios (OR) were calculated using multivariate logistic regression to assess the effect of work-related events on depressive symptoms. Sixteen events were found to be risk factors and were sorted into four types as follows: experience of an accident or disaster (OR: 4.78-7.67), excessive responsibility (OR: 3.01-3.62), drastic change in workstyle or workload (OR: 2.38-3.08), and interpersonal conflict (OR: 2.41-11.16). The current results, including magnitude relationship of ORs, should be utilized for promoting psychosocially healthy work environment.
Nishimura et al. 2020.
Industrial Health, vol. 58, no. 6.
User License: *Creative Commons Attribution -NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) (https://creativecommons.org/licenses/by-nc-nd/4.0/)*
Keywords: Depression; industrial accident compensation insurance; longitudinal study; mental health; work-related events.
Evidence Level: 4B
Link: https://www.jstage.jst.go.jp/article/indhealth/58/6/58_2020-0058/_article

Occupational risk for post-traumatic stress disorder and trauma-related depression: A systematic review with meta-analysis

There is evidence suggesting that occupational trauma leads to post-traumatic stress disorder (PTSD) and depression. However, there is a lack of high-quality reviews studying this association. We, therefore, conducted a systematic review with a meta-analysis to summarize the evidence of occupational trauma on PTSD and depression. After a database search on studies published between 1994 and 2018, we included 31 studies, of which only four had a low risk of bias. For soldiers exposed to wartime deployment, the pooled relative risk (RR) was 2.18 (95% CI 1.83-2.60) for PTSD and 1.15 (95% CI 1.06-1.25) for depression. For employees exposed to occupational trauma, there also was an increased risk for PTSD (RR = 3.18; 95% CI 1.76-5.76) and for depression (RR = 1.73; 95% CI 1.44-2.08). The overall quality of the evidence according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach was moderate; the evidence was high only for the association between workers after exposure to trauma and development of PTSD. The study results indicate an increased risk of PTSD and depression in soldiers after participation in war and in employees after occupational trauma.

Petereit-Haack et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Depression; occupational accident; occupational disease; occupational trauma; posttraumatic stress disorder; systematic review.

Evidence Level: 1A

Link: https://www.mdpi.com/1660-4601/17/24/9369

Psychosocial Issues – Risk Factors

The effect of commuting time on job stress in obese men with different exercise frequency in China

Previous studies have mainly focused on the independent impact of commuting time, exercise, and stress on people. There are few studies regarding the impact of the combined effect of multiple factors on special populations such as obese people. As obesity has become increasingly widespread in China, we studied the impact of commuting time on work stress on Chinese obese men (who exercise regularly vs. who exercise irregularly). We performed a secondary retrospective analysis of the cross-sectional data from the 2014 China Labor Force Dynamics Survey. We found that long commute times and less exercise have a positive effect on the increase in stress, but the effect is less evident for people who exercise regularly. Commuters traveling on foot are more stressed than those traveling by car. This study also found that commuting time had a significant impact on the perceived work stress of obese men who exercised irregularly. But the relationship between commuting time and work stress was different among groups with different commuting styles. For obese men who commuted on foot or motorcycle, commuting time had a significant impact on their job stress. However, for obese men who commuted by bicycle, bus, or car, commuting time had no significant effect on job stress. Additionally, active and passive commuting have different effects on stress. Active commuters tend to be more stressed, while passive commuters do not show a significant impact.

Zhu et al. 2020.

American Journal of Mens Health, vol. 14, no. 6.

Keywords: Commuting; obese men; obesity in China; physical exercise; work stress.

Evidence Level: 4B

Link: https://journals.sagepub.com/doi/full/10.1177/1557988320975542

Psychosocial job strain and polypharmacy: a national cohort study

Objectives Psychosocial job strain has been associated with a range of adverse health outcomes. The aim of this study was to examine the association between psychosocial job strain and prospective risk of polypharmacy (the prescription of ≥5 medications) and to evaluate whether coping strategies can modify

this risk. **Methods** Cohort study of 9703 working adults [mean age 47.5 (SD 10.8) years; 54% female] who participated in the Swedish Longitudinal Occupational Survey of Health (SLOSH) at baseline in 2006 or 2008. Psychosocial job strain was represented by job demands and control, and measured by the Swedish version of the demand-control questionnaire. The outcome was incidence of polypharmacy over an eight-year follow-up period. Information on dispensed drugs were extracted from the Swedish Prescribed Drug Register. Logistic regression was used to estimate the association of job strain status with polypharmacy, adjusted for a range of confounders. **Results** During the follow-up, 1409 people developed polypharmacy (incident rate: 20.6/1000 person-years). In comparison to workers with low-strain jobs (high control/low demands), those with high-strain jobs (low control/high demands) had a significantly higher risk of incident polypharmacy (OR 1.40, 95% CI 1.04-1.89). The impact of high-strain jobs on developing polypharmacy remained among those with covert coping strategies (ie, directed inwards or towards others) but not among those with open coping strategies (ie, primarily directed toward the stressor). **Conclusions** Workers in high-strain jobs may be at an increased risk of polypharmacy. Open coping strategies may reduce the negative impact of psychosocial job strain on risk of polypharmacy.
Tan et al. 2020.
Scandinavian Journal of Work and Environmental Health, vol. 46, no. 6.

Keywords: Cohort study; coping; epidemiology; job control; job demand; job strain; occupational stress; polypharmacy; psychosocial; strain; stress.
Evidence Level: 4B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3914

Exploring the relationship between innovative work behavior, job anxiety, workplace ostracism, and workplace incivility: Empirical evidence from small and medium sized enterprises (SMEs)
The aim of this study is to explore the relationship between workplace ostracism (WO), workplace incivility (WI), and innovative work behavior (IWB), using job anxiety as a mediating variable. Building on the conservation of resource (COR) theory, this study proposes a theoretical framework. In this framework, workplace ostracism and workplace incivility are theorized to strengthen innovative work behavior, directly and indirectly, through job anxiety. Data were collected from the workers of small and medium sized enterprise (SME) entrepreneurs located in Pakistan. To estimate the proposed relationships in the conceptual model, we used structural equation modeling (SEM) through AMOS-21. The outcomes of this study confirmed that workplace ostracism and workplace incivility had a negative impact on innovative work behavior. It was also confirmed that job anxiety mediates in the relationship between workplace ostracism, workplace incivility, job anxiety, and innovative work behavior. At the end of the study, we thoroughly discussed the conclusions, practical implications, limitations, and future research directions of the study.
Samma et al. 2020.
Healthcare, vol. 8, no. 4.

Keywords: Innovative work behavior; job anxiety; workplace incivility; workplace ostracism.
Evidence Level: 6B
Link: https://www.mdpi.com/2227-9032/8/4/508

The emotion regulation roots of job satisfaction
Job satisfaction is a core variable in the study and practice of organizational psychology because of its implications for desirable work outcomes. Knowledge of its antecedents is abundant and informative, but there are still psychological processes underlying job satisfaction that have not received complete attention. This is the case of employee emotion regulation. In this study, we argue that employees' behaviors directed to manage their affective states participate in their level of job satisfaction and hypothesize that employee affect-improving and -worsening emotion regulation behaviors increase and decrease, respectively, job satisfaction, through the experience of positive and negative affect. Using a diary study with a sample of professionals from diverse jobs and organizations, for the most part, the mediational hypotheses were supported by the results albeit a more complex relationship was found in the

case of affect worsening emotion regulation. This study contributes to expanding the job satisfaction and emotion regulation literatures and informs practitioners in people management in organizations about another route to foster and sustain positive attitudes at work.
Madrid et al. 2020.
Frontiers of Psychology, vol.24.

Keywords: Affect; diary study; emotion regulation; job attitudes; job satisfaction.
Evidence Level: 5B
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.609933/full

The effects of acute work stress and appraisal on psychobiological stress responses in a group office environment
Background: The high prevalence of office stress and its detrimental health consequences are of concern to individuals, employers and society at large. Laboratory studies investigating office stress have mostly relied on data from participants that were tested individually on abstract tasks. In this study, we examined the effect of psychosocial office stress and work interruptions on the psychobiological stress response in a realistic but controlled group office environment. We also explored the role of cognitive stress appraisal as an underlying mechanism mediating the relationship between work stressors and the stress response. **Methods and materials:** Ninety participants (44 female; mean age 23.11 ± 3.80) were randomly assigned to either a control condition or one of two experimental conditions in which they were exposed to psychosocial stress with or without prior work interruptions in a realistic multi-participant laboratory setting. To induce psychosocial stress, we adapted the Trier Social Stress Test for Groups to an office environment. Throughout the experiment, we continuously monitored heart rate and heart rate variability. Participants repeatedly reported on their current mood, calmness, wakefulness and perceived stress and gave saliva samples to assess changes in salivary cortisol and salivary alpha-amylase. Additionally, cognitive appraisal of the psychosocial stress test was evaluated. **Results:** Our analyses revealed significant group differences for most outcomes during or immediately after the stress test (i.e., mood, calmness, perceived stress, salivary cortisol, heart rate, heart rate variability) and during recovery (i.e., salivary cortisol and heart rate). Interestingly, the condition that experienced work interruptions showed a higher increase of cortisol levels but appraised the stress test as less threatening than individuals that experienced only psychosocial stress. Exploratory mediation analyses revealed a blunted response in subjective measures of stress, which was partially explained by the differences in threat appraisal. **Discussion:** The results showed that experimentally induced work stress led to significant responses of subjective measures of stress, the hypothalamic-pituitary-adrenal axis and the autonomic nervous system. However, there appears to be a discrepancy between the psychological and biological responses to preceding work interruptions. Appraising psychosocial stress as less threatening but still as challenging could be an adaptive way of coping and reflect a state of engagement and eustress.
Kerr et al. 2020.
Psychoneuroendocrinology, no. 121.

Keywords: Cortisol; heart rate variability; office stress; stress appraisal; stress reactivity; TSST.
Evidence Level: 2A
Link: https://www.sciencedirect.com/science/article/pii/S0306453020302596?via%3Dihub

Work support, role stress, and life satisfaction among Chinese social workers: the mediation role of work-family conflict
The current study examined the relationships among work support, role stress, work-family conflict, and life satisfaction, with a sample of social workers in China's Pearl River Delta (*N* = 1414). Using structure equation modelling, the study revealed that social workers' life satisfaction reduced because of role conflict and work-family conflicts. Work-family conflict partially mediated the negative effects of role ambiguity and conflict on social workers' life satisfaction. Work support from their director, manager, supervisor, and co-

workers protectively reduced role stress and work-family conflict. The findings emphasize the significance of managing the interference between work and family for social workers' well-being.
Jia et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.23.

Keywords: Life satisfaction; role stress; social workers; work support; work-family conflict.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/23/8881

The influence of workload and work flexibility on work-life conflict and the role of emotional exhaustion
The purpose of this study is to examine the relationship between contextual work-related factors in terms of job demands (workload-WL) and job resources (work flexibility-WF), work-life conflict (WLC) and the burnout dimension emotional exhaustion (EE) in a large population-based sample. Building on the job demands resources model (JDRM), we have developed the hypothesis that WL has an indirect effect on EE that is mediated by WLC. We conducted a secondary analysis using data from the Dresden Burnout Study (DBS, N = 4246, mean age (SD) = 42.7 years (10.5); 36.4% male). Results from structural equation modelling revealed that EE is positively associated with WL (β = 0.15, p = 0.001) and negatively associated with WF (β = -0.13, p = 0.001), also after accounting for potential confounding variables (demography, depressive symptoms, and lifetime diagnosis of burnout). Both effects are mediated by WLC (β = 0.18; p = 0.001 and β = 0.08; p = 0.001, respectively) highlighting the important role of WLC in employee health. In summary, WF may help to reduce burnout symptoms in employees, whereas WL may increase them. Study results suggest that both associations depend on WLC levels.
Buruck et al. 2020.
Behavioral Science, vol. 10, no. 11.

Keywords: Burnout; job demands-resources model; work flexibility; work-life-conflict; workload.
Evidence Level: 6B
Link: https://www.mdpi.com/2076-328X/10/11/174

Sleep disturbance and work-related mental strain: A national prospective cohort study of the prediction of subsequent long-term sickness absence, disability pension and mortality
Aims: Sleep disturbances and work-related mental strain are linked to increased sickness absence and disability pension (DP), but we have no information on synergy effects. The aim of this study was to examine the combined (and separate) association of the two predictors with subsequent long-term work disability and mortality. **Methods:** A total of 45,498 participants aged 16-64 years were interviewed in the Swedish Surveys of Living Conditions between 1997 and 2013, and were followed up on long-term sickness absence (LTSA; >90 days/year), DP and mortality via national registers until 2016. Crude and multivariable Cox analyses were used to estimate hazard ratios (HR) and 95% confidence intervals (CI). **Results:** For LTSA, the HRs for sleep disturbances and work-related mental strain were 1.6 (95% CI 1.5-1.7) and 1.3 (95% CI 1.2-1.4), respectively. For DP, the HRs were 2.0 (95% CI 1.8-2.2) and 1.4 (95% CI 1.2-1.5). Mortality was only predicted by sleep disturbances (HR=1.2, 95% CI 1.1-1.4). No synergy effect was seen. **Conclusions:** Work-related mental strain and, in particular, sleep disturbances were associated with a higher risk of subsequent LTSA and DP, but without synergy effects. Sleep disturbances were also associated with mortality. Exposure to interventions tackling sleep disturbance and prevention of workplace stress may reduce work disability.
Akerstedt et al. 2020.
Scandinavian Journal of Public Health, vol. 48, no. 8.

Keywords: Work disability; death; stress; synergy.
Evidence Level: 4A
Link: https://journals.sagepub.com/doi/full/10.1177/1403494820911813

The impact of caring and killing on physiological and psychometric measures of stress in animal shelter employees: A pilot study

Animal shelter employees are in a unique position where they care for, and later kill, the same animals. The aim of our exploratory study was to assess whether "caring" and/or "killing" evokes physiological and psychometric indicators of stress in employees. Experiment 1 compared three careers that kill regularly, but involve varying degrees of husbandry (*n* = 28). Blood pressure (BP), salivary cortisol, heart rate (HR), and heart rate variability (HRV) were collected; data showed higher HR and lower HRV during the process of killing. Psychometric scales showed that burnout and Impact Event Scale-Revised (IES-R) scores were higher in careers with higher contact with animals. Experiment 2 compared three careers that involve husbandry, but varying exposure to killing (*n* = 41). BP, cortisol awakening response, HR, and HRV were measured as well as Professional Quality of Life Scale, IES-R, and Moral Injury Event Scale were administered. There were no significant differences across careers in any measures. The data suggest that the process of killing may be physiologically stressful to the person, and higher levels of animal contact in a euthanasia context may be associated with burnout and traumatic stress, but that the act of euthanasia is not a unique predictor of overall occupational distress. fatigue; occupational stress.

Andrukonis et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Animal shelter; animal-care employees; compassion

Evidence Level: 5A

Link: https://www.mdpi.com/1660-4601/17/24/9196

A cross-sectional study of the relationships between work-related affective feelings expressed by workers in Turkey

Understanding employees' feelings at work plays a significant role in developing practical and effective organizational and human resource management policies and practices. Furthermore, work-related emotions may have a considerable effect on workers' health and wellbeing and affect work effectiveness and work performance. The objectives of the current study were to investigate the relationships among four work-related (WOR) affective feelings (WORAF) and to validate the WORAF questionnaire in a Turkish sample. A survey was performed including four constructs: (1) WOR feelings of happiness, (2) WOR feelings of anxiety, (3) WOR feelings of anger, and (4) WOR feelings of dejection. A total of 322 workers from various companies in Turkey completed a paper-based survey. A research model was developed, and its main components were estimated with partial least squares structural equation modeling (PLS-SEM). The results revealed that dejection and anger at work play a critical role in experienced anxiety in occupational settings. Similarly, dejection, anger, and anxiety at work play a crucial role in perceived happiness at work.

Cakit et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: PLS-SEM; Turkey; feelings at work; modeling; work-related affective feelings.

Evidence Level: 5B

Link: https://www.mdpi.com/1660-4601/17/24/9470

Work-related post-traumatic stress disorder: report of five cases

Post-traumatic stress disorder (PTSD) may arise after events involving a risk to physical integrity or to life, one's own or that of others. It is characterized by intrusive symptoms, avoidance behaviors, and hyper-excitability. Outside certain categories (e.g., military and police), the syndrome is rarely described in the occupational setting. We report here five unusual cases of work-related PTSD, diagnosed with an interdisciplinary protocol (occupational health visit, psychiatric interview, psychological counselling and testing): (1) a 51-yr-old woman who had undergone three armed robbery attempts while working in a peripheral post office; (2) a 53-yr-old maintenance workman who had suffered serious burns on the job; (3) a 33-yr-old beauty center receptionist after sexual harassment and stalking by her male employer; (4) a 57-yr-old male psychiatrist assaulted by a psychotic outpatient; (5) a 40-yr-old woman, sales manager in a shoe store, after physical aggression by a thief. All patients required psychiatric help and pharmacological

treatment, with difficulty of varying degrees in resuming work. We conclude that PTSD can develop even in professional categories generally considered to be at low risk. In such cases, a correct interdisciplinary diagnostic approach is fundamental for addressing therapy and for medico-legal actions.
Stefano et al. 2020.
Industrial Health, vol. 58, no. 6.

Keywords: Adjustment disorder; mental health; occupational psychiatry; post-traumatic stress disorder (PTSD); psycho-social risk; psychological assessment; work stress.
Evidence Level: 5A
Link: https://www.jstage.jst.go.jp/article/indhealth/58/6/58_2020-0079/_article

Psychosocial Issues – Assessment and Management

Understanding and supporting law enforcement professionals working with distressing material: Findings from a qualitative study
This study aimed to extend previous research on the experiences and factors that impact law enforcement personnel when working with distressing materials such as child sexual abuse content. A sample of 22 law enforcement personnel working within one law enforcement organisation in England, United Kingdom participated in anonymous semi-structured interviews. Results were explored thematically and organised in the following headings: "Responses to the material", "Impact of working with distressing evidence", "Personal coping strategies" and "Risks and mitigating factors". Law enforcement professionals experienced heightened affective responses to personally relevant material, depictions of violence, victims' displays of emotions, norm violations and to various mediums. These responses dampened over time due to desensitisation. The stress experienced from exposure to the material sometimes led to psychological symptoms associated with Secondary Traumatic Stress. Job satisfaction, self-care activities, the coping strategies used when viewing evidence, detachment from work outside working hours, social support and reducing exposure to the material were found to mediate law enforcement professionals' resilience. Exposure to distressing material and the risks associated with this exposure were also influenced by specific organisational procedures implemented as a function of the funding available and workload. Recommendations for individual and organisational practices to foster resilience emerged from this research. These recommendations are relevant to all organisations where employees are required to view distressing content.
Denk-Florea et al. 2020.
PLoS One, vol. 15, no. 11.

Keywords: Law enforcement; professionals; distress; child abuse.
Evidence Level: 5A
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242808

Comparing effectiveness of HRV-biofeedback and mindfulness for workplace stress reduction: A randomized controlled trial
Psychophysiological disorders due to work-related stress continue to be highly costly for health systems and approaches for cost-effective and easily accessible interventions are much needed. Both heart rate variability-biofeedback (HRV-Bfb) and mindfulness-based interventions (MBI) have been empirically shown to reduce stress. This study compares these two interventions in the work context to a wait-list-control-group (WLC). In this three-armed randomized controlled trial (RCT), 69 healthy adults employed in the same organization were randomized to participate in HRV-Bfb, MBI or the WLC. Participants were assessed for psychophysiological parameters of stress (stress perception, coping, HRV parameters and cortisol) and stress related symptoms (depressive symptoms, psychological wellbeing, mindfulness and self-compassion). Participants trained using either HRV-Bfb or MBI for 6 weeks on a daily basis. Outcomes were assessed at baseline, after the intervention and at follow-up 12 weeks later. Results did not show any

statistically significant differences between HRV-Bfb and MBI groups, and neither of the intervention groups (IGs) differed from the WLC. Findings suggest an overall reduction in stress for all groups, including the WLC, with mostly small to medium effect sizes. However, it is important to note that participants with higher baseline stress levels might benefit more from mindfulness and biofeedback-based stress reduction interventions. The results have to be interpreted with caution due to the relatively small sample size. MBI might have a slightly stronger effect on stress reduction in comparison to HRV-Bfb, as suggested by the effect sizes. This study highlights issues and challenges of the implementation of such interventions in corporate health management.
Brinkmann et al. 2020.
Applied Psychophysiology Biofeedback, vol. 45, no. 4.

Keywords: Heart rate variability biofeedback; mindfulness meditation; occupational health; stress.
Evidence Level: 2A
Link: https://link.springer.com/article/10.1007%2Fs10484-020-09477-w

Bullying and Harassment

Presenteeism, overcommitment, workplace bullying, and job satisfaction: a moderated mediation relationship
Presenteeism is a hazardous behaviour that may have personal and organizational consequences. The main objective of this research was to investigate the relationship between presenteeism and job satisfaction and evaluate the role of overcommitment as a mediator and the role of work-related and personal bullying as moderators in these relationships. Results from 377 subjects showed that presenteeism and overcommitment are positively related to job satisfaction, with overcommitment being a mediator in the relationships. These relationships are moderated by work-related bullying but not by personal bullying. The findings are discussed, and implications, future research pathways, and limitations are noted.
Rodríguez-Cifuentes et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.22.

Keywords: Economic stress; job satisfaction; overcommitment; personal bullying; presenteeism; work-related bullying; workplace bullying.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/22/8616

Silent counterattack: the impact of workplace bullying on employee silence
The purpose of this paper is to explore the relationship between workplace bullying (WB) and employee silence (ES) as well as its mechanism. This paper collects data from 322 employees of three Chinese enterprises in two waves, with a 2 months interval between the two waves. Moreover, this paper uses confirmatory factor analysis, a bootstrapping mediation test, a simple slope test, and other methods to verify the hypothesis. We find that: (1) WB is positively correlated with ES; (2) psychological safety (PS) and affective commitment mediated the relationship between WB and ES, respectively, and these two variables have a chain mediating effect in the above relationship; and (3) a forgiveness climate moderates this chain mediating effect by weakening the negative impact of WB on PS. Our findings can effectively guide organizations to ultimately adjust their management style, pay attention to employees' cognitive and emotional resources, and formulate some measures to curb WB in organizations.
Liu et al. 2020.
Frontiers in Psychology, vol.23.

Keywords: Affective commitment; employee silence; forgiveness climate; psychological safety; workplace bullying.
Evidence Level: 5B
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.572236/full

Clinical characteristics of patients seeking treatment for common mental disorders presenting with workplace bullying experiences

Background: Targets of workplace bullying tend to develop severe mental health complaints, having increased risk of sick leave and expulsion from the workplace. Hence, these individuals are likely to be overrepresented among patients seeking treatment for common mental disorders (CMD). This study investigated the prevalence of exposure to workplace bullying in a patient group seeking treatment for CMD. Further we explored if exposed and non-exposed patients differed on clinical and work-related characteristics. **Methods:** The sample comprised of 675 patients from an outpatient clinic in Norway and consisted of 70% women and had a mean age of 39 (*SD* = 10.5) years. The study had a cross-sectional design and differences between the patient groups were analysed using chi-square, Mann-Whitney *U*-tests and independent sample *t*-tests. **Results:** The prevalence of exposure to bullying was 25.8%. The patients exposed to bullying reported significantly more major depressive disorders (MDDs) measured with the MINI psychiatric interview, higher levels of depressive symptoms, anxiety symptoms, subjective health complaints, alcohol use, and lower resilience as measured with questionnaires. Twice as many were on full-time sick leave, reported lower work ability, lower return to work self-efficacy, and lower job satisfaction. A majority preferred another job than the one they have today over returning to their current employment. **Conclusion:** Victims of workplace bullying are a vulnerable group at risk of expulsion from working life, being overrepresented among patients seeking mental health treatment for CMD. One in four patients represented with such experience have higher levels of psychological symptoms and are more often diagnosed with depression as compared to other patients. Thus, this is a problem that should be addressed in clinical settings. If not addressed there is an increased risk of sick leave and permanent exclusion from working life.

Aarestad al. 2020.

Frontiers of Psychology, vol. 11.

Keywords: Common mental disorders; health complaints; sick leave; work; workplace bullying.

Evidence Level: 4B

Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.583324/full

Burnout

The moderating role of extroversion and neuroticism in the relationship between autonomy at work, burnout, and job satisfaction

The main aim of this research project was to determine the relationship that exists between autonomy at work and both burnout and job satisfaction, taking into account the moderating effect of the personality factors extroversion and neuroticism. The study was carried out with 971 volunteers (553 women and 418 men) with a mean age of 37.58 years. The majority had either a university degree (485 participants) or higher education qualifications (Spanish baccalaureate) (202 participants). The following instruments were administered: the Maslach Burnout Inventory (MBI), to measure burnout among participants; the Mini International Personality Item Pool Scale (Mini-IPIP) by Donnellan, Oswald, Baird, and Lucas (2006) to measure the personality factors extroversion and neuroticism; the Brief Index of Affective Job Satisfaction (BIAJS) by Thompson and Phua (2012); and the Job Content Questionnaire (JCQ) by Karasek (1985) to measure autonomy at work. The results obtained indicate that those who enjoy greater autonomy at work have lower levels of emotional exhaustion. The stronger the effect is, the higher the score for extroversion. The personality factors studied were not found to have a direct influence on the criterion variables. However, the interaction effects were significant, except in the case of neuroticism. The results indicate that there are no differences between those who score highly for extroversion and neuroticism and the rest of the population in terms of predicting emotional exhaustion or job satisfaction. The present study aims to serve as a guideline for recruitment specialists, business owners, and job designers, encouraging them to take into account all these variables in order to foster the development of healthy and competitive organizations. Environmental moderators that could interfere with the result have not been introduced in

this research. It has focused on the study of the personality factors of the workers, considering that the professional functions performed by the workers were similar.
Farfan et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 21.

Keywords: Autonomy at work; burnout; emotional exhaustion; extroversion; job satisfaction; neuroticism; performance.
Evidence Level: 4B
Link: https://www.mdpi.com/1660-4601/17/21/8166

Enabling Healthy and Safe Workplaces

Health and Wellbeing

What kind of intervention is effective for improving subjective well-being among workers? A systematic review and meta-analysis of randomized controlled trials
Objectives: This study aimed to conduct a systematic review and meta-analysis of randomized controlled trials (RCTs) to improve subjective well-being (SWB), including evaluative, hedonic, and eudemonic well-being, and the mental component of quality of life (QOL) of working population. **Methods:** A literature search was conducted, using PubMed, Embase, PsycINFO, and PsycARTICLES. Eligible studies included those that were RCTs of any intervention, conducted among healthy workers, measured SWB as a primary outcome, and original articles in English. Study characteristics, intervention, outcomes, and results on SWB outcomes were extracted by the investigators independently. After a brief narrative summarizing and classifying the contents of the interventions, the included outcomes were categorized into each aspect of SWB (evaluative, hedonic, and eudemonic well-being, and the mental component of QOL). Finally, the characteristics of the effective interventions for increasing each aspect were summarized, and the pooled effect of interventions on SWB was investigated by a meta-analysis. Publication bias was investigated by drawing a funnel plot and conducting Egger's test. **Results:** From the 5,450 articles found, 39 met the inclusion criteria for the systematic review. The interventions included in this review were classified into six categories (physical activity, ergonomics, psychological, environmental, multicomponent intervention, and others). The meta-analysis from 31 studies showed that the pooled effect of included interventions on SWB was significantly positive (standardized mean difference (SMD) = 0.51; standard error (SE) = 0.10). A funnel plot showed there were extremely large or small SMDs, and Egger's test was significant. Thus, we conducted sensitivity analysis, excluding these extreme SMDs, and confirmed that the estimated pooled effect was also significantly positive. Subgroup analyses for separate types of interventions showed the effects of psychological interventions (e.g., mindfulness, cognitive behavioral based approach, and other psychological interventions) were also significantly positive. **Conclusion:** The current study revealed the effectiveness of interventions for increasing SWB. Specifically, psychological interventions (e.g., mindfulness, cognitive behavioral based approach, and other psychological interventions) may be useful for improving SWB.
Sakurata et al. 2020.
Frontiers of Psychology, vol. 11.

Keywords: Intervention; meta-analysis; positive mental health; subjective well-being; systematic review; worker.
Evidence Level: 1A
Link: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.528656/full

Co-creating and evaluating an app-based well-being intervention: the HOW (Healthier Outcomes at Work) Social Work Project
Stress and mental health at work are the leading causes of long-term sickness absence in the UK, with chronically poor working conditions impacting employee physiological and psychological health. Social

workers play a significant part in the fabric of UK society, but have one of the most stressful occupations in the country. The aim of this project was to work with UK social workers to co-develop, implement, and evaluate a series of smartphone-based mental health initiatives. A Participatory Action Research (PAR) approach, consisting of semi-structured interviews and focus group and steering group discussions, was utilized to design the mental health and well-being interventions. Study efficacy was evaluated via a pre- and post-intervention survey and post-intervention semi-structured interviews. Interventions developed were psycho-educational, improved top-down and bottom-up communication, and provided access to a Vocational Rehabilitation Assistant for those struggling and at risk of sickness absence. Six months following dissemination, surveys demonstrated significant improvements in communication, and mean score improvements in four other working conditions. This project, therefore, demonstrates that co-developed initiatives can be positively impactful, despite post-intervention data collection being impacted by COVID-19. Future studies should build upon these findings and broaden the PAR approach nationally while taking a robust approach to evaluation.
Ravalier et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.23.

Keywords: App; intervention; mental health; stress; well-being; working conditions.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/23/8730

Low-volume high-intensity interval training improves cardiometabolic health, work ability and well-being in severely obese individuals: a randomized-controlled trial sub-study
Background: Obesity is associated with impaired health and lower work ability. Increased physical activity is a cornerstone in the treatment of obesity and related risk factors. Recently, high-intensity interval training (HIIT) has emerged as a popular exercise option. However, data regarding the effects on cardiometabolic health, perceived work ability and well-being in severely obese individuals are lacking. **Methods:** Sixty-five obese individuals with sedentary occupation (48.7 ± 9.9 years, BMI: 39.6 ± 7.1 kg/m^2) were randomly allocated to an extremely time-efficient HIIT (5 × 1 min at 80-95% maximal heart rate on cycle ergometers, 2×/week for 12 weeks) or an inactive control group (CON). Both groups received nutritional counseling to support weight loss. Primary outcome was maximal oxygen uptake (VO_{2max}), secondary outcomes were cardiometabolic risk indices, body composition, work ability index (WAI), quality of life (QoL, EQ-5D-5L-questionnaire) and perceived stress (PSQ-questionnaire). **Results:** Mean body weight reduction was 5.3 kg [95% confidence interval (95% CI) - 7.3 to - 3.3 kg] in the HIIT group ($P < 0.001$) and 3.7 kg (95% CI - 5.3 to - 2.1 kg) in CON ($P < 0.001$), respectively. Only the HIIT group showed significant ($P < 0.001$) changes in VO_{2max} [+ 3.5 mL/kg/min (95% CI 2.5 to 4.6 mL/kg/min)], waist circumference [-7.5 cm (95% CI - 9.8 to - 5.1 kg)], mean arterial blood pressure [- 11 mmHg (95% CI - 14 to - 8 mmHg)], WAI [+ 3.0 points (95% CI 1.7 to 4.3 points)] and QoL [+ 10% (95% CI 5 to 16%)]. In CON, none of these parameters improved significantly. **Conclusions:** Low-volume HIIT may induce significant improvements in cardiometabolic health, especially VO_{2max}, WAI and well-being in obese individuals after only 12 weeks. Our results underpin the wide range of benefits on health and subjective measures through exercise that go well beyond simple weight loss through dietary restriction alone.
Reljic et al. 2020.
Journal of Translational Medicine, vol. 18, no.1.

Keywords: Aerobic exercise; cardiorespiratory fitness; high-intensity interval training; metabolic syndrome; obesity; psychological health; weight loss; work ability.
Evidence Level: 1A
Link: https://translational-medicine.biomedcentral.com/articles/10.1186/s12967-020-02592-6

Demographic and socioeconomic determinants of body mass index in people of working age
Obesity is currently the most common metabolic disease, causing numerous health problems and, if untreated, leading to premature mortality. Obesity is a significant issue among people of working age since their ability to work depends directly on their health condition and psychomotor fitness. Demographic and

socioeconomic factors have a significant impact on the body weight of people of working age. The aim of this study is to identify relationships between the body mass index and selected demographic and socioeconomic variables in working-age residents of the city of Wrocław, Poland. The study involved 4315 respondents (2206 women and 2109 men) aged 18-64 years from Wrocław. The sample selection was random and purposive, using multilevel stratification. The applied research tool was the authors' own cross-sectional diagnostic questionnaire of socioeconomic status. Based on the collected data, the respondents' body weight was categorized according to WHO criteria. The majority of respondents (60%) had a normal body weight, while 40% were categorized as overweight or obese. The difference was statistically significant ($p < 0.001$). Sex, age, occupational status, marital status, number of people in the household, having a steady source of income, disposable (net) income, and savings were significantly correlated ($p < 0.001$) with respondents' body mass index. Public health programs aimed at promoting healthy lifestyle behaviors should be addressed primarily to groups at the highest risk of overweight and obesity.

Puciato et al. 2020.

International Journal of Environmental Research and Public Health, vol.17, no.21.

Keywords: Dynamic programming; hedging; postdecision state variable; risk management; transaction costs.

Evidence Level: 4B

Link: https://www.mdpi.com/1660-4601/17/21/8168

Law enforcement personnel are willing to change, but report influencing beliefs and barriers to optimised dietary intake

Backgound: Law enforcement personnel have been recognized as having a high risk for several lifestyle-related health conditions which, in combination with the nature of their work (sedentary roles interspersed with intermittent high-intensity activity, shift work, and a high stress-load), can have a negative impact on their health. The aim of this study was to investigate the dietary habits and factors or barriers influencing these habits within a cohort of law enforcement personnel in the United States of America. **Method:** Cross-sectional data were obtained via validated paper-based surveys being the Perceived Barriers to Healthy Eating, Food Choice Questionnaire and Rapid Eating Assessment for Participants, Short Version. **Results:** A total of 159 participants (median age = 27 [range 19-60] years; 74% males) participated. Barriers to healthy eating included being busy and irregular working hours. Overall, 91% (n = 143) placed high importance on consuming nutritious food and 80% (n = 126) on food high in vitamins and minerals. A further 80% (n = 127) emphasized high protein content and 41% (n = 62) followed a high protein diet. Barriers to healthy eating included busy lifestyle (60%, n = 94), and irregular working hours (41%, n = 64). Overall, 80% (n = 127) were very willing to make changes in eating habits to be healthier. **Conclusion:** Law enforcement officers know what they should eat and report convenience and health the most important factors guiding their food choices. Knowing this, officers find challenges putting good dietary practices into practice due to factors like a busy lifestyle and irregular work hours. Reportedly "very willing" to make changes in their eating habits to be healthier, future interventions should focus on how to effect changes to their eating habits as opposed to focussing on what to eat.

MacKenzie-Shalders et al. 2020.

BMC Public Health, vol.20, no.1.

Keywords: Behaviour; food choice; health; nutrition; police.

Evidence Level: 4A

Link: https://pubmed.ncbi.nlm.nih.gov/33138785/

Occupational stress and psychological health impact on hypertension of miners in noisy environment in Wulumuqi, China: a case-control study

Background: Hypertension has been declared as a global public health crisis by the World Health Organization, because of its high prevalence. It affects the health of one billion people worldwide and is directly responsible for the deaths of more than 10 million people per year. The purpose of our research

was to explore the influence of occupational stress and psychological health on hypertension of miners who work in a noisy environment and provide decision reference for relevant departments to keep miners' health. **Methods:** A case-control study was carried out in this research. The study subjects were divided into case groups and control groups based on whether they had hypertension or not. Effort-Reward Imbalance questionnaire and Self-Reporting Inventory questionnaire were used to investigate the psychological health status and occupational stress of the target population. General information was balanced between case and control groups through propensity score matching method. After propensity score matching, a multifactorial analysis was used to explore the impact of occupational stress and psychological health on hypertension. **Results:** According to the result of the multivariate analysis, psychological health was hazard to hypertension ($t = 5.080$, $P<0.001$) and occupational stress was not a direct risk factor for hypertension ($t = 1.760$, $P = 0.080$). The model was statistically significant ($\chi^2 = 20.4$, $P<0.01$). **Conclusions:** For miners working in the noisy environment, psychological status was a direct risk factor to hypertension, while occupational stress was an indirect factor.

Lu et al. 2020.

BMC Public Health vol.20, no.1.

Keywords: Hypertension; miners; noisy environment; occupational stress; psychological health.

Evidence Level: 4B

Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09760-9

Use of social media platforms for promoting healthy employee lifestyles and occupational health and safety prevention: A systematic review

This systematic review assesses the feasibility and efficacy of social networking or enterprise social networking for promoting healthy lifestyles or for occupational health and safety (OHS) prevention. Literature searches were conducted in several indexed databases in order to retrieve studies whose main objective was the promotion of healthy lifestyles or the prevention of occupational injuries by means of social media or enterprise social networking alone or in combination with others promotional or preventive interventions. Ten studies were included. Results suggest that social media may be considered a possible means of communication for the promotion of healthy lifestyle habits in organizations, however further study into this technology has been recommended by several authors to judge the incremental impacts of social media on the promotion of healthy lifestyles. Similar conclusions were drawn from studies that included the use of a social media platform for OHS prevention. Based on current evidence, an organization's use of social media to promote a healthy lifestyle or OHS among its employees can constitute an innovative and promising means of intervention. It is important to mention that due to the scarcity and poor methodological quality of existing evidence, it is difficult at this time to draw firm conclusions regarding its effectiveness and relevance.

Laroche et al. 2020.

Safety Science, vol. 131.

Keywords: Enterprise social networking; healthy lifestyles; occupational health and safety; social media; social networking; workplace.

Evidence Level: 1A

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7406239/

The WHO/ILO report on long working hours and ischaemic heart disease - conclusions are not supported by the evidence

Working hours is a ubiquitous exposure given that most adults are employed, and one that is modifiable via legislative change if not always through individual-level choice. According to a recent report from the World Health Organization (WHO) and International Labour Organization (ILO), there is currently sufficient evidence to conclude that long working hours (i.e., ≥55 h per week) elevate the risk of fatal and non-fatal ischaemic heart disease to a clinically meaningful extent. After assessing the data used by the ILO/WHO, we feel that the expert group has not correctly applied their own framework for assessing the strength of the evidence. In the meta-analysis of observational studies in the report, the association between long working

hours and incident heart disease appeared stronger in lower quality cohort studies with a high risk of bias (minimally-adjusted hazard ratio 1.20, 95% CI 1.01-1.41, compared to standard 35-40 weekly hours) than in the superior-quality studies with a lower risk of bias for which the estimate was not significantly different from the null (1.08, 95% CI 0.93-1.25). There was also marked effect modification, such that there was no increase in ischaemic heart disease for those working long hours in high socioeconomic status occupations, a finding also reported in analyses of a recent census-based cohort study which was not included in the report. Our meta-analysis of all these studies confirm that the findings are not consistent but differ between subgroups and that the summary age- and sex-adjusted hazard ratio for long working hours in high socioeconomic status occupations does not support excess risk: 0.85, 95% CI 0.63-1.13 ($P_{interaction}$ = 0.005, total N = 451,982). For these and other reasons detailed in this commentary, we advance a more cautious interpretation of the existing evidence. The conclusions should be restricted to low socioeconomic status occupations only and more research is still needed to confirm or refute harmfulness and determine clinical relevance.

Kivimaki et al. 2020.

Environment International, no.144.

Keywords: International Labor Organization; ischaemic heart disease; long working hours; meta-analysis; systematic review; World Health Organization.

Evidence Level: 6A

Link: https://www.sciencedirect.com/science/article/pii/S0160412020320031?via%3Dihub

Prediction of metabolic syndrome based on sleep and work-related risk factors using an artificial neural network

Background: Metabolic syndrome (MetS) is a major public health concern due to its high prevalence and association with heart disease and diabetes. Artificial neural networks (ANN) are emerging as a reliable means of modelling relationships towards understanding complex illness situations such as MetS. Using ANN, this research sought to clarify predictors of metabolic syndrome (MetS) in a working age population. **Methods:** Four hundred sixty-eight employees of an oil refinery in Iran consented to providing anthropometric and biochemical measurements, and survey data pertaining to lifestyle, work-related stressors and sleep variables. National Cholesterol Education Programme Adult Treatment Panel III criteria was used for determining MetS status. The Management Standards Indicator Tool and STOP-BANG questionnaire were used to measure work-related stress and obstructive sleep apnoea respectively. With 17 input variables, multilayer perceptron was used to develop ANNs in 16 rounds of learning. ANNs were compared to logistic regression models using the mean squared error criterion for validation. **Results:** Sex, age, exercise habit, smoking, high risk of obstructive sleep apnoea, and work-related stressors, particularly Role, all significantly affected the odds of MetS, but shiftworking did not. Prediction accuracy for an ANN using two hidden layers and all available input variables was 89%, compared to 72% for the logistic regression model. Sensitivity was 82.5% for ANN compared to 67.5% for the logistic regression, while specificities were 92.2 and 74% respectively. **Conclusions:** Our analyses indicate that ANN models which include psychosocial stressors and sleep variables as well as biomedical and clinical variables perform well in predicting MetS. The findings can be helpful in designing preventative strategies to reduce the cost of healthcare associated with MetS in the workplace.

Eyvazlou et al. 2020.

BMC Endocrine Disorders, vol. 20, no. 1.

Keywords: Metabolic syndrome; modelling; obstructive sleep apnea; work-related stressors; workplace.

Evidence Level: 5B

Link: https://bmcendocrdisord.biomedcentral.com/articles/10.1186/s12902-020-00645-x

The development of a sleep intervention for firefighters: the FIT-IN (Firefighter's Therapy for Insomnia and Nightmares) study

Background: Firefighters are vulnerable to irregular sleep patterns and sleep disturbance due to work characteristics such as shift work and frequent dispatch. However, there are few studies investigating

intervention targeting sleep for firefighters. This preliminary study aimed to develop and test a sleep intervention, namely FIT-IN (Firefighter's Therapy for Insomnia and Nightmares), which was based on existing evidence-based treatment tailored to firefighters in consideration of their occupational characteristics. **Methods:** This study implemented a single-group pre-post study design, utilizing an intervention developed based on brief behavior therapy for insomnia with imagery rehearsal therapy components. FIT-IN consisted of a total of three sessions (two face-to-face group sessions and one telephone session). Participants were recruited from Korean fire stations, and a total of 39 firefighters participated. Participants completed a sleep diary for two weeks, as well as the following questionnaires to assess their sleep and psychological factors: insomnia severity index (ISI), disturbing dream and nightmare severity index (DDNSI), Epworth sleepiness scale (ESS), depressive symptom inventory-suicidality subscale (DSI), and Patient Health Questionnaire-9 (PHQ-9). These questionnaires were administered before the first session and at the end of the second session. **Results:** The FIT-IN program produced improvements in sleep indices. There was a significant increase in sleep efficiency ($p < 0.01$), and a decrease in sleep onset latency, number of awakenings, and time in bed ($p < 0.05$), as derived from weekly sleep diaries. In addition, significant decreases were shown for insomnia ($p < 0.001$) and nightmare severity ($p < 0.01$). **Conclusion:** There were significant improvements in sleep and other clinical indices (depression, PTSD scores) when comparing pre-and post-intervention scores. FIT-IN may be a feasible and practical option in alleviating sleep disturbance in this population. Further studies will be needed to ascertain FIT-IN's effectiveness.
Jang et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.23.

Keywords: Brief behavioral therapy for insomnia; firefighters; imagery rehearsal therapy; insomnia; nightmare.
Evidence Level: 5A
Link: https://www.mdpi.com/1660-4601/17/23/8738

Recovery from work: testing the effects of chronic internal and external workload on health and well-being
Background: The aim of this study was to examine the effects of reduced recovery opportunities on health, associated with chronic internal workload (ie, during work) and external workload (ie, following work). **Methods:** Data from two consecutive surveys (2013 and 2016) from the Norwegian Living Conditions Survey on Work Environment were used. To assess a dose-response association between workload and health, self-reported ratings of internal workload (ie, having too much to do and skipping lunch breaks during work) and external workload (ie, using mobile technology for work-related issues during leisure time) over the two time periods were divided into tertile groups representing low, medium and high workload. Anxiety, depression, physiological and psychological fatigue and sleep were assessed as outcome symptoms. **Results:** Chronic medium levels of internal workload were associated with psychological fatigue (OR=2.84, 95% CI 1.75 to 4.62) and physical fatigue (OR=1.85, 95% CI 1.31 to 2.63), and high internal workload was associated with psychological fatigue (OR=7.24, 95% CI 4.59 to 11.40), physical fatigue (OR=4.23, 95% CI 3.06 to 5.83) and sleep problems (OR=1.81, 95% CI 1.07 to 3.05). Chronic external high workload was only associated with psychological fatigue (OR=1.67, 95% CI 1.26 to 2.22) and with physical fatigue problems (OR=1.47, 95% CI,1.09-1.98) when the data were adjusted for age, gender, education level, job autonomy and occupational status. **Conclusions:** This study emphasises that individuals who chronically experience high workload are at an increased risk for reporting psychological and physical fatigue, and sleep problems.
Cropley et al. 2020.
Journal of Epidemiology and Community Health, vol. 74, no. 11.

Keywords: Workplace; employment; epidemiology of chronic diseases; heart disease; methodology; mortality; psychological stress; work stress.
Evidence Level: 4A
Link: https://jech.bmj.com/content/74/11/919.long

Relationship between job training and subjective well-being in accordance with work creativity, task variety, and occupation
Background: Job training influences the overall working environment and worker's well-being. The purpose of this study is to find the relationship between job training and subjective well-being in accordance with occupations and understand the influence of task characteristics-work creativity and task variety (WCTV)-on the effect of training. **Methods:** A cross-sectional study based on the Fifth Korean Working Conditions Survey was conducted on 50,205 workers in the Republic of Korea. The World Health Oorganization-5 well-being index was used to measure their subjective well-being. The relationship between job training and subjective well-being was divided in accordance with the level of WCTV. **Results:** Training paid for by employer showed a negative effect on subjective well-being when received for more than 3 days (OR 0.88, $p << 0.01$) in the last 12 months. Training paid for by oneself showed a positive linkage with well-being when the level of training was 1-3 days (Odds ratio = 1.55, $p << 0.001$). This result showed different aspects in accordance with the level of WCTV. For the high WCTV group, the aforementioned results were reaffirmed, but for the group with low WCTV, job training did not show a statistically significant result on well-being. On-the-job training was not related to subjective well-being regardless of the level of WCTV. **Conclusion:** Job training had different effects on subjective well-being depending on the type and frequency of training, as well as the WCTV. It is imperative to comprehensively apply different types of job training in accordance with the characteristics of occupations to uplift workers' well-being.
Shin et al. 2020.
Safety and Health at Work, vol. 11, no. 4.

Keywords: Creativity; job training; subjective well-being; task characteristic; task variety.
Evidence Level: 4B
Link: https://www.sciencedirect.com/science/article/pii/S209379112030319X?via%3Dihub

Vaping in the workplace: Implications for employer-sponsored tobacco cessation programs
Objective: Assess workplace vaping as a trigger for tobacco use; examine interest in and prevalence of vaping cessation programs; determine needs of parents whose children vape. **Methods:** Employees of companies with more than 150 employees, drawn from an opt-in national online panel (N = 1607), ages 18 to 65, completed an online survey in November 2019. **Results:** Among tobacco users, 46% to 48% reported workplace vaping was a trigger for smoking and vaping, respectively; 7% of former users reported it as a trigger. Quit vaping support is important to 85% of employees; 1/3 of workplaces have such programs, with industry variation. Child vaping results in presenteeism and absenteeism among roughly 1/3 of parents. **Conclusions:** Workplace vaping is a trigger for smoking and vaping among current and former tobacco users. A gap exists between desired support for vaping cessation and current employer-sponsored cessation programs.
Graham et al. 2020.
Journal of Occupational and Environmental Medicine, vol. 62, no. 12.

Keywords: Vaping; workplace; employer; sponsored cessation program; tobacco.
Evidence Level: 5A
Link:
https://journals.lww.com/joem/Fulltext/2020/12000/Vaping_in_the_Workplace__Implications_for.2.aspx

Work Health and Safety

Influencing mechanism of job satisfaction on safety behavior of new generation of construction workers based on Chinese context: the mediating roles of work engagement and safety knowledge sharing
China's construction industry developed rapidly and safety production has become a vital issue. Improving the safety behavior of construction workers is an important measure to effectively decrease construction

safety accidents. At present, a New Generation of Construction Workers (NGCWs) born after 1980 has gradually become the main force of construction companies in China and the special group characteristics coming from the intergenerational difference may make them behave differently in safety-related activities, therefore, it is very important to study how to promote their safety behavior. This paper aimed to explore the influencing mechanism of job satisfaction on the safety behavior of NGCWs and examine the mediating role of safety knowledge sharing and work engagement. Confirmatory factor analysis and structural equation modeling analysis were applied to test the theoretical model. Empirical research results indicated that job satisfaction can effectively promote safety behavior through safety knowledge sharing and work engagement. Safety knowledge sharing plays a complete mediating role between job satisfaction and safety compliance behavior, as well as between job satisfaction and safety participation behavior. Moreover, work engagement plays a complete mediating role between job satisfaction and safety participation behavior, which can provide valuable management references for China's construction companies to strengthen their safety behavior.

Ni et al. 2020.

International Journal for Environmental Research and Public Health, vol.17, no.22.

Keywords: Construction worker; health and safety; job satisfaction; safety behavior; work engagement.

Evidence Level: 6B

Link: https://www.mdpi.com/1660-4601/17/22/8361

Safety culture transformation-The impact of training on explicit and implicit safety attitudes

The present paper investigates the changeability of safety culture elements such as explicit and implicit safety attitudes by training. Therefore, three studies with different time frames, training durations, and settings will be presented. In the first study, the short-term attitude change of students from an international environmental sciences study program was measured after safety training in a chemical laboratory. In the second study, the medium-term attitude change was assessed after a Crew Resource Management training for German production workers in the automotive industry. In the third study, the long-term attitude changes were measured after safety ethics training in a sample of German occupational psychology and business students. Different self-report measures were used to evaluate the training effectiveness of explicit safety attitudes. The change of implicit safety attitudes was assessed by Implicit Association Tests. The results of all three studies revealed a significant training effect on the explicit safety attitudes, but not on the implicit ones. Besides the training effect on the explicit attitudes, there was no effect of time frame (short-, medium-, long-term), training duration (2 h, 2 days, 12 weeks), and setting (chemical laboratory, automotive industry, safety ethics study program) on the attitude change. Based on the results, conceptual, methodological, and practical implications for training effectiveness and safety culture transformation are discussed.

Marquardt et al. 2020.

Human Factors of Ergonomics in Manufacturing, vol. 17.

Keywords: Crew resource management training; implicit association test; attitude change; evaluation; implicit attitudes; safety culture; safety training; social cognition.

Evidence Level: 6B

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7753658/

Impact of work environment and occupational stress on safety behavior of individual construction workers

This study was conducted to investigate how the work environment and psychological state influence construction workers' perceptions and safety behaviors. Structural equation modeling was developed with five factors on the working environment (i.e., job demand, job control, job support, rewards, organizational justice, lack of reward), two factors on workers' psychological condition (i.e., depression and trait anxiety), and four factors on safety perception (i.e., safety motivation, safety knowledge, and safety compliance and participation behaviors). Sample data were collected from 399 construction workers working at 29

construction sites in South Korea and analyzed the direct and indirect effects between those factors. The results showed that construction workers' safety compliance and participation behavior are related to their safety knowledge and motivation, and depression and trait anxiety were found to lower safety motivation, knowledge, and, eventually, safety behavior. Job demands, lack of job control, lack of reward, and lack of organizational justice negatively impacted safety behavior. In contrast, job support did not show a significant relationship with safety behavior.
Jung et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.23.

Keywords: Construction worker; occupational stress; safety behavior; structural equation modeling; work environment.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/22/8304

Self-measured worksite blood pressure and its association with organ damage in working adults: Japan Morning Surge Home Blood Pressure (J-HOP) worksite study
The effects of elevations in blood pressure (BP) on worksite stress as an out-of-office BP setting have been evaluated using ambulatory BP monitoring but not by self-measurement. Herein, we determined the profile of self-measured worksite BP in working adults and its association with organ damage in comparison with office BP and home BP measured by the same home BP monitoring device. A total of 103 prefectural government employees (age 45.3 ± 9.0 years, 77.7% male) self-measured their worksite BP at four timepoints (before starting work, before and after a lunch break, and before leaving the workplace) and home BP in the morning, evening, and nighttime (at 2, 3, and 4 a.m.) each day for 14 consecutive days. In the total group, the average worksite systolic BP (SBP) was significantly higher than the morning home SBP (129.1 ± 14.3 vs. 124.4 ± 16.4 mmHg, p = .026). No significant difference was observed among the four worksite SBP values. Although the average worksite BP was higher than the morning home BP in the study participants with office BP < 140/90 mmHg (SBP: 121.4 ± 9.4 vs. 115.1 ± 10.4 mmHg, p < .001, DBP: 76.0 ± 7.7 vs. 72.4 ± 8.4 mmHg, p = .013), this association was not observed in those with office BP ≥ 140/90 mmHg or those using antihypertensive medication. Worksite SBP was significantly correlated with the left ventricular mass index evaluated by echocardiography (r = 0.516, p < .0001). The self-measurement of worksite BP would be useful to unveil the risk of hypertension in working adults who show normal office and home BP.
Tomitani et al. 2020.
Journal of Clinical Hypertension.

Keywords: Home blood pressure; masked hypertension; organ damage; self-measured worksite blood pressure; worksite hypertension.
Evidence Level: 5B
Link: https://onlinelibrary.wiley.com/doi/10.1111/jch.14122

The future of research on work, safety, health and wellbeing: A guiding conceptual framework
Work plays a central role in health. A conceptual model can help frame research priorities and questions to explore determinants of workers' safety, health, and wellbeing. A previous conceptual model focused on the workplace setting to emphasize the role of conditions of work in shaping workers' safety, health and wellbeing. These conditions of work include physical, organizational, and psychosocial factors. This manuscript presents and discusses an updated and expanded conceptual model, placing the workplace and the conditions of work within the broader context of socio-political-economic environments and consequent trends in employment and labor force patterns. Social, political and economic trends, such as growing reliance on technology, climate change, and globalization, have significant implications for workers' day-to-day experiences. These structural forces in turn shape employment and labor patterns, with implications for the availability and quality of jobs; the nature of relationships between employers and workers; and the benefits and protections available to workers. Understanding these patterns will be

critical for anticipating the consequences of future changes in the conditions of work, and ultimately help inform decision-making around policies and practices intended to protect and promote worker safety, health, and wellbeing. This model provides a structure for anticipating research needs in response to the changing nature of work, including the formation of research priorities, the need for expanded research methods and measures, and attention to diverse populations of enterprises and workers. This approach anticipates changes in the way work is structured, managed, and experienced by workers and can effectively inform policies and practices needed to protect and promote worker safety, health and wellbeing.

Sorensen et al. 2020.

Social Science and Medicine, vol. 269.

Keywords: Conceptual model; future of work; total worker health; work organization; worker health and safety; worker well-being; working conditions.

Evidence Level: 6A

Link: https://www.sciencedirect.com/science/article/pii/S0277953620308121?via%3Dihub

Dry eye disease association with computer exposure time among subjects with computer vision syndrome

Purpose: To assess the time of exposure to the computer and dry eye disease (DED) in subjects with computer vision syndrome (CVS). **Methods:** A cross-sectional study was conducted in office workers, computer users of both sexes, with an age range of 18-45 years without comorbidities; we included 108 subjects divided into 3 groups according to the time of computer exposure in hours per day (H/D): <4 (n = 23), 4 -7.9 (n = 49), >8 (n = 39). A specific questionnaire was applied to them on the exposure time and the type of visual display terminal (VDT) used, as well as the computer vision symptoms scale (CVSS17). DED was diagnosed with the Ocular Surface Disease Index (OSDI). Ocular surface damage and signs of DED were evaluated with the tear rupture time test (TBUT), the integrity of the ocular surface by ocular surface staining (OSS) and the production of the aqueous basal tear film using the Schirmer test. **Results:** Average computer exposure time, measured differently, was positively correlated with DED development. The computer exposure time measured in hours per year and TBUT showed a significant negative correlation (p <0.001) (rho -0.463). Years of computer exposure and staining of the ocular surface showed a significant positive correlation (p <0 0.001; rho 0.404). The accumulated exposure time was negatively correlated with TBUT (p <0.001; rho -0.376) and positively with OSS (p <0.001; rho 0.433). Schirmer test did not correlate with computer exposure time. **Conclusion:** The prolonged time of exposure to the computer in subjects with CVS was significantly correlated with the DED tests, in the different ways of measuring it; but not with the Schirmer test.

Sánchez-Valerio et al. 2020.

Clinical Ophthalmology, vol. 14.

Keywords: Computer vision syndrome; dry eye disease.

Evidence Level: 4B

Link: https://www.dovepress.com/dry-eye-disease-association-with-computer-exposure-time-among-subjects-peer-reviewed-article-OPTH

Koebner phenomenon induced by the use of a computer mouse in an occupational setting: case report

Occupational activities are well-known triggers for the onset or aggravation of several dermatoses. The Koebner phenomenon is characterized by the appearance of cutaneous lesions typical of a given inflammatory dermatosis in an area where the skin was injured by mechanical, chemical, or biological agents. Although it is usually easily identified when associated to significant trauma, the Koebner phenomenon may go unnoticed when a small-scale injury underlies its pathogenesis. Herein, we report a case of Koebner phenomenon induced by the repetitive use of a computer mouse in an occupational setting, leading to recalcitrant psoriatic lesions on the palm of the right hand. When atypical features or

unexpected poor responses to treatment are observed in skin conditions, a complete social and occupational anamnesis is paramount to identify aggravating factors and allow successful patient management.
Alpalhao et al. 2020.
Revista Brasileira de Medicina do Trabalho, vol. 18, no. 2.

Keywords: Case report; occupational dermatosis; psoriasis.
Evidence Level: 5B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7732036/

Electrolyte beverage intake to promote hydration and maintain kidney function in Guatemalan sugarcane workers laboring in hot conditions
Objectives: To evaluate impact of electrolyte supplementation on hydration status and health outcomes in Guatemalan agricultural workers performing heavy work under hot climatic conditions. **Methods:** A 3-week pragmatic trial was conducted with a group of 50 workers during the 2017 to 2018 sugarcane harvest. Workers received an electrolyte hydration intervention during 2 of the 3 weeks. Blood and urine samples were collected each week. **Results:** Increased electrolyte intake resulted in less muscle injury. Kidney function was maintained across the intervention period. Workers were adequately hydrated and average electrolyte levels remained in normal ranges. Mild indications of hyponatremia occurred at higher levels of fluid intake. **Conclusions:** This trial demonstrates the feasibility of maintaining workers' electrolyte levels under extremely hot and humid conditions while mitigating muscle injury. Electrolyte supplementation should be added to standard workplace water, rest, and shade interventions to protect workers.
Krisher et al. 2020.
Journal of Occupational and Environmental Medicine, vol. 62, no. 12.

Keywords: Electrolyte; intake; beverage; hydration; kidney function; workers; sugarcane; hot conditions.
Evidence Level: 5A
Link:
https://journals.lww.com/joem/Fulltext/2020/12000/Electrolyte_Beverage_Intake_to_Promote_Hydration.21.aspx

Risk Assessment

Lifestyle-associated health risk indicators across a wide range of occupational groups: a cross-sectional analysis in 72,855 workers
Background: Identify and compare health risk indicators for common chronic diseases between different occupational groups. **Methods:** A total of 72,855 participants (41% women) participating in an occupational health service screening in 2014-2019 were included. Occupation was defined by the Swedish Standard Classification of Occupation, and divided into nine major and additionally eight sub-major groups. These were analysed separately, as white- and blue-collar occupations and as low- and high-skilled occupations. Seven health risk indicators were self-reported: exercise, physical work situation, sitting at work and leisure, smoking, diet, and perceived health, whereas cardiorespiratory fitness, BMI and blood pressure were measured. These were further dichotomized (yes/no) and as clustering of risk indicators (≥3 vs. <3). **Results:** The greatest variation in OR across sub-major and major occupational groups were seen for daily smoking (OR = 0.68 to OR = 5.12), physically demanding work (OR = 0.55 to OR = 45.74) and high sitting at work (OR = 0.04 to OR = 1.86). For clustering of health risk indicators, blue-collar workers had significantly higher clustering of health risks (OR: 1.80; 95% CI 1.71-1.90) compared to white-collar workers (reference). Compared to high-skilled white-collar workers, low-skilled white-collar workers had similar OR (2.00; 1.88-2.13) as high-skilled blue-collar workers (1.98; 1.86-2.12), with low-skilled blue-collar workers having the highest clustered risk (2.32; 2.17-2.48). **Conclusion:** There were large differences in health risk indicators across occupational groups, mainly between high-skilled white-collar occupations and the other occupations, with important variations also between major and sub-major occupational groups. Future

health interventions should target the occupational groups identified with the highest risk for effective disease prevention.
Vaisanen et al. 2020.
BMC Public Health, vol. 20, no. 1.

Keywords: Blue-collar; cardiorespiratory fitness; lifestyle; low- and high-skilled occupations; occupational groups; occupations; physical activity pattern; risk indicators; white-collar.
Evidence Level: 4B
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09755-6

Developing a job exposure matrix of work organization hazards in the United States: A review on methodological issues and research protocol
Background: Most job exposure matrices (JEMs) have been developed for chemical and physical hazards in the United States (US). In addition, the overall validity of most JEMs of work organization hazards using self-reported data in the literature remains to be further tested due to several methodological weaknesses. **Methods:** This paper aims to review important methodological issues with regard to a JEM of work organization hazards using self-report data and to present a research protocol for developing a four-axis (job titles, hazards, sex, and time) JEM of major work organization hazards using the US General Social Survey-Quality of Work-Life (GSS-QWL) data (2002-2018; N = 7,100 workers). **Results:** Five methodological weaknesses in existing JEMs of work organization hazards using self-report data were identified: having only two axes (hazard and occupation), using psychometrically weak items and scales, including scales having little interoccupational variability, unresolved optimal minimum numbers of subjects per occupation, and low accessibility. The methodological weaknesses were successfully addressed in the proposed research protocol. **Conclusion:** The work organization JEM to be developed will significantly facilitate and strengthen occupational epidemiological studies on work organization hazards and major health outcomes, improve national and occupational surveillance of work organization hazards, and promote interventions for a healthy work environment in the US.
Choi et al. 2020.
Safety and Health at Work, vol. 11, no. 4.

Keywords: United States; epidemiology; job exposure matrix; surveillance; work organization.
Evidence Level: 6A
Link: https://www.sciencedirect.com/science/article/pii/S2093791120302936?via%3Dihub

Risk perception and risk-reduction behavior model for blue-collar workers: adapted from the health promotion model
This study examined the health promotion model (HPM) as a framework for assessing perceptions and health-related behaviors related to cardiovascular disease (CVD) risk among blue-collar workers. This was done with the aim of providing time-sensitive educational and training materials for workers while on the job or functioning in their communities. The revised HPM was evaluated in the above context using specific criteria developed by Chinn and Kramer (2008) and scoping literature review. Specifically, we assessed the model based on five criteria such as its clarity, simplicity, generality, accessibility, and importance. The revised HPM showed strengths in both accessibility and generality. That is, it applied to all populations and chronic illnesses through clearly defined and specified major concepts. However, there were several weaknesses in areas of clarity and consistency; the model included three new concepts (i.e., activity-related affect, commitment to a plan of action, and immediate competing demands and preference) that actually decreased these elements. In this context, situational influences require adequately reflected external variables. Nevertheless, the revised HPM showed predictive power among this study's target population. The HPM was modified to address deficiencies in regard to the concept of risk perception. Work-related situational influences were also restructured based on individual and environmental characteristics. The modified framework can be used to clarify health-related behaviors among blue-collar workers.
Hwang et al. 2020.

Frontiers of Psychology, vol.4, no.11.

Keywords: Cardiovascular disease; health promotion model; risk perception; theory evaluation; workers.
Evidence Level: 6B
Link: https://pubmed.ncbi.nlm.nih.gov/33250802/

Ergonomics

Lifetime duration of exposure to biomechanical factors at work as a mediator of the relationship between socioeconomic position and walking speed
The study aimed to assess the proportion mediated by the duration of exposure to ergonomic factors at work on the relationship between socioeconomic position (SEP) and low walking speed. This cross-sectional study was performed on data collected at baseline on 19,704 men and 20,273 women 45-70 years old, currently or previously employed, enrolled in the Constances cohort. SEP was assigned through current or last occupation, categorized in three classes, based on the European Socioeconomic Classification. Walking speed was assessed through one measurement of normal walking for 3 m and dichotomized at the lowest quintile of the sex- and age- (5-year) specific distribution. Self-reported workplace exposure throughout working life to repetitive work, intense physical work, and lifting/carrying heavy loads was used to assess the duration of exposure to each factor, categorized in four classes. Through Poisson regression models, adjusted for BMI, smoking, alcohol intake, hypertension, physical activity, diabetes, cardiovascular diseases, and a cognitive score, the attenuation in the prevalence ratio (PR) of low walking speed by SEP produced by the inclusion of duration of exposure to each factor was evaluated. The mediating effect of work ergonomic exposures on the relationship between SEP and low walking speed was assessed using the weighted method by Vanderweele. In the fully adjusted model without ergonomic exposures, both men and women in the middle and the lowest SEP had a significantly increased risk of low walking speed compared with those in the highest SEP (men: PR = 1.30 and PR = 1.46, respectively; women: PR = 1.24 and PR = 1.45, respectively). The inclusion in separate regression models of exposure duration to repetitive work, intense physical work, and handling of heavy loads produced modest risk attenuations in both men and women, all smaller or around 10%. Mediation analysis revealed in both sexes significant mediation effects for most ergonomic exposures considered, although also with low mediation effects. Significant differences in walking speed by SEP were observed in this large sample, but the proportion of such differences explained by the duration of exposure to ergonomic factors at work was low using either the risk attenuation or the mediation analysis methods.
D'Errico et al. 2020.
Frontiers of Public Health, vol. 8, no. 412.

Keywords: Ergonomics; mediation analysis; socioeconomic position; walking speed; work.
Evidence Level: 4A
Link: https://www.frontiersin.org/articles/10.3389/fpubh.2020.00412/full

Functional analysis of the spine with the Idiag SpinalMouse system among sedentary workers affected by non-specific low back pain
WHO describes "low back pain" (LBP) as the most common problem in overall occupational-related diseases. The aim of this study was to evaluate characteristics of spinal functionality among sedentary workers and determine usability of the SpinalMouse® skin-surface measurement device in workplace settings in a risk population for LBP. The spinal examination was implemented at National Instruments Corporations' Hungarian subsidiary, Debrecen in October, 2015, involving 95 white-collar employees as volunteers to assess spinal posture and functional movements. Data from the physical examination of 91 subjects (age: 34.22 ± 7.97 years) were analyzed. Results showed significant differences ($p < 0.05$) in posture and mobility of the spinal regions in sitting compared to standing position. Significant positive correlations were observed between values measured in standing and sitting positions in all observed regions and aspects of the spine ($p < 0.05$) except posture of lumbar extension ($p = 0.07$) and mobility of sacrum/hip in E-F ($p = 0.818$). Significant ($p < 0.001$) difference (5.70°) was found between the spinal

inclination in sitting 6.47 ± 3.55° compared to standing 0.77 ± 2.53 position. Sitting position has a negative effect on the posture and mobility of the spine among white-collar employees. The SpinalMouse can be used effectively to determine spinal posture and mobility in cross-sectional studies and impact analysis of physical exercise interventions.
Csuhai et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: SpinalMouse; health promotion; low back pain; occupational health; skin surface measures.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/24/9259

Work disabling nerve injury at both elbows due to laptop use at flexible workplaces inside an office: Case-report of a bilateral ulnar neuropathy
Background: This case report describes whether a female civil servant who developed bilateral ulnar neuropathy can be classified as having an occupational disease. **Methods:** The Dutch six-step protocol for the assessment and prevention of occupational diseases is used. **Results:** Based on the six-step protocol, we propose that pressure on the ulnar nerve in the elbow region precipitated the neuropathy for this employee while working prolonged periods in elbow flexion with a laptop. **Conclusion:** Despite the low incidence laptop use might be a risk factor for the occurrence of ulnar neuropathy due to prolonged pressure on the elbow. Employers and workers need to be educated about this disabling occupational injury due to laptop use and about protective work practices such as support for the upper arm and elbow. This seems especially relevant given the trend of more flexible workspaces inside and outside offices, and given the seemingly safe appearance of laptop use.
Kuijer et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Elbow; ergonomics; laptop; nerve injury; neuropathy; occupational disease; prevention; risk factors; workstation.
Evidence Level: 5A
Link: https://www.mdpi.com/1660-4601/17/24/9529

Chronic Health Issues

Work-related asthma: a position paper from the Thoracic Society of Australia and New Zealand and the National Asthma Council Australia
Work-related asthma (WRA) is one of the most common occupational respiratory conditions, and includes asthma specifically caused by occupational exposures (OA) and asthma that is worsened by conditions at work (WEA). WRA should be considered in all adults with asthma, but especially those with new-onset or difficult to control asthma. Improvement in asthma symptoms when away from work is suggestive of WRA. Clinical history alone is insufficient to diagnose WRA; therefore, objective investigations are required to confirm the presence of asthma and the association of asthma with work activities. Management of WRA requires pharmacotherapy similar to that of non-WRA, however, also needs to take into account control of the causative workplace exposure. Ongoing exposure will likely lead to decline in lung function and worsening asthma control. WRA is a preventable condition but this does rely on increased awareness of WRA and thorough identification and control of all potential occupational respiratory hazards.
Hoy et al. 2020.
Respirology, vol.25, no.11.

Keywords: Asthma; occupational asthma; occupational health; preventative medicine; work-exacerbated asthma.
Evidence Level: 6A
Link: https://onlinelibrary.wiley.com/doi/10.1111/resp.13951

Chronic obstructive pulmonary disease prevalence and prediction in a high-risk lung cancer screening population

Background: Chronic obstructive pulmonary disease (COPD) is an underdiagnosed condition sharing risk factors with lung cancer. Lung cancer screening may provide an opportunity to improve COPD diagnosis. Using Pan-Canadian Early Detection of Lung Cancer (PanCan) study data, the present study sought to determine the following: 1) What is the prevalence of COPD in a lung cancer screening population? 2) Can a model based on clinical and screening low-dose CT scan data predict the likelihood of COPD? **Methods:** The single arm PanCan study recruited current or former smokers age 50-75 who had a calculated risk of lung cancer of at least 2% over 6 years. A baseline health questionnaire, spirometry, and low-dose CT scan were performed. CT scans were assessed by a radiologist for extent and distribution of emphysema. With spirometry as the gold standard, logistic regression was used to assess factors associated with COPD. **Results:** Among 2514 recruited subjects, 1136 (45.2%) met spirometry criteria for COPD, including 833 of 1987 (41.9%) of those with no prior diagnosis, 53.8% of whom had moderate or worse disease. In a multivariate model, age, current smoking status, number of pack-years, presence of dyspnea, wheeze, participation in a high-risk occupation, and emphysema extent on LDCT were all statistically associated with COPD, while the overall model had poor discrimination (c-statistic = 0.627 (95% CI of 0.607 to 0.650). The lowest and the highest risk decile in the model predicted COPD risk of 27.4 and 65.3%. **Conclusions:** COPD had a high prevalence in a lung cancer screening population. While a risk model had poor discrimination, all deciles of risk had a high prevalence of COPD, and spirometry could be considered as an additional test in lung cancer screening programs.

Goffin et al. 2020.
BMC Pulmonary Medicine, vol.20, no.1.

Keywords: CT scan; chronic obstructive pulmonary disease; lung cancer; screening; spirometry.
Evidence Level: 4A
Link: https://bmcpulmmed.biomedcentral.com/articles/10.1186/s12890-020-01344-y

Impacts of long-standing illness and chronic illness on working hours and household income in a longitudinal UK study

Individuals within households encounter a variety of events including development of a disability or chronic illness. We used data from the Understanding Society, 2009-2016, to determine whether there are changes to working hours or household income as a result of an individual developing an illness. After adjusting for a variety of sociodemographic characteristics, there were few associations observed between one's own individual illness status and household income. There was a clear trend of reduction of weekly working hours with increasing severity and chronicity of the individuals' illness or disease. Individuals who were not ill, but lived in an household with an ill person worked about 30-min less per week, b = -0.69, 95% confidence interval (CI)=(-1.09, -0.30), while those with a limiting long-standing illness and a chronic disease worked 3.5 h less per week, b = -3.64, 95% CI=(-4.21, -3.08), compared to individuals with no illness in their household. Individuals with a limiting illness only had lower incomes, b = -0.04, 95% CI=(-0.07, -0.004) compared to individuals with no household illness. These associations were not greatly changed with the inclusion of reception of benefits or being cared for. Interactions were observed by gender, age being cared for and reception of benefits. Additionally, there were differences were observed by working age groups and between those who lived alone and those who did not. The findings suggest that while there is a reduction of working hours among individuals with an illness or who have an ill person in their home, household income is resilient to the experience of an illness, in the United Kingdom. However, this appeared to differ by household composition, i.e. whether individuals were of working age or whether they lived alone. Identification of households at highest risk of income reduction may serve to inform policy and appropriate distribution of services and support.

Booker et al. 2020.
SSM Population Health, vol. 12.

Keywords: Diagnosed medical condition; household income; impact of ill health; long-standing illness; longitudinal; working hours.
Evidence Level: 4A
Link: https://www.sciencedirect.com/science/article/pii/S2352827320303219?via%3Dihub

Costs of diabetes complications: hospital-based care and absence from work for 392,200 people with type 2 diabetes and matched control participants in Sweden
Aims: The risk of complications and medical consequences of type 2 diabetes are well known. Hospital costs have been identified as a key driver of total costs in studies of the economic burden of type 2 diabetes. Less evidence has been generated on the impact of individual diabetic complications on the overall societal burden. The objective of this study was to analyse costs of hospital-based healthcare (inpatient and outpatient care) and work absence related to individual macrovascular and microvascular complications of type 2 diabetes in Sweden in 2016. **Methods:** Data for 2016 were retrieved from a Swedish national retrospective observational database cross-linking individual-level data for 1997-2016. The database contained information from population-based health, social insurance and socioeconomic registers for 392,200 people with type 2 diabetes and matched control participants (5:1). Presence of type 2 diabetes and of diabetes complications were derived using all years, 1997-2016. Costs of hospital-based care and of absence from work due to diabetes complications were estimated for the year 2016. Regression analysis was used for comparison with control participants to attribute absence from work to individual complications, and to account for joint presence of complications. **Results:** Use of hospital care for complications was higher in type 2 diabetes compared with control participants in 2016: 26% vs 12% had ≥1 hospital contact; there were 86,104 vs 24,608 outpatient visits per 100,000 people; and there were 9894 vs 2546 inpatient admissions per 100,000 people (all $p < 0.001$). The corresponding total costs of hospital-based care for complications were €919 vs €232 per person ($p < 0.001$), and 74.7% of costs were then directly attributed to diabetes (€687 per person). Regression analyses distributed the costs of days absent from work across diabetes complications per se, basic type 2 diabetes effect and unattributed causes. Diabetes complications amounted to €1317 per person in 2016, accounting for possible complex interactions (25% of total costs of days absent). Key drivers of costs were the macrovascular complications angina pectoris, heart failure and stroke; and the microvascular complications eye diseases, including retinopathy, kidney disease and neuropathy. Early mortality in working ages cost an additional €579 per person and medications used in risk-factor treatment amounted to €418 per person. **Conclusions:** The economic burden of complications in type 2 diabetes is substantial. Costs of absence from work in this study were found to be greater than of hospital-based care, highlighting the need for considering treatment consequences in a societal perspective in research and policy. Graphical abstract.
Anderson et al. 2020.
Diabetologia, vol. 63, no. 12.

Keywords: Costs and cost analysis; diabetes complications; diabetes mellitus, type 2; hospital costs; insurance, disability; sick leave.
Evidence Level: 4B
Link: https://link.springer.com/article/10.1007/s00125-020-05277-3

Effect of family history, occupation and diet on the risk of Parkinson disease: A case-control study
Background: The aetiology of Parkinson's disease (PD) is still very controversial, with a peculiar lack of established risk factors or protective behavior. **Methods:** We carried out a case-control study of 634 idiopathic PD patients admitted from 2011 to 2015 to two hospitals located in central Italy and 532 controls matched by hospital, gender and age (± 5 years). The study questionnaire included questions on host factors, family history, residence, occupation and lifestyle. Odds ratios (ORs) for PD and 95% confidence intervals (CIs) were estimated with logistic regression, adjusting for actual and potential confounders. **Results:** A lower OR was observed in females (0.74; 95%CI:0.58-0.96), while older age classes showed a constantly increased risk for PD ($p<0.005$) starting from the class 65-69 years. Subjects who reported a first degree relative affected by PD showed a borderline increase which was more evident in those enrolled in the urban center of Rome (OR = 1.65; 95%CI: 1.09-2.50). Significant reduction of the risk was associated to

current smoking (OR = 0.48; 95%CI: 0.24-0.54), and to vegetables consumption (p<0.03), while borderline increases were associated to meat and cold cut consumption. Occupational activities classified according to ISCO-08 categories did not show increased risk, while higher ORs' were found for pilots and physicians. **Conclusions:** The results from this study confirmed the higher risk of PD in males and in elderly, and the inverse association with smoking habit. The possible etiological role of familial clustering, dietary habit, and some job tasks is suggested.
Torti et al. 2020.
PLoS One, vol. 15, no. 12.

Keywords: Parkinson's disease; family history; occupation; diet; risk.
Evidence Level: 4A
Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0243612

Development of an intervention to create a supportive work environment for employees with chronic conditions: An intervention mapping approach
Purpose This study describes the development of an evidence-based intervention to create a supportive work environment for employees with chronic conditions. Occupational physicians (OPs) play an important role in guiding organizations in this process of organizational change. Supportive work environments can aid in preventing work-related problems and facilitate sustainable employment. Current workplace interventions for employees with chronic conditions are mainly focused on return to work or a reduction in sick leave at the individual worker's level. This study contributes to the literature an organizational-level intervention which utilizes a preventive approach. **Methods** Intervention mapping (IM) is a six-step, structured protocol that was used to develop this intervention. In step 1, a needs assessment was conducted to define the problem and explore the perspectives of all stakeholders involved. The program outcomes and the performance objectives of employees with chronic conditions and occupational physicians were specified in step 2. In step 3, appropriate methods and practical applications were chosen. Step 4 describes the actual development of the intervention, consisting of (1) a training for occupational physicians to teach them how to guide organizations in creating a supportive work environment; (2) a practical assignment; and (3) a follow-up meeting. The intervention will be implemented in a pilot study in which occupational physicians will put their acquired knowledge and skills into practice within one of their organizations, which is delineated in step 5. **Conclusions** IM proved to be a valuable and practical tool for the development of this intervention, aiming to facilitate sustainable employment for employees with chronic conditions.
Bosma et al. 2020.
Journal of Occupational Rehabilitation, vol. 30, no. 4.

Keywords: Chronic disease; occupational health services; organizations; work.
Evidence Level: 6B
Link: https://link.springer.com/article/10.1007%2Fs10926-020-09885-z

Occupational Exposure

Association between benzene exposure, serum levels of cytokines and hematological measures in Chinese workers: A cross-sectional study
Background: Low benzene exposure leads to hematotoxicity, but we still lack sensitive early monitoring and early warning markers. Benzene is associated with inflammation, which is mainly mediated by cytokines network. However, until now few studies have conducted high-throughput detection of multi-cytokines to get a global view of cytokine changes and screen for markers of benzene-induced toxicity. We hypothesized that cytokine profiles mediate benzene-induced hematotoxicity. **Methods:** 228 subjects consisting of 114 low benzene exposed workers and 114 healthy controls were recruited at Research Center of Occupational Medicine, Peking University Third Hospital, Beijing. The serum concentrations of 27 cytokines were detected by cytokinomics array, urinary benzene series metabolites were measured by

UPLC-MS/MS, and peripheral blood cell counts were observed by basic blood test. **Results:** Among 27 cytokines, IL-9 and MIP1-α were significantly lower, but IL-4, IL-10, IL-15, MCP-1, TNF-α and VEGF were significantly higher in benzene exposure group than controls. Urinary benzene metabolite S-phenylmercapturic acid (S-PMA) was significantly higher in benzene exposure group and had a negative linear relationship with WBC count. S-PMA was only significantly associated with IL-9, meanwhile IL-9, IL-15 and VEGF had a positive linear relationship with WBC count. The bootstrapping mediation models showed that the effect of S-PMA on WBC count was partially explained by IL-9 for 10.11%. **Conclusion:** This study suggests that exposure to benzene was associated with alternation of blood cell count and cytokine profiles in workers exposed to low levels of benzene, especially decreases of WBC count and IL-9. We also found IL-9 partially mediated the effect of low benzene exposure on WBC count, which may be a potential and promising early monitoring and early warning marker of benzene hematotoxicity.
Wang et al. 2020.
Ecotoxicol, vol. 207.

Keywords: Benzene exposure; Cytokine profiles; Hematotoxicity; IL-9.
Evidence Level: 4B
Link: https://www.sciencedirect.com/science/article/pii/S0147651320313993?via%3Dihub

Workplace screening identifies clinically significant and potentially reversible kidney injury in heat-exposed sugarcane workers
An epidemic of chronic kidney disease of unknown origin (CKDu) has emerged in the past two decades in agricultural communities, characterized by progressive renal failure with a dearth of early clinical symptoms. The aim of this study is to improve understanding of the natural history of this disease and to evaluate the impact of an educational and behavioral intervention on the trajectories of renal decline among a cohort of Guatemalan sugarcane workers. We identified groups of workers based on their kidney function during a longitudinal parent study conducted among sugarcane workers during the 2016-2017 harvest season. At the study's first time point in February 2017, workers who developed abnormal kidney function (AKF) (estimated glomerular filtration rate, eGFR, <60 mL/min per 1.73 m^2) were placed in the AKF group, workers with reduced kidney function (RKF) (eGFR 60-89) were placed in the RKF group, and workers who maintained normal kidney function (NKF) (eGFR ≥ 90) were placed in the NKF group. As part of the study, a health promotion, behavioral and educational intervention centered on water, electrolytes, rest, and shade (WERS) was provided to all study participants. We then prospectively analyzed renal function at the three study time points in February, March, and April. Additional data collected from previous harvests allowed for retrospective analysis and we compared the rate of change in eGFR over the previous five years (2012 to 2016) for each identified group. Mixed effects linear regression with random intercepts for the workers was used to investigate the difference in rates of change for the three groups and to assess the impact of the intervention study on rate of change of kidney function during the study compared to each group's prior trajectory, utilizing the retrospective data collected during the five years prior to the study intervention. Between 2012 and 2016, eGFR declined at a rate of 0.18 mL/min per 1.73 m^2 per year for the NKF group (95% CI: -0.66, 0.29, $p = 0.45$), 2.02 per year for the RKF group (95% CI: 1.00, 3.03, $p = 0.0001$) and 7.52 per year for the AKF group (95% CI: 6.01, 9.04, $p < 0.0001$). All study groups stabilized or improved their trajectory of decline during the intervention. This study supports the need to institute WERS interventions and to include mid-harvest screening protocols and longitudinal tracking of kidney function among sugarcane workers at high risk of CKDu. Early detection of rapid kidney function decline combined with appropriate interventions hold promise for stopping or slowing progression of renal insufficiency among these workers.
Sorensen et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 22.

Keywords: Central America; agricultural workers; heat stress; kidney disease; occupational interventions.
Evidence Level: 4B
Link: https://www.mdpi.com/1660-4601/17/22/8552

Maternal occupational exposure and congenital heart defects in offspring
Objectives Congenital heart defects (CHD) are the most prevalent congenital anomalies. This study aims to examine the association between maternal occupational exposures to organic and mineral dust, solvents, pesticides, and metal dust and fumes and CHD in the offspring, assessing several subgroups of CHD. **Methods** For this case-control study, we examined 1174 cases with CHD from EUROCAT Northern Netherlands and 5602 controls without congenital anomalies from the Lifelines cohort study. Information on maternal jobs held early in pregnancy was collected via self-administered questionnaires, and job titles were linked to occupational exposures using a job exposure matrix. **Results** An association was found between organic dust exposure and coarctation of aorta [adjusted odds ratio (OR_{adj}) 1.90, 95% confidence interval (CI) 1.01-3.59] and pulmonary (valve) stenosis in combination with ventricular septal defect (OR_{adj}2.68, 95% CI 1.07-6.73). Mineral dust exposure was associated with increased risk of coarctation of aorta (OR_{adj}2.94, 95% CI 1.21-7.13) and pulmonary valve stenosis (OR_{adj}1.99, 95% CI 1.10-3.62). Exposure to metal dust and fumes was infrequent but was associated with CHD in general (OR_{adj}2.40, 95% CI 1.09-5.30). Exposure to both mineral dust and metal dust and fumes was associated with septal defects (OR_{adj}3.23, 95% CI 1.14-9.11). Any maternal occupational exposure was associated with a lower risk of aortic stenosis (OR_{adj}0.32, 95% CI 0.11-0.94). **Conclusions** Women should take preventive measures or avoid exposure to mineral and organic dust as well as metal dust and fumes early in pregnancy as this could possibly affect foetal heart development.
Spinder et al. 2020.
Scandinavian Journal of Work and Environmental Health, vol. 46, no. 6.

Keywords: Maternal; occupational exposure; congenital heart defects; offspring
Evidence Level: 4A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3912

Exploring evaluation variables for low-cost particulate matter monitors to assess occupational exposure
Background: Small, lightweight, low-cost optical particulate matter (PM) monitors are becoming popular in the field of occupational exposure monitoring, because these devices allow for real-time static measurements to be collected at multiple locations throughout a work site as well as being used as wearables providing personal exposure estimates. Prior to deployment, devices should be evaluated to optimize and quantify measurement accuracy. However, this can turn out to be difficult, as no standardized methods are yet available and different deployments may require different evaluation procedures. To gain insight in the relevance of different variables that may affect the monitor readings, six PM monitors were selected based on current availability and evaluated in the laboratory; **Methods:** Existing strategies that were judged appropriate for the evaluation of PM monitors were reviewed and seven evaluation variables were selected, namely the type of dust, within- and between-device variations, nature of the power supply, temperature, relative humidity, and exposure pattern (peak and constant). Each variable was tested and analyzed individually and, if found to affect the readings significantly, included in a final correction model specific to each monitor. Finally, the accuracy for each monitor after correction was calculated; **Results:** The reference materials and exposure patterns were found to be main factors needing correction for most monitors. One PM monitor was found to be sufficiently accurate at concentrations up to 2000 $\mu g/m^3$ $PM_{2.5}$, with other monitors appropriate at lower concentrations. The average accuracy increased by up to three-fold compared to when the correction model did not include evaluation variables; **Conclusions:** Laboratory evaluation and readings correction can greatly increase the accuracy of PM monitors and set boundaries for appropriate use. However, this requires identifying the relevant evaluation variables, which are heavily reliant on how the monitors are used in the workplace. This, together with the lack of current consensus on standardized procedures, shows the need for harmonized PM monitor evaluation methods for occupational exposure monitoring.
Ruiter et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.22.

Keywords: Evaluation; exposure monitoring; low-cost monitors; occupational; particulate matter; sensors; wearables.

Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/22/8602

Trends in exposure to diesel particulate matter and prevalence of respiratory symptoms in Western Australian miners
Diesel-powered equipment is used frequently in the mining industry. They are energetically more efficient and emit lower quantities of carbon monoxide and carbon dioxide than the gasoline equipment. However, diesel engines release more diesel particulate matter (DPM) during the combustion process which has been linked to harmful health effects. This study assessed the trends in DPM exposure and the prevalence of respiratory symptoms among Western Australian miners, using the available secondary data collected from 2006 to 2012. The data consisted of elemental carbon (EC) concentrations and information on miner's respiratory symptoms. The measured EC concentrations from n = 2598 miners ranged between 0.01 mg/m^3 and 1.00 mg/m^3 and tended to significantly decrease over the study period ($p < 0.001$). Underground mine workers were exposed to significantly higher ($p < 0.01$) median EC concentrations of 0.069 mg/m^3 (IQR 0.076) when compared to surface workers' 0.038 mg/m^3 (IQR 0.04). Overall, 29% of the miners reported at least one respiratory symptom, with the highest frequency recorded for cough (16%). Although the exposure levels of DPM in the mining industry of Western Australia have declined over the study period, they are still high and adhering to stringent occupational standard for DPM is recommended.
Rumchev et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 22.
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Keywords: Australia; diesel particulate matter; respiratory symptoms; underground mines.
Evidence Level: 4A
Link: https://www.mdpi.com/1660-4601/17/22/8435

Respiratory surveillance for coal mine dust and artificial stone exposed workers in Australia and New Zealand: A position statement from the Thoracic Society of Australia and New Zealand
Coal mine lung dust disease (CMDLD) and artificial stone (AS) silicosis are preventable diseases which have occurred in serious outbreaks in Australia recently. This has prompted a TSANZ review of Australia's approach to respiratory periodic health surveillance. While regulating respirable dust exposure remains the foundation of primary and secondary prevention, identification of workers with early disease assists with control of further exposure, and with the aims of preserving lung function and decreasing respiratory morbidity in those affected. Prompt detection of an abnormality also allows for ongoing respiratory specialist clinical management. This review outlines a medical framework for improvements in respiratory surveillance to detect CMDLD and AS silicosis in Australia. This includes appropriate referral, improved data collection and interpretation, enhanced surveillance, the establishment of a nationwide Occupational Lung Disease Registry and an independent advisory group. These measures are designed to improve health outcomes for workers in the coal mining, AS and other dust-exposed and mining industries.
Perret et al. 2020.
Respirology, vol. 25, no. 11.
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Keywords: Coal mine dust lung disease; pneumoconiosis; prevention; respiratory surveillance; silicosis.
Evidence Level: 6A
Link: https://onlinelibrary.wiley.com/doi/10.1111/resp.13952

A potential health risk to occupational user from exposure to biocidal active chemicals
Biocidal active chemicals have potential health risks associated with exposure to retail biocide products such as disinfectants for COVID-19. Reliable exposure assessment was investigated to understand the exposure pattern of biocidal products used by occupational workers in their place of occupation, multi-use facilities, and general facilities. The interview-survey approach was taken to obtain the database about several subcategories of twelve occupational groups, the use pattern, and the exposure information of non-human hygiene disinfectant and insecticide products in workplaces. Furthermore, we investigated valuable

exposure factors, e.g., the patterns of use, exposure routes, and quantifying potential hazardous chemical intake, on biocidal active ingredients. We focused on biocidal active-ingredient exposure from products used by twelve occupational worker groups. The 685 non-human hygiene disinfectants and 763 insecticides identified contained 152 and 97 different active-ingredient chemicals, respectively. The toxicity values and clinical health effects of total twelve ingredient chemicals were determined through a brief overview of toxicity studies aimed at estimating human health risks. To estimate actual exposure amounts divided by twelve occupational groups, the time spent to apply the products was investigated from the beginning to end of the product use. This study investigated the exposure assessment of occupational exposure to biocidal products used in workplaces, multi-use facilities, and general facilities. Furthermore, this study provides valuable information on occupational exposure that may be useful to conduct accurate exposure assessment and to manage products used for quarantine in general facilities.

Kim et al. 2020.

International Journal of Environmental Research and Public Health, vol.17, no.23.

Keywords: Exposure assessment; hazardous ingredients; insecticide; non-human hygiene disinfectant; toxicological endpoint.

Evidence Level: 5A

Link: https://www.mdpi.com/1660-4601/17/23/8770

Significance of norovirus in occupational health: a review of published norovirus outbreaks in Central and Northern Europe

Objectives: Globally, norovirus (NoV) is the leading cause of gastroenteritis infection among all ages. The development of prevention strategies in the field of occupational health requires a detailed knowledge about the impact of the disease on employees. This review article aims not only at evaluating the burden of NoV outbreaks on staff but also at discussing implications for future prevention strategies.

Methods: Published NoV outbreaks in Central and Northern Europe were identified via a systematic literature search. Additionally, published NoV outbreaks in Germany were detected via a manual literature search. Key epidemiological data, as the number of symptomatic staff, was then extracted. The proportion of affected employees was calculated for each dataset (single NoV outbreaks or aggregated data of multiple outbreaks). **Results:** Overall, 116 datasets were extracted from 72 relevant articles. 144,852 persons were affected by NoV gastroenteritis, 25,408 out of them (17.5%) were employees. 23,874 (94.0%) of them fell sick during outbreaks in hospitals and related settings. NoV cases among personnel in food establishments were reported only sporadically (mean ratio: 0.01).

Conclusions: Employees in hospitals and community facilities seem quantitatively to be most vulnerable towards NoV epidemics. Therefore, high quality of prevention measures in these settings, respective compliance with prevention strategies should have the highest priority. The disease can be considered as an occupational disease, even regularly without long-term consequences. Following work safety rules, a vaccination for vulnerable groups should be recommended if the vaccine development turns out to be successful.

Hofmann et al. 2020.

International Archives of Occupational and Environmental Health, vol.93, no.8.

Keywords: Central/Northern Europe; Norovirus gastroenteritis; occupational health; outbreak.

Evidence Level: 6B

Link: https://link.springer.com/article/10.1007%2Fs00420-020-01543-4

Factors affecting lead dust in construction workers' homes in the greater Boston area

Lead is a known reproductive, developmental, and neurological toxicant. Workers with a high likelihood of being exposed to lead at work may inadvertently transport lead home from work, known as "take-home exposure." This is concerning for many workers for whom a workplace intervention is not feasible because their worksites and employers often change, rendering centralized strategies insufficient. This study aimed to better understand the connection between lead in the home of workers living with children and work in construction (n=23), while other occupations were used as a comparison group (janitorial n=5, autobody

n=2). Thirty workers living in disadvantaged communities in the Greater Boston area were recruited in 2018-2019 through collaboration with non-profits and worker unions with expertise working with low-income or immigrant workers. Construction workers that performed renovations, bridge constructions, welding, metal work, and demolitions were prioritized during recruitment. During a visit to their residences, a worker questionnaire was administered, and observations and a dust vacuumed sample of the home were collected. Factors predicting lead in home dust were explored by a bivariate analysis and a multivariable regression model. We found lead in homes' dust in the range of 20-8,310ppm. Homes of construction workers generally had higher and more variable lead dust concentrations (mean 775, max 8,300ppm) than autobody and janitor worker homes combined (mean 296, max 579ppm). Five of the construction workers' home lead dust concentrations exceeded US guidelines for yard soil in children's play areas of 400ppm, and were similar to other studies of homes near lead smelters, superfund sites, or in the Boston area in the early 1990s, pointing to disparities relating to work. Results from the multivariable regression model suggest that lead dust in homes of workers was associated with sociodemographic-, home-, and work-related factors, and pointed to overlapping vulnerabilities; however, a larger sample size is needed to verify findings. Results provide evidence that work-related factors are important to consider when assessing home exposures, and that take-home exposures for workers in lead high-risk jobs such as construction may be an important source of exposure in the home prime for public health intervention at work, home, and community levels.

Diana et al. 2020.

Environmental Research.

Keywords: Autobody; construction; dust; home; janitor; job precariousness; lead; take-home exposure; work.

Evidence Level: 5B

Link: https://www.sciencedirect.com/science/article/pii/S0013935120314079?via%3Dihub

Study of occupational chromium, iron, and nickel exposure and amyotrophic lateral sclerosis in Denmark

Studies of occupational metal exposures and amyotrophic lateral sclerosis (ALS) have focused primarily on known neurotoxicants, including lead, mercury, selenium, and cadmium. However, these exposures are often co-occurring with other lesser studied metals. We conducted a population-based case-control study with the aim of assessing associations between occupational chromium, iron, and nickel exposures and risk of ALS. We identified ALS cases in Denmark from 1982 through 2013 from the Danish National Patient Registry and matched them to 100 controls based on birth year and sex. Cumulative metal exposures were estimated using job exposure matrices applied to occupational history from the Danish Pension Fund. Although mutually adjusted odds of ALS were higher in men with chromium exposures in the third quartile (aOR = 1.24; 95% CI 0.91, 1.69) and fourth quartile (aOR = 1.19; 95% CI: 0.80, 1.76) compared to those with no exposure, differences did not reach statistical significance. We also observed higher odds of ALS in women with nickel exposures in the third quartile (aOR = 2.21; 95% CI: 1.14, 4.28), but not for the fourth quartile (aOR = 0.61; 95% CI: 0.23, 1.64). Our findings do not suggest associations between occupational exposures to these metals and ALS. However, unavoidable non-differential misclassification from the use of JEMs may have masked truly increased risk.

Dickerson et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 21.

Keywords: ALS; amyotrophic lateral sclerosis; metals; motor neuron disease; occupational exposures.

Evidence Level: 4A

Link: https://www.mdpi.com/1660-4601/17/21/8086

Human volunteer study of the decontamination of chemically contaminated hair and the consequences for systemic exposure

The decontamination of exposed persons is a priority following the release of toxic chemicals. Efficacious decontamination reduces the risk of harm to those directly affected and prevents the uncontrolled spread of contamination. Human studies examining the effectiveness of emergency decontamination procedures have primarily focused on decontaminating skin, with few examining the decontamination of hair and scalp. We report the outcome of two studies designed to evaluate the efficacy of current United Kingdom (UK) improvised, interim and specialist mass casualty decontamination protocols when conducted in sequence. Decontamination efficacy was evaluated using two chemical simulants, methyl salicylate (MeS) and benzyl salicylate (BeS) applied to and recovered from the hair of volunteers. Twenty-four-hour urinary MeS and BeS were measured as a surrogate for systemic bioavailability. Current UK decontamination methods performed in sequence were partially effective at removing MeS and BeS from hair and underlying scalp. BeS and MeS levels in urine indicated that decontamination had no significant effect on systemic exposure raising important considerations with respect to the speed of decontamination. The decontamination of hair may therefore be challenging for first responders, requiring careful management of exposed persons following decontamination. Further work to extend these studies is required with a broader range of chemical simulants, a larger group of volunteers and at different intervention times.

Collins et al. 2020.

Science Reports, vol. 10, no. 1.

Keywords: Hair; contamination; chemical; systemic exposure; decontamination; human.

Evidence Level: 6B

Link: https://www.nature.com/articles/s41598-020-77930-1

Occupational exposures and exacerbations of asthma and COPD-A general population study

Purpose: Recent studies suggest that occupational inhalant exposures trigger exacerbations of asthma and chronic obstructive pulmonary disease, but findings are conflicting. **Methods:** We included 7,768 individuals with self-reported asthma (n = 3,215) and/or spirometric airflow limitation (forced expiratory volume in 1 second (FEV1)/ forced expiratory volume (FVC) <0.70) (n = 5,275) who participated in The Copenhagen City Heart Study or The Copenhagen General Population Study from 2001-2016. Occupational exposure was assigned by linking job codes with job exposure matrices, and exacerbations were defined by register data on oral corticosteroid treatment, emergency care unit assessment or hospital admission. Associations between occupational inhalant exposure each year of follow-up and exacerbation were assessed by Cox regression with time varying exposure and age as the underlying time scale.
Results: Participants were followed for a median of 4.6 years (interquartile range, IQR 5.4), during which 870 exacerbations occurred. Exacerbations were not associated with any of the selected exposures (high molecular weight sensitizers, low molecular weight sensitizers, irritants or low and high levels of mineral dust, biological dust, gases & fumes or the composite variable vapours, gases, dusts or fumes). Hazards ratios ranged from 0.8 (95% confidence interval: 0.7;1.0) to 1.2 (95% confidence interval: 0.9;1.7).
Conclusion: Exacerbations of obstructive airway disease were not associated with occupational inhalant exposures assigned by a job exposure matrix. Further studies with alternative exposure assessment are warranted.

Skaaby et al. 2020.

PLos One, vol. 15, no. 12.

Keywords: Occupational exposure; exacerbations; asthma; COPD.

Evidence Level: 4A

Link: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0243826

Occupational noise: Auditory and non-auditory consequences

Occupational noise exposure accounts for approximately 16% of all disabling hearing losses, but the true value and societal costs may be grossly underestimated because current regulations only identify hearing impairments in the workplace if exposures result in audiometric threshold shifts within a limited frequency

region. Research over the past several decades indicates that occupational noise exposures can cause other serious auditory deficits such as tinnitus, hyperacusis, extended high-frequency hearing loss, and poor speech perception in noise. Beyond the audiogram, there is growing awareness that hearing loss is a significant risk factor for other debilitating and potentially life-threatening disorders such as cardiovascular disease and dementia. This review discusses some of the shortcomings and limitations of current noise regulations in the United States and Europe.
Sheppard et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: Continuous equivalent level; dementia; hidden hearing loss; hyperacusis; occupational noise exposure; otoacoustic emissions; sound pressure level; tinnitus; ultra-high frequency.
Evidence Level: 6A
Link: https://www.mdpi.com/1660-4601/17/23/8963

Urinary oxidative stress biomarkers in workers of a titanium dioxide based pigment production plant
Titanium dioxide is produced or imported into the EU for over one million tons/year. The International Agency for Research on Cancer (IARC) classification is 2B, a possible inhalation carcinogen for humans. This study evaluates urinary biomarkers of oxidative stress in workers of a plant producing TiO_2 pigment powder, having 0.25 µm average particle size and an ultrafine fraction, compared to unexposed subjects. Urine samples were collected from forty workers before and after the shift, from six employees of the same company and eighteen volunteers from the same geographical area. Titanium and other metals concentrations were measured by ICP-MS, while DNA, RNA, and protein oxidation products by HPLC/MS-MS. A statistically significant increase was found for the urinary concentration of Al, Cd, Cr, Cu, Fe, Mn, Pb, Ti, and Zr, and for all biomarkers of oxidative stress in post-shift workers' urine samples. Urinary concentrations after the working shift were higher than for employees and volunteers pooled together for Cd, Mn, and Zr, and for the oxidative stress biomarkers 8-oxoGuo, 8-oxodGuo, and $3NO_2$Tyr. Biomonitoring studies on dose and effect biomarkers for TiO_2 occupational exposure provide information useful for protecting workers' health even in conditions that comply with health and safety standards, highlighting reversible effects of chronic exposure at very low doses.
Buonaurio et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: HPLC-MS/MS; ICP-MS; occupational exposure; oxidative stress biomarkers; urinary Titanium.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/23/9085

Occupational exposure to pesticides and health symptoms among family farmers in Brazil
Objective: To explore the association of occupational pesticide exposure with acute and mental health symptoms. **Methods:** Cross-sectional survey carried out with 78 Brazilian family farmers, who were pesticide applicators and helpers conveniently selected. Symptoms and exposure data were collected by interviews, and mental health outcomes by the Self-Reporting Questionnaire. Blood samples were analyzed to assess cholinesterase levels. Exposure indicators and symptoms were compared between applicators and helpers, and Poisson regression was performed to estimate prevalence ratios. **Results:** Farmers reported exposure to multiple pesticides from early ages; they worked without safety training, technical support, and full protective equipment, and they had a high prevalence of acute and mental health symptoms (e.g., headache, mucosal irritation, tachycardia, and depressive signs). Applicators had more cholinesterase changes than helpers, but less symptoms. Helpers used less personal protection and had significantly higher prevalence ratio of headache, dyspnea, wheezing, cough, poor digestion, tiredness, and feeling worthless, after adjustment. **Conclusions:** Acute and mental health symptoms were observed, both among farmers and helpers. Thus, surveillance actions must be reinforced in Brazil, technical support and safety training improved, focused on applicators and helpers, who are occupationally and environmentally exposed to pesticides. Agricultural practices of these groups with less pesticide use should receive incentive.

Buralli et al. 2020.
Revista de Saúde Pública, vol. 54, no. 133.

Keywords: Occupational exposure; pesticides; health; symptoms; farmers.
Evidence Level: 4B
Link: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102020000100308&lng=en&nrm=iso&tlng=en

Wastewater treatment plant workers' exposure and methods for risk evaluation of their exposure
Work in wastewater treatment plants (WWTPs) can be associated with respiratory symptoms and diarrhea. The aim of this study was to obtain knowledge about WWTP workers' exposure to airborne bacteria and endotoxin, and the inflammatory potential (TIP) of their exposure, and to evaluate the risk posed by the exposure by 1) calculating a hazard index and relating the exposure to suggested occupational exposure limits (OELs), 2) estimating the potential deposition of bacteria in the airways, 3) relating it to the risk group classification of bacteria by the European Union, and 4) estimating the TIP of the personal exposure. A cohort of 14 workers were followed over one year. Bioaerosols were collected using personal and stationary samplers in a grid chamber house and an aeration tank area. Airborne bacteria were identified using (MALDI-TOF MS), and TIP of exposure was measured using HL-60 cells. A significant effect of season, work task, and person was found on the personal exposure. A hazard index based on exposure levels indicates that the risk caused by inhalation is low. In relation to suggested OELs, 14% and 34% of the personal exposure were exceeded for endotoxin (≥50 EU/m^3) and bacteria (≥500 CFU/m^3). At least 70% of the airborne bacteria in the grid chamber house and the aeration tank area could potentially deposit in the lower respiratory tract. From the personal samples, three of 131 bacterial species, Enterobacter cloacae, Staphylococcus aureus, and Yersinia enterocolitica are classified within Risk Group 2. Seven additional bacteria from the stationary samples belong to Risk Group 2. The bacterial species composition was affected significantly by season ($p = 0.014$) and by sampling type/area ($p = 0.001$). The TIP of WWTP workers' exposure was higher than of a reference sample, and the highest TIP was measured in autumn. TIP of personal exposure correlated with bacterial exposure. Based on the geometric average exposures to endotoxin (9.2 EU/m^3) and bacteria (299 CFU/m^3) and based on the calculated hazard index, the risk associated with exposure is low. However, since 43 of 106 exposure levels exceed suggested OELs, the TIP of exposure was elevated and associated with bacterial exposure, and WWTP workers were exposed to pathogenic bacteria, a continued focus on preventive measures is important. The identification of bacteria to species level in personal samples was necessary in the risk assessment, and measurement of the microbial composition made the source tracking possible.
Lu et al. 2020.
Ecotoxicology and Environmental Safety, vol. 205.

Keywords: Airborne bacteria; endotoxin; inflammation; pathogens.
Evidence Level: 4A
Link: https://www.sciencedirect.com/science/article/pii/S0147651320312021?via%3Dihub

Is environmental and occupational particulate air pollution exposure related to Type-2 Diabetes and Dementia? A cross-sectional analysis of the UK biobank
Human exposure to particulate air pollution (e.g., $PM_{2.5}$) can lead to adverse health effects, with compelling evidence that it can increase morbidity and mortality from respiratory and cardiovascular disease. More recently, there has also been evidence that long-term environmental exposure to particulate air pollution is associated with type-2 diabetes mellitus (T2DM) and dementia. There are many occupations that may expose workers to airborne particles and that some exposures in the workplace are very similar to environmental particulate pollution. We conducted a cross-sectional analysis of the UK Biobank cohort to verify the association between environmental particulate air pollution ($PM_{2.5}$) exposure and T2DM and dementia, and to investigate if occupational exposure to particulates that are similar to those found in environmental air pollution could increase the odds of developing these diseases. The UK Biobank dataset

comprises of over 500,000 participants from all over the UK. Environmental exposure variables were used from the UK Biobank. To estimate occupational exposure both the UK Biobank's data and information from a job exposure matrix, specifically developed for UK Biobank (Airborne Chemical Exposure-Job Exposure Matrix (ACE JEM)), were used. The outcome measures were participants with T2DM and dementia. In appropriately adjusted models, environmental exposure to $PM_{2.5}$ was associated with an odds ratio (OR) of 1.02 (95% CI 1.00 to 1.03) per unit exposure for developing T2DM, while $PM_{2.5}$ was associated with an odds ratio of 1.06 (95% CI 0.96 to 1.16) per unit exposure for developing dementia. These environmental results align with existing findings in the published literature. Five occupational exposures (dust, fumes, diesel, mineral, and biological dust in the most recent job estimated with the ACE JEM) were investigated and the risks for most exposures for T2DM and for all the exposures for dementia were not significantly increased in the adjusted models. This was confirmed in a subgroup of participants where a full occupational history was available allowed an estimate of workplace exposures. However, when not adjusting for gender, some of the associations become significant, which suggests that there might be a bias between the occupational assessments for men and women. The results of the present study do not provide clear evidence of an association between occupational exposure to particulate matter and T2DM or dementia.
Dimakakou et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Air pollution; dementia; environmental exposure; epidemiological analysis; epidemiology; occupational exposure; particulate matter; type 2 diabetes.
Evidence Level: 4A
Link: https://www.mdpi.com/1660-4601/17/24/9581

Asbestosis

Association between asbestos exposure and pericardial and tunica vaginalis testis malignant mesothelioma: a case-control study and epidemiological remarks
Objectives: The purposes of this study are to describe the epidemiology of pericardial and tunica vaginalis testis mesothelioma and assess the role of asbestos exposure for these rare diseases. **Methods:** Based on incident pericardial and tunica vaginalis testis mesothelioma cases collected from the Italian national mesothelioma registry (ReNaM) in the period 1993-2015, incidence rates, survival median period and prognostic factors have been evaluated. A case-control study has been performed to analyze the association with asbestos exposure (occupational and non-occupational) for these diseases. **Results:** Between 1993 and 2015, 58 pericardial (20 women and 38 men) and 80 tunica vaginalis testis mesothelioma cases have been registered with a mean annual standardized (world standard population as reference) incidence rates of 0.049 (per million) in men and 0.023 in women for the pericardial site, and 0.095 for tunica vaginalis testis mesothelioma. Occupational exposure to asbestos was significantly associated with the risk of the diseases [odds ratio (OR) 3.68, 95% confidence interval (CI) 1.85-7.31 and OR 3.42, 95% CI 1.93-6.04 in pericardial and tunica vaginalis testis mesothelioma, respectively]. The median survival was 2.5 months for pericardial and 33.0 months for tunica vaginalis testis mesotheliomas. Age was the main predictive factor for survival for both anatomical sites. **Conclusions:** For the first time in an analytical study, asbestos exposure was associated with pericardial and tunica vaginalis testis mesothelioma risk, supporting the causal role of asbestos for all anatomical sites. The extreme rarity of the diseases, the poor survival and the prognostic role of age have been confirmed based on population and nationwide mesothelioma registry data.
Marinaccio et al. 2020.
Scandinavian Journal of Work, Environment and Health, vol.46, no.6.

Keywords: Asbestos; case–control study; epidemiology; exposure; Italy; malignant mesothelioma; mesothelioma; national registry; pericardial and tunica vaginalis testis; rare disease.
Evidence Level: 4B
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3895

Characteristics of asbestos fibers in lung tissue from occupational and environmental asbestos exposure of lung cancer patients in Busan, Korea

The Asbestos Injury Relief Act in Korea requires that asbestos exposure be assessed through clinical examination and chest computed tomography (CT). However, a more specific measurement of asbestos characteristics in the lung tissue may be appropriate. We aimed to investigate the asbestos burden and characterize asbestos fibers in patients with lung cancer and ultimately assess the relationship between occupational and environmental asbestos exposure and lung cancer in Korea. We evaluated 37 lung cancer patients (LCPs) from Busan. The factors affecting asbestos burden in LCPs were analyzed using a multiple regression analysis. History of asbestos exposure (environmental/occupational), male sex, and old age were the main factors affecting asbestos burden in lung tissues of LCPs. These factors had an approximate 37% adjusted coefficient of determination. There was a significant difference in the length of asbestos fibers (4.06-37.6 µm vs. 4.26-91.7 µm) and aspect ratio (4.5-151.9 vs. 5.6-735.6) between those who were occupationally exposed to asbestos and those who were environmentally exposed ($P < 0.01$). Therefore, both environmental/occupational exposure to asbestos should be strongly managed to reduce the risk of lung cancer, and exposure should be assessed according to the characteristics of asbestos fibers in the lung tissue.

Jung et al. 2020.

Scientific Reports, vol.23, no.10.

Keywords: Asbestos; lung cancer; exposure; occupation; environmental

Evidence Level: 5B

Link: https://www.nature.com/articles/s41598-020-77291-9

Sedentary Practices

Sedentary lifestyle: overview of updated evidence of potential health risks

One-third of the global population aged 15 years and older engages in insufficient physical activities, which affects health. However, the health risks posed by sedentary behaviors are not well known. The mean daily duration of sedentary behavior is 8.3 hours among the Korean population and 7.7 hours among the American adult population. Sedentary lifestyles are spreading worldwide because of a lack of available spaces for exercise, increased occupational sedentary behaviors such as office work, and the increased penetration of television and video devices. Consequently, the associated health problems are on the rise. A sedentary lifestyle affects the human body through various mechanisms. Sedentary behaviors reduce lipoprotein lipase activity, muscle glucose, protein transporter activities, impair lipid metabolism, and diminish carbohydrate metabolism. Furthermore, it decreases cardiac output and systemic blood flow while activating the sympathetic nervous system, ultimately reducing insulin sensitivity and vascular function. It also alters the insulin-like growth factor axis and the circulation levels of sex hormones, which elevates the incidence of hormone-related cancers. Increased sedentary time impairs the gravitostat, the body's weight homeostat, and weight gain, adiposity, and elevated chronic inflammation caused by sedentary behavior are risk factors for cancer. Sedentary behaviors have wide-ranging adverse impacts on the human body including increased all-cause mortality, cardiovascular disease mortality, cancer risk, and risks of metabolic disorders such as diabetes mellitus, hypertension, and dyslipidemia; musculoskeletal disorders such as arthralgia and osteoporosis; depression; and, cognitive impairment. Therefore, reducing sedentary behaviors and increasing physical activity are both important to promote public health.

Park et al. 2020.

Korean Journal of Family Medicine, vol. 41, no. 6.

Keywords: All-cause mortality; cancer; exercise; metabolic disease; physical activity; sedentary behavior.

Evidence Level: 6A

Link: https://www.kjfm.or.kr/journal/view.php?doi=10.4082/kjfm.20.0165

Workplace neighbourhood built environment and workers' physically active and sedentary behaviour: a systematic review of observational studies

Background: Many desk-based workers can spend more than half of their working hours sitting, with low levels of physical activity. Workplace neighbourhood built environment may influence workers' physical activities and sedentary behaviours on workdays. We reviewed and synthesised evidence from observational studies on associations of workplace neighbourhood attributes with domain-specific physical activity and sedentary behaviour and suggested research priorities for improving the quality of future relevant studies. **Methods:** Published studies were obtained from nine databases (PubMed, Web of Science, PsycINFO, Scopus, Transport Research International Documentation, MEDLINE, Cochrane, Embase, and CINAHL) and crosschecked by Google Scholar. Observational studies with quantitative analyses estimating associations between workplace neighbourhood built environment attributes and workers' physical activity or sedentary behaviour were included. Studies were restricted to those published in English language peer-reviewed journals from 2000 to 2019. **Results:** A total of 55 studies and 455 instances of estimated associations were included. Most instances of potential associations of workplace neighbourhood-built environment attributes with total or domain-specific (occupational, transport, and recreational) physical activity were non-significant. However, destination-related attributes (i.e., longer distances from workplace to home and access to car parking) were positively associated with transport-related sedentary behaviour (i.e., car driving). **Conclusions:** The findings reinforce the case for urban design policies on designing mixed-use neighbourhoods where there are opportunities to live closer to workplaces and have access to a higher density of shops, services, and recreational facilities. Studies strengthening correspondence between the neighbourhood built environment attributes and behaviours are needed to identify and clarify potential relationships.

Lin et al. 2020.
The International Journal of Behavioral Nutrition and Physical Activity, vol. 17, no.1.

Keywords: Employee; physical activity; sitting; walkability; worksite.
Evidence Level: 1A
Link: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-01055-x

New global guidelines on sedentary behaviour and health for adults: broadening the behavioural targets

Background: In 2018, the World Health Organisation (WHO) commenced a program of work to update the 2010 Global Recommendations on Physical Activity for Health, for the first-time providing population-based guidelines on sedentary behaviour. This paper briefly summarizes and highlights the scientific evidence behind the new sedentary behaviour guidelines for all adults and discusses its strengths and limitations, including evidence gaps/research needs and potential implications for public health practice. **Methods:** An overview of the scope and methods used to update the evidence is provided, along with quality assessment and grading methods for the eligible new systematic reviews. The literature search update was conducted for WHO by an external team and reviewers used the AMSTAR 2 (Assessment of Multiple Systematic Reviews) tool for critical appraisal of the systematic reviews under consideration for inclusion. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) method was used to rate the certainty (i.e. very low to high) of the evidence. **Results:** The updated systematic review identified 22 new reviews published from 2017 up to August 2019, 14 of which were incorporated into the final evidence profiles. Overall, there was moderate certainty evidence that higher amounts of sedentary behaviour increase the risk for all-cause, cardiovascular disease (CVD) and cancer mortality, as well as incidence of CVD, cancer, and type 2 diabetes. However, evidence was deemed insufficient at present to set quantified (time-based) recommendations for sedentary time. Moderate certainty evidence also showed that associations between sedentary behaviour and all-cause, CVD and cancer mortality vary by level of moderate-to-vigorous physical activity (MVPA), which underpinned additional guidance around MVPA in the context of high sedentary time. Finally, there was insufficient or low-certainty systematic review evidence on the type or domain of sedentary behaviour, or the frequency and/or duration of bouts or breaks in sedentary behaviour, to make specific recommendations for the health outcomes examined. **Conclusions:** The WHO 2020 guidelines are based on the latest evidence on sedentary behaviour and health, along with interactions between sedentary behaviour and MVPA, and support implementing public

health programmes and policies aimed at increasing MVPA and limiting sedentary behaviour. Important evidence gaps and research opportunities are identified.

Dempsey et al. 2020.

International Journal of Behavior, nutrition and Physical Activity, vol. 17, no. 1.

Keywords: Cancer; cardiovascular; chronic disease; exercise; global health; guidelines; health promotion; physical activity; public health; sedentary; type 2 diabetes.

Evidence Level: 6B

Link: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-01044-0

Using an e-health intervention to reduce prolonged sitting in UK office workers: A randomised acceptability and feasibility study

Low-cost workplace interventions are required to reduce prolonged sitting in office workers as this may improve employees' health and well-being. This study aimed to assess the acceptability and feasibility of an e-health intervention to reduce prolonged sitting among sedentary UK-based office workers. Secondary aims were to describe preliminary changes in employee health, mood and work productivity after using an e-health intervention. Healthy, university office workers (n = 14) completed this study. An 8 week randomised crossover design was used, consisting of two trials: Intervention (computer-based prompts) and Control. Eligibility and retention rates were recorded to assess the feasibility of the trial and interviews were conducted following the intervention to explore its acceptability. Sitting, standing and stepping were objectively assessed prior to and during week 8 of each trial. Before and after each trial, measurements of vascular function, cerebrovascular function, mood and work productivity were obtained. This study had eligibility and retention rates of 54.5% and 77.8%, respectively. Participants expressed a lack of autonomy and disruption to their workflow when using the e-health intervention, raising concerns over its acceptability and long-term implementation. Preliminary data indicate that the intervention may improve the patterning of activity accrued during work hours, with increases in the number of standing and stepping bouts completed, in addition to improving vascular function. This e-health intervention is feasible to deliver in a cohort of university office workers. However, adaptations to its implementation, such as personalised settings, are needed to increase acceptability before larger trials can be conducted.

Carter et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: Cardiovascular health; prompts; sedentary behaviour; workplace.

Evidence Level: 5A

Link: https://www.mdpi.com/1660-4601/17/23/8942

Rise and recharge: Effects on activity outcomes of an e-health smartphone intervention to reduce office workers' sitting time

This feasibility study evaluated the effects of an individual-level intervention to target office workers total and prolonged sedentary behaviour during working hours, using an e-health smartphone application. A three-arm (Prompt-30 or 60 min Intervention arm and a No-Prompt Comparison arm), quasi-randomised intervention was conducted over 12 weeks. Behavioural outcomes (worktime sitting, standing, stepping, prolonged sitting, and physical activity) were monitored using accelerometers and anthropometrics measured at baseline, 6 weeks and 12 weeks. Cardiometabolic measures were taken at baseline and 12 weeks. Fifty-six office workers (64% female) completed baseline assessments. The Prompt-60 arm was associated with a reduction in occupational sitting time at 6 (-46.8 min/8 h workday [95% confidence interval = -86.4, -6.6], $p < 0.05$) and 12 weeks (-69.6 min/8 h workday [-111.0, -28.2], $p < 0.05$) relative to the No-Prompt Comparison arm. Sitting was primarily replaced with standing in both arms ($p > 0.05$). Both Intervention arms reduced time in prolonged sitting bouts at 12 weeks (Prompt-30: -27.0 [-99.0, 45.0]; Prompt-60: -25.8 [-98.4, 47.4] min/8 h workday; both $p > 0.05$). There were no changes in steps or cardiometabolic risk. Findings highlight the potential of a smartphone e-health application, suggesting 60 min prompts may present an optimal frequency to reduce total occupational sedentary behaviour.

Morris et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Activity breaks; feasibility; intervention; physical activity; sedentary behaviour; sitting; workplace.
Evidence Level: 3A
Link: https://www.mdpi.com/1660-4601/17/24/9300

Physical Activity

Leveraging walking performance to understand work fatigue among young adults: Mixed-methods study
Background: Work fatigue negatively impacts personal health in the long term. Prior research has indicated the possibility of leveraging both walking parameters and perceptual measures to assess a person's fatigue status. However, an effective and ubiquitous approach to assessing work fatigue in young adults remains unexplored. **Objective:** The goals of this paper were to (1) explore how walking rhythms and multiple streams of data, including reaction time, self-reports, and an activity diary, reflect work-induced fatigue in the lab setting; (2) identify the relationship between objective performance and subjective perception in indicating fatigue status and fatigability; and (3) propose a mobile-based assessment for work-induced fatigue that uses multiple measurements. **Methods:** We conducted a 2-day in-lab study to measure participants' fatigue status using multiple measurements, including the stair climb test (SCT), the 6-minute walk test (6MWT), and the reaction time test. Both the SCT and the 6MWT were conducted at different points in time and under 2 conditions (measurement time, including prior to and after work, and pace, including normal and fast). Participants reported their fatigue perception through questionnaires completed before conducting walking tests and in an activity diary recorded over a week. Walking performance data were collected by a smartphone with a built-in 3-axis accelerometer. To examine the effect of fatigability on walking performance, we first clustered participants into 2 groups based on their reported mental fatigue level in the entry surveys and then compared their walking performance using a generalized linear model (GLM). The reaction time was examined using a 2-way repeated-measures GLM. We conducted semistructured interviews to understand participants' fatigue perception after each day's walking tests. **Results:** All participants (N=26; mean age 24.68 years) were divided into 2 groups-the fatigue-sensitive group (11/26, 42%) and the fatigue-nonsensitive group (15/26, 58%)-based on their mental subscores from 3 entry surveys: Fatigue Scale-14, Three-Dimensional Work Fatigue Inventory, and Fatigue Self-Assessment Scale (FSAS). The fatigue-sensitive group reported a significantly higher FSAS score in the before-work setting (t_{50}=-3.361; P=.001). The fatigue-sensitive group covered fewer steps than the fatigue-nonsensitive group (β_1=-0.099; SE 0.019; t_1=-5.323; P<.001) and had a higher step-to-step time variability in the 6MWT ($\beta_1=9.61 \times 10^{-4}$; t_1=2.329; P=.02). No strong correlation between subjective and objective measurements was observed in the study. **Conclusions:** Walking parameters, including step counts and step-to-step time variability, and some selected scales (eg, FSAS) were found to reflect participants' work-induced fatigue. Overall, our work suggests the opportunity of employing mobile-based walking measurements to indicate work fatigue among young adults.
Yan et al. 2020.
Interactive Journal of Medicine Research, vol. 9, no. 4.

Keywords: 6MWT; fatigability; mobile health; walking performance; work fatigue.
Evidence Level: 5B
Link: https://www.i-jmr.org/2020/4/e16376/

The social and physical workplace environment and commute mode: A natural experimental study
Despite strong evidence for health benefits from active travel, levels remain low in many countries. Changes to the physical and social workplace environment might encourage active travel but evaluation has been limited. We explored associations between changes in the physical and social workplace environment and changes in commute mode over one year among 419 participants in the Commuting and Health in Cambridge study. In adjusted analyses, an increase in the presence of one physical characteristic

(e.g. bicycle parking or shower facilities) was associated with a 3.3% (95% confidence interval 1.0-5.6) reduction in the proportion of commutes by private motor vehicle and a 4.4% (95% CI 1.2-7.7) increase in the proportion of trips including active modes among men. These associations were not seen in women. A change to a more favourable social environment for walking or cycling among workplace management was associated with an increased proportion of commutes including active modes in women (4.5%, 95% CI 1.4-7.5) but not men. However, in both genders a change to more a favourable social environment for cycling among colleagues was associated with a reduced proportion of commutes by exclusively active modes (-2.8%, 95% CI -5.0 to -0.6). This study provides longitudinal evidence for gender differences in the associations between workplace environment and commute mode. A more supportive physical environment was associated with more active commuting in men, while the social environment appeared to have more complex associations that were stronger among women.

Patterson et al. 2020.

Preventative Medicine Reports, vol.28.

Keywords: Active commuting; active travel; cycling; environment; natural experiment; physical activity; walking; workplace; workplace facilities.

Evidence Level: 4B

Link: https://www.sciencedirect.com/science/article/pii/S2211335520302187?via%3Dihub

The physical activity wearables in the police force (PAW-Force) study: acceptability and impact

Background: Policing is a highly stressful and increasingly sedentary occupation. The study aim was to assess the acceptability and impact of a mobile health (mHealth) technology intervention (Fitbit® activity monitor and 'Bupa Boost' smartphone app) to promote physical activity (PA) and reduce sedentary time in the police force. **Methods:** Single-group, pre-post, mixed methods pilot study. Police officers and staff (n = 180) were recruited from two police forces in South West England. Participants used the technology for 12 weeks (an 'individual' then 'social' phase) followed by 5 months of optional use. Data sources included Fitbit®-recorded objective step count, questionnaire surveys and semi-structured interviews (n = 32). Outcome assessment points were baseline (week 0), mid-intervention (week 6), post-intervention (week 12) and follow-up (month 8). Paired t-tests were used to investigate changes in quantitative outcomes. Qualitative analysis involved framework and thematic analysis. **Results:** Changes in mean daily step count were non-significant ($p > 0.05$), but self-reported PA increased in the short term (e.g. + 465.4 MET-minutes/week total PA baseline to week 12, $p = 0.011$) and longer term (e.g. + 420.5 MET-minutes/week moderate-to-vigorous PA baseline to month 8, $p = 0.024$). The greatest impact on behaviour was perceived by less active officers and staff. There were no significant changes in sedentary time; the qualitative findings highlighted the importance of context and external influences on behaviour. There were no statistically significant changes (all p-values > 0.05) in any secondary outcomes (physical and mental health-related quality of life, perceived stress and perceived productivity), with the exception of an improvement in mental health-related quality of life (SF-12 mental component score + 1.75 points, $p = 0.020$) from baseline to month 8. Engagement with and perceived acceptability of the intervention was high overall, but a small number of participants reported negative physical (skin irritation) and psychological (feelings of guilt and anxiety) consequences of technology use. Individual app features (such as goal-setting and self-monitoring) were generally preferred to social components (social comparison, competitions and support). **Conclusions:** mHealth technology is an acceptable and potentially impactful intervention for increasing PA in the police force. The intervention was less useful for reducing sedentary time and the impact on secondary outcomes is unclear.

Buckingham et al. 2020.

BMC Public Health, vol. 20, no. 1.

Keywords: Behaviour change; mobile health; physical activity; police force; sedentary behaviour.

Evidence Level: 5A

Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09776-1

Effect of a long exercise program in the reduction of musculoskeletal discomfort in office workers
The purpose of this study was to assess the effect of a six week exercise program to reduce the muscle tone of the trapezius and musculoskeletal discomfort (MED) of office workers. Twenty-six workers performed an exercise program based on: (1) stretching of cervical and/or dorsal region; (2) joint mobility of shoulders and rachis; (3) strengthening deep stabilizer and core muscles; and (4) scapula stabilizing exercises. A Myoton device was used to evaluate trapezius tone and the Cornell Musculoskeletal Discomfort Questionnaire was used to assess changes in MED at three points of evaluation: at the beginning (Pre_1) and at the end of the workday (Post_1), and after the training program (Pre_2). The Wilcoxon test and Cohen's d were performed to examine differences and effect sizes between evaluations. Main results show that trapezius tone remained constant during the workday, but decreased in the dominant upper trapezius (p = 0.003, ES = -0.60) and increased in the non-dominant middle trapezius (p = 0.016, ES = 0.45) after the exercise program, which eliminated significant muscle asymmetries. MED significantly decreased in the neck (p = 0.027, ES = -0.60) and upper back (p = 0.046, ES = -0.67). In conclusion, MED appears to improve in office workers after a six week training program, which may be explained by a decrease in trapezius tone and increase in the left middle trapezius tone.
Villanueva et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: Lower back; muscle tone; neck; shoulder; trapezius; upper back; workplace.
Evidence Level: 5A
Link: https://www.mdpi.com/1660-4601/17/23/9042

An mHealth workplace-based "Sit Less, Move More" program: Impact on employees' sedentary and physical activity patterns at work and away from work
Background: Most workplace interventions that aim to reduce sedentary behaviour have 38 focused on employees' sedentary patterns at-work but less have focused on understanding the 39 impact beyond working time. The aim of this study was to evaluate the impact of a 13-week m-40 health workplace-based 'sit less, move more' intervention (Walk@WorkApp; W@W-App) on 41 physical activity (PA) and sitting in desk-based employees at-work and away from work. **Methods:** Participants (n = 141) were assigned by hospital to an intervention group (IG; used the W@W-App; n = 90) or an active comparison group (A-CG; monitored occupational activity; n = 51). The W@W-App, installed on the participants´ own smartphones, provided real-time feedback for occupational sitting, standing, and stepping, and gave access to automated strategies to sit less and move more at work. Changes between groups were assessed for total sitting time, sedentary bouts and breaks, and light and moderate-to-vigorous PA (activPAL3TM; min/day) between the baseline and after program completion. **Results:** Compared to the A-CG, employees that used the W@W-App program increased their number of daily breaks and the time spent on short sedentary bouts (<20 min, p = 0.047) during weekends. Changes in shortest sedentary bouts (5-10 min) during weekends were also statistically significant (p < 0.05). No changes in workday PA or sitting were observed.
Conclusion: Desk-based employees seemed to transfer the W@W-App program knowledge outside of work. Evaluating the impact of workplace (mHealth-based or not) interventions at work but also away from work would provide a better understating of the impact of such interventions.
Bort-Roig et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 23.

Keywords: mHealth; occupational health; sedentary behaviour; sitting; workplace.
Evidence Level: 3A
Link: https://www.mdpi.com/1660-4601/17/23/8844

Musculoskeletal Health

Work above shoulder level and shoulder complaints: a systematic review
Objective: To investigate the association and the exposure-response relationship between work above shoulder height and shoulder pain or disorders. **Methods:** A systematic search was performed in Medline, Embase, and Health and Safety Science Abstracts. Included were articles with prospective cohort, case-control, cross-sectional, or intervention study designs. Quality assessment was based on an evaluation scheme adjusted to study design and normalized to 100%. The cut-off for sufficient quality to include articles was above 40% and cut-off for high-quality articles was above 50% of maximal score. The level of strength of evidence for an association between exposure and effect was assessed according to the GRADE guidelines. **Results:** Thirty-four articles were included. Articles that document large effects (higher risk estimates; OR ≥ 2) have higher quality score, include analyses of severe arm elevation, more often use clinical outcome, and report an exposure-response relationship compared to studies reporting lower risk estimates. The studies that reported large effects were all significant. An exposure-response relationship was found in many high-quality studies when relating exposure intensity of arm elevation (level of arm elevation, amplitude) as well as duration of arm elevation, especially > 90°. **Conclusion:** We conclude on a limited evidence for an association between arm elevation at work and shoulder disorders. Severe arm elevation with elbows above shoulder level (i.e., > 90°) shows a moderate evidence for an association with shoulder disorders.
Waersted et al. 2020.
International Archives Occpational Environmental Health, vol. 93, no. 8.

Keywords: Arm elevation; shoulder pain; systematic review; work-related musculoskeletal disorders.
Evidence Level: 1A
Link: https://link.springer.com/article/10.1007%2Fs00420-020-01551-4

Prevalence of work related musculoskeletal disorders in Italian workers: is there an underestimation of the related occupational risk factors?
Background: Work-related musculoskeletal disorders (WMSDs) represent an important socio-economic burden. The current risk assessment and management involved in the ethiopathogenesis of WMSDs is based on observational tools and checklists, which have some limitations in terms of accuracy and reliability. The aim of this study was to assess WMSD prevalence and identify possible correlations with several socio-demographic and work-related variables in a large cohort representative of Italian workers in order to improve our understanding of the WMSD phenomenon. **Methods:** This study includes data from INSuLa, a cross-sectional nationally representative survey of health and safety at work, developed by the Italian Workers' Compensation Authority. A total of 8000 Italian workers were included. Multivariate logistic regression analyses were performed to evaluate the association of independent variables, such as workers' perceptions of exposure to biomechanical/ergonomic and video display unit (VDU) risks (Risk Perceived) and the actual risk exposure (Risk Detected) on Back, Lower and Upper limb pain. Socio-demographic, occupational and other health-related variables were included to investigate possible association with musculoskeletal disorders. **Results:** Workers perceiving a significant exposure to biomechanical/ergonomic and VDU risks but not included in a health surveillance program for them (Risk Perceived/No Risk Detected) have had significantly higher odds of reporting musculoskeletal disorders. Regarding the biomechanical/ergonomic risk these workers are in the 19-24 age range (39.9%), transportation, warehousing/information and communication sectors (38.9%) and are employed in companies with more than 250 workers (35.8%). Regarding VDU risk, workers are in the 45-54 age range (24.5%), professional, financial and business services (38.0%) and come from companies with more than 250 employees (25.6%). **Conclusions:** Within the occupational safety and health management systems an appropriate assessment of occupational risk factors correlated to musculoskeletal disorders (mainly biomechanical/ergonomic and VDU) and the correct definition of their exposure levels is essential to adequately prevent the onset of WMSDs. In this regard, our findings provide useful information to design novel approaches, aimed at improving our understanding of emerging risks, identifying gaps in current risk assessment strategies and enhancing workplace interventions are mandatory to improve the occupational

risk assessment and management process and therefore implement the subsequent health surveillance systems.
Russo et al. 2020.
BMC Musculoskeletal Disorders, vol. 21, no. 1.

Keywords: Biomechanical risk; ergonomic risk; health surveillance program; low back pain; lower limbs; musculoskeletal disorders; risk assessment; upper limbs; video display unit risk.
Evidence Level: 4B
Link: https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-020-03742-z

Upper-extremity musculoskeletal disorders: how many cases can be prevented? Estimates from the COSALI cohort
Objective: This study aimed to estimate the proportion and number of incident upper-extremity musculoskeletal disorders (UEMSD) cases attributable to occupational risk factors in a working population. **Methods:** Between 2002-2005, occupational physicians randomly selected 3710 workers, aged 20-59, from the Pays de la Loire (PdL) region. All participants underwent a standardized clinical examination. Between 2007-2010, 1611 workers were re-examined. This study included 1246 workers who were free of six main clinically diagnosed UEMSD at baseline but were diagnosed with at least one of these UEMSD at follow-up [59% of men, mean age: 38 (standard deviation 8.6) years]. Relative risks and population-attributable fractions (PAF) were calculated using Cox multivariable models with equal follow-up time and robust variance. The total number of incident UEMSD in the PdL region was estimated after adjustment of the sample weights using 2007 census data. The estimated number of potentially avoidable UEMSD was calculated by multiplying PAF by the total number of incident UEMSD in PdL. **Results:** At follow-up, 139 new cases of UEMSD (11% of the study sample) were diagnosed. This represented an estimated 129 320 incident cases in the PdL in 2007. Following adjustment for personal factors, 26 381 (20.4% of all incident UEMSD) were attributable to high physical exertion, 16 682 (12.9%) to low social support, and 8535 (6.6%) to working with arms above shoulder level. **Conclusions:** A large number and important proportion of incident UEMSD may be preventable by reducing work exposures to physical exertion and working with arms above shoulder level as well as improving social support from co-workers/supervisors
Nambiema et al. 2020.
Scandinavian Journal of Work, Environment and Public Health, vol.46, no. 6.

Keywords: Musculoskeletal; occupational risk; upper extremities
Evidence Level: 4A
Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3911

An employer-sponsored musculoskeletal care coordination service can improve clinical outcomes and self-reported productivity
Objective: To evaluate the effects of participation with a novel musculoskeletal care coordination service on clinical outcomes, self-reported productivity, and satisfaction. **Methods:** Prospective analysis of participants using the service from January 1, 2019 to December 31, 2019. **Results:** One hundred eighty nine participants were enrolled; 54 participants completed their recommended clinical pathway. Low back pain was the most common musculoskeletal issue (N = 86, 46%). 88 participants (47%) were triaged to home exercise and 59 (31%) to physical therapy. Behavioral health issues were common: 47 participants (25%) were referred to their EAP. Only 30 participants (16%) required a medical referral. Engagement was associated with improvements in pain, physical function, mood, and self-reported productivity ($P < 0.01$). The net promotor score for this service was 95. **Conclusions:** Employers with populations for whom musculoskeletal complaints are common might benefit from integrating a musculoskeletal care coordination service in their benefits offering.
Madhusudhan et al. 2020.
Journal of Occupational and Environmental Medicine, vol.62, no.11.

Keywords: Musculoskeletal; productivity; clinical outcomes

Evidence Level: 4A
Link:
https://journals.lww.com/joem/Fulltext/2020/11000/An_Employer_Sponsored_Musculoskeletal_Care.21.aspx

Fear-avoidance behavior and sickness absence in patients with work-related musculoskeletal disorders
Background and Objectives: The purpose of this work is to determine the association of fear-avoidance attitudes with sickness absence status, its duration and disability in a work accident context. (2) **Materials and Methods:** This is a descriptive observational design, conducting the study in two occupational insurance provider clinics with patients with nonspecific low back and neck pain during the study period. Clinical variables were the Fear Avoidance Questionnaire, Roland Morris Disability Questionnaire, Neck Disability Index, Numerical Pain Scale; sociodemographic variables were sex, age, occupational, educational level, sickness absence status, and duration in days of absence from work. Multiple logistic and linear regressions were used to explore the association between variables. (3) *Results:* Fear-avoidance behavior is related to sickness absence status (OR = 1.048, $p = 0.007$), and the physical activity dimension (OR = 1.098, $p = 0.013$) is more relevant than the work dimension (OR = 1.056, $p = 0.028$). The duration of sickness absence is related to higher values on the fear-avoidance behavior scale in its global dimension (b = 0.84, $p = 0.003$, r = 0.327), and the results of the physical activity dimension (B = 1.37, $p = 0.035$, r = 0.236) were more relevant than the work dimension (B = 1.21, $p = 0.003$, r = 0.324). Fear-avoidance behavior is related to disability in both dimensions (B = 0.912, $p < 0.001$, r = 0.505). (4) **Conclusions:** Fear-avoidance behaviors may influence the typification of sickness absence status, its duration both in its physical activity and work dimension, and its disability reported with higher values than in other healthcare contexts.
Macías-Toronjo et al. 2020.
Medicina, vol.56, no.12.

Keywords: Accidents; attitude; avoidance learning; disability; employment; exercise; fear; neck pain; workplace.
Evidence Level: 4A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7760519/

Employability and intention to apply for rehabilitation in people with back pain: A cross-sectional cohort study
Objectives: To analyse the association between self-reported prognosis of employability and health-related measures, and to clarify which determinants influence the intention to apply for medical rehabil-itation. **Design:** Cross-sectional study of a random sample of German employees. **Participants:** A total of 6,654 participants (58% female) aged 45-59 years with back pain during the last 3 months. **Results:** Out of a total of 6,654 persons, 4,838 had a positive self-reported prognosis of employability. Persons with positive and negative prognoses clearly differ with regard to health-related measures. Of 1,816 persons who reported a negative prognosis, 26% stated an intention to apply for rehabilitation. Intention was determined mainly by perceived social support from family and friends (odds ratio (OR) 1.87; 95% confidence interval (95% CI) 1.66-2.10), as well as physicians and therapists (OR 1.64; 95% CI 1.41-1.90). **Conclusion:** A negative self-reported prognosis of employability is associated with self-reported health restrictions that may determine the need for rehabilitation interventions. A considerable proportion of persons with self-reported health restrictions do not plan to use medical rehabilitation. Perceived social support is an important facilitator of intention to apply for rehabilitation. However, this study needs to be replicated in other populations combining self-reported and administrative data.
Fauser et al. 2020.
Journal of Rehabilitation Medicine, vol. 52, no. 11.

Keywords: Back pain; intention; need for rehabilitation; propensity score; rehabilitation research; self-reported prognosis.
Evidence Level: 4A
Link: https://www.medicaljournals.se/jrm/content/abstract/10.2340/16501977-2767

Influences of neck and/or wrist pain on hand grip strength of industrial quality proofing workers
Background: The aim of this study was to analyze the interaction between neck and/or wrist pain and hand grip strength (HGS) and to investigate factors (age, sex, neck disorders, and carpal tunnel syndrome) influencing the HGS of industrial quality proofing workers (*N* = 145). **Methods:** Standardized questionnaires [Neck Disability Index (NDI), Boston Carpal Tunnel Questionnaire] were used to evaluate existing neck and/or wrist pain. HGS measurements were performed in different wrist positions. **Results:** Significant differences between participants with and without neck pain were found in different wrist positions, in neutral wrist position right [without neck pain (*n* = 48) 46.34 (43.39 - 49.30); with neck pain (*n* = 97) 38.46 (36.20 - 40.72), $F_{(1,144)} = 16.82$, $p < 0.001$, $\eta_p^2 = 0.11$] and left [without neck pain 44.06 (41.19 - 46.94); with neck pain 37.36 (35.13 - 39.58), $F_{(1,144)} = 12.70$, $p < 0.001$, $\eta_p^2 = 0.08$]. A significant difference between participants with and without wrist pain was found for neutral wrist position right [without wrist pain (*n* = 105) 42.53 (40.37 - 44.70); with wrist pain (*n* = 40) 37.24 (33.56 - 40.91), $F_{(1,144)} = 6.41$, $p = 0.01$, $\eta_p^2 = 0.04$]. Regression analysis showed significant results especially for steps two (age and weight, NDI) and three (age and weight, NDI, Boston Carpal Tunnel Questionnaire) for neutral position right ($R^2 = 0.355$, $R^2 = 0.357$, respectively). **Conclusion:** Neck pain has an impact on HGS but should be evaluated in consideration of age and sex.
Wollesen et al. 2020.
Safety and Health at Work, vol. 11, no. 4.

Keywords: Carpal tunnel syndrome; Hand grip force; Neck pain.
Evidence Level: 5A
Link: https://www.sciencedirect.com/science/article/pii/S2093791120303036?via%3Dihub

A systematic review of workplace interventions to rehabilitate musculoskeletal disorders among employees with physical demanding work
Purpose This systematic review investigates the effectiveness of workplace interventions to rehabilitate musculoskeletal disorders (MSDs) among employees with physically demanding work. **Methods** A systematic search was conducted in bibliographic databases including PubMed and Web of Science Core Collection for English articles published from 1998 to 2018. The PICO strategy guided the assessment of study relevance and the bibliographical search for randomized controlled trials (RCTs) and non-RCTs in which (1) participants were adult workers with physically demanding work and MSD (including specific and non-specific MSD and musculoskeletal pain, symptoms, and discomfort), (2) interventions were initiated and/or carried out at the workplace, (3) a comparison group was included, and (4) a measure of MSD was reported (including musculoskeletal pain, symptoms, prevalence or discomfort). The quality assessment and evidence synthesis adhered to the guidelines developed by the Institute for Work & Health (Toronto, Canada) focusing on developing practical recommendations for stakeholders. Relevant stakeholders were engaged in the review process. **Results** Level of evidence from 54 high and medium quality studies showed moderate evidence of a positive effect of physical exercise. Within this domain, there was strong evidence of a positive effect of workplace strength training. There was limited evidence for ergonomics and strong evidence for no benefit of participatory ergonomics, multifaceted interventions, and stress management. No intervention domains were associated with "negative effects". **Conclusions** The evidence synthesis recommends that implementing strength training at the workplace can reduce MSD among workers with physically demanding work. In regard to workplace ergonomics, there was not enough evidence from the scientific literature to guide current practices. Based on the scientific literature, participatory ergonomics and multifaceted workplace interventions seem to have no beneficial effect on reducing MSD among this group of workers. As these interventional domains were very heterogeneous, it should also be recognized that general conclusions about their effectiveness should be done with care.
Sundstrup et al. 2020.
Journal of Occupational Rehabilitation, vol. 30, no. 4.

Keywords: Ergonomics; occupational health; pain; participatory ergonomics; physical demands; physical exercise; strength training; stress management.

Evidence Level: 1A
Link: https://link.springer.com/article/10.1007%2Fs10926-020-09879-x

Is hard physical work in the early working life associated with back pain later in life? A cross-sectional study among 5700 older workers
Objectives: Physically demanding work increases the risk of developing musculoskeletal disorders during working life, with low back pain (LBP) as the most prevalent and debilitating musculoskeletal disorder worldwide. However, a lack of knowledge exists about the role of early working years on musculoskeletal health later in life. This study investigated whether an exposure-response association exists between physical demands in early working life and risk of LBP in later working life. **Design:** Cross-sectional study. **Setting, participants and outcome measure:** In the SeniorWorkingLife study, 5909 wage earners aged ≥50 years with currently sedentary work replied to a questionnaire survey in 2018 about physical work demands during their first working years (exposure) and current LBP (outcome). Associations between physical work demands in the early working years and current LBP were modelled using general linear models controlling for various confounders, combined with model-assisted weights based on national registers. **Results:** Hard physical work during early working life was associated with more intense LBP later in life among senior workers with currently sedentary jobs. In the fully adjusted model, workers with 'standing/walking work with lifting/carrying' and 'heavy or fast work that is physically strenuous' during the first years of working life reported higher LBP intensity than those with sedentary work during their first working years (0.2 (95% CI, 0.0 to 0.4) and 0.6 (95% CI, 0.4 to 0.9), respectively). **Conclusion:** Work involving lifting/carrying or work that is physically strenuous in early life is associated with higher intensity of LBP among older workers with currently sedentary employment. These findings suggest that early working life may have an impact on later working years and underscore the necessity for careful introduction and instruction to the working environment for retaining musculoskeletal health and prolonging working life.
Blafoss et al. 2020.
BMJ Open, vol. 10, no. 12.

Keywords: Back pain; musculoskeletal disorders; occupational & industrial medicine; public health.
Evidence Level: 4A
Link: https://bmjopen.bmj.com/content/10/12/e040158.long

Association of exposure to a combination of ergonomic risk factors with musculoskeletal symptoms in Korean workers
This study examined the relationship of musculoskeletal symptoms with exposure to a combination of ergonomic risk factors at work and the possible ameliorating effect of enough time to rest during working hours or between consecutive shifts in Korean workers. Data were from the 2017 Korean Working Conditions Survey. Workers exposed to ergonomic risk factors were more likely to report musculoskeletal symptoms than those without exposure, and exposure to more ergonomic risk factors increased the probability of musculoskeletal symptoms. Workers who had the opportunity to rest when desired and those who had enough time to rest between consecutive shifts were less likely to report musculoskeletal symptoms. In conclusion, workers exposed to more ergonomic risk factors had an increased risk for musculoskeletal symptoms, and providing enough time to rest and recovery to workers reduced the risk of musculoskeletal symptoms.
Park et al. 2020.
International Journal of Environmental Research and Public Health, vol. 17, no. 24.

Keywords: Disorder; ergonomics; exposure; musculoskeletal abnormalities; risk factors.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/24/9456

Effectiveness of workplace intervention strategies in lower back pain prevention: a review
The aim of this study was to identify effective work place intervention strategies for the prevention of low back pain (LBP). The study focused on interventions to two major groups: personal interventions and

technical interventions. Data basis were searched for with inclusion criteria: study design based on randomised controlled trial; outcome measures including non-specific LBP occurrence expressed by prevalence or intensity; intervention met the definition of the technical and/or personal (physical exercises, behavioural training, educational) intervention programme. Eighteen papers were selected for full analysis. The diversification of quantitative indicators of differences between control and intervention groups were carried out using Cohen's d index. The results of analysis showed strong differences in effects among intervention strategies, as well as among different cases within similar intervention strategies. LBP severity before intervention and the length of intervention were discussed as potentially influencing factors. The results of the analysis suggest that the most effective strategies for LBP prevention include technical modifications of the workstand and education based on practical training. Behavioural and physical training seems to be of lesser importance. LBP severity before intervention and the time when the measurements of outcome measures take place play an important role in the effectiveness of intervention.
Roman-Liu et al. 2020.
Industrial Health, vol. 58, no. 6.

Keywords: Behavioural training; personal intervention; physical exercises; technical intervention.
Evidence Level: 1A
Link: https://www.jstage.jst.go.jp/article/indhealth/58/6/58_2020-0130/_article

COVID 19

Adapting to the Future of Work

Achieving effective remote working during the COVID-19 pandemic: A work design perspective
Existing knowledge on remote working can be questioned in an extraordinary pandemic context. We conducted a mixed-methods investigation to explore the challenges experienced by remote workers at this time, as well as what virtual work characteristics and individual differences affect these challenges. In Study 1, from semi-structured interviews with Chinese employees working from home in the early days of the pandemic, we identified four key remote work challenges (work-home interference, ineffective communication, procrastination, and loneliness), as well as four virtual work characteristics that affected the experience of these challenges (social support, job autonomy, monitoring, and workload) and one key individual difference factor (workers' self-discipline). In Study 2, using survey data from 522 employees working at home during the pandemic, we found that virtual work characteristics linked to worker's performance and well-being via the experienced challenges. Specifically, social support was positively correlated with lower levels of all remote working challenges; job autonomy negatively related to loneliness; workload and monitoring both linked to higher work-home interference; and workload additionally linked to lower procrastination. Self-discipline was a significant moderator of several of these relationships. We discuss the implications of our research for the pandemic and beyond.
Wang et al. 2020.
Applied Psychology, vol. 10.
Keywords: COVID; remote working; pandemic; work design.
Evidence Level: 5B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7675760/

Telework after COVID: A "Silver Lining" for workers with disabilities?
Purpose The COVID pandemic was a severe blow to all workers, but it may ultimately have a silver lining for some workers with disabilities if it makes work from home easier and more acceptable. In addition, the pandemic is shaking up traditional workplace structures and causing employers to rethink how essential tasks can be done, which may broaden their views of workplace accommodations. We assess the potential for the pandemic to improve employment opportunities for people with disabilities. **Methods** This article analyzes pre-COVID data on disability and home-based work from three representative data sources-the American Community Survey, American Time Use Survey, and Current Population Survey. We employ both

cross-tabulations and regressions to predict work at home. **Results** We find that workers with disabilities are more likely than those without disabilities both to work primarily from home and to do any work at home. This is true for both employees and self-employed workers. Workers with disabilities face similar wage gaps in on-site and home-based work, indicating that while increased availability of home-based work may create more employment opportunities for workers with disabilities, it is unlikely to erase wage disparities. While workers with disabilities are currently more likely to be working primarily from home, only 34% are in occupations with high potential for home-based work, compared to 40% of workers without disabilities. **Conclusions** Workers with disabilities are currently more likely to work from home and many may benefit from expanded work-at-home opportunities, but the types of jobs they hold constrain this potential. Research is needed to see how home-based work evolves as the economy recovers from the pandemic over the next several years.
Schur et al. 2020.
Journal of Occupational Rehabilitation, vol. 30, no. 4.
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Keywords: Discrimination; employment insecurity; pay equity; right to employment; work location.
Evidence Level: 4B
Link: https://link.springer.com/article/10.1007%2Fs10926-020-09936-5

Activities of employers and OHS services during the developing COVID-19 epidemic in Poland
Background: The epidemic is affecting the global economy, plunging many industries. The global extent of the epidemic and government controls, restrictions and constraints have led to imbalances in world trade and have put many companies under pressure. The epidemic is a test of individual companies' ability to operate effectively in the new environment. It is up to managers to mitigate its impact on business. The aim of the article is to identify the activities of employers in Poland related to the protection of workers with the developing epidemic COVID-19. **Methods:** A survey was carried out among the employees of OHS services employed in enterprises in Poland. The research was conducted in three stages at two-week intervals. The obtained results were subjected to statistical analyses. **Results:** In the analysed three periods a total of 588 answers were obtained, which allowed to formulate conclusions. The research showed that in connection with the COVID-19 epidemic, about 30% of the plants updated their occupational risk assessment, about 40% updated their safety instructions, about 90% of the plants equipped their employees with additional personal protective equipment. **Conclusions:** The COVID-19 outbreak in Poland resulted in taking additional actions by employers to protect workers. Systematicity (methodicality) of these activities depended mainly on the seniority of the OHS service. As a border internship indicating a different approach to an emergency situation related to the epidemic, 7 years were set.
Nowacki et al. 2020.
Safety Science, vol. 131.
User License: *Elsevier Connect COVID-19 resource centre*
Keywords: COVID-19 epidemic; enterprises; health and safety at work; health and safety service; occupational risk.
Evidence Level: 4B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7392100/

A rapid review of mental and physical health effects of working at home: how do we optimise health?
Background: The coronavirus (COVID-19) pandemic has resulted in changes to the working arrangements of millions of employees who are now based at home and may continue to work at home, in some capacity, for the foreseeable future. Decisions on how to promote employees' health whilst working at home (WAH) need to be based on the best available evidence to optimise worker outcomes. The aim of this rapid review was to review the impact of WAH on individual workers' mental and physical health, and determine any gender difference, to develop recommendations for employers and employees to optimise workers' health. **Method:** A search was undertaken in three databases, PsychInfo, ProQuest, and Web of Science, from 2007 to May 2020. Selection criteria included studies which involved employees who regularly worked at home, and specifically reported on physical or mental health-related outcomes. Two review authors independently screened studies for inclusion, one author extracted data and conducted risk of bias

assessments with review by a second author. **Results:** Twenty-three papers meet the selection criteria for this review. Ten health outcomes were reported: pain, self-reported health, safety, well-being, stress, depression, fatigue, quality of life, strain and happiness. The impact on health outcomes was strongly influenced by the degree of organisational support available to employees, colleague support, social connectedness (outside of work), and levels of work to family conflict. Overall, women were less likely to experience improved health outcomes when WAH. **Conclusions:** This review identified several health outcomes affected by WAH. The health/work relationship is complex and requires consideration of broader system factors to optimise the effects of WAH on workers' health. It is likely mandated WAH will continue to some degree for the foreseeable future; organisations will need to implement formalised WAH policies that consider work-home boundary management support, role clarity, workload, performance indicators, technical support, facilitation of co-worker networking, and training for managers.
Oakman et al. 2020.
BMC Public Health, vol.20, no.1.

Keywords: Gender; mental health; physical health; telecommute; working at home.
Evidence Level: 6A
Link: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09875-z

Working from home and job loss due to the COVID-19 pandemic are associated with greater time in sedentary behaviors
Objectives: Due to the COVID-19 pandemic, major changes to how, or even whether, we work have occurred. This study examines associations of changing COVID-19-related employment conditions with physical activity and sedentary behavior. **Methods:** Data from 2,303 US adults in employment prior to COVID-19 were collected April 3rd-7th, 2020. Participants reported whether their employment remained unchanged, they were working from home (WFH) when they had not been before, or they lost their job due to the pandemic. Validated questionnaires assessed physical activity, sitting time, and screen time. Linear regression quantified associations of COVID-19-related employment changes with physical activity, sitting time, and screen time, controlling for age, sex, race, BMI, smoking status, marital status, chronic conditions, household location, public health restrictions, and recalled physical activity, sitting time, and screen time prior to the COVID-19 pandemic. **Results:** Compared to those whose employment remained unchanged, participants whose employment changed (either WFH or lost their job) due to COVID-19 reported higher sitting time (WFH: g = 0.153, 95% CI = 0.095-0.210; lost job: g = 0.212, 0.113-0.311) and screen time (WFH: g = 0.158, 0.104-0.212; lost job: g = 0.193, 0.102-0.285). There were no significant group differences for physical activity (WFH: g = -0.030, -0.101 to 0.042; lost job: g=-0.070, -0.178 to 0.037). **Conclusion:** COVID-19 related employment changes were associated with greater sitting and screen time. As sedentary time is consistently negatively associated with current and future health and wellbeing, increased sedentary time due to employment changes is a public health concern.
McDowell et al. 2020.
Frontiers in Public Health, vol.5.

Keywords: COVID-19; employment; physical activity; sedentary behavior; work from home.
Evidence Level: 4A
Link: https://www.frontiersin.org/articles/10.3389/fpubh.2020.597619/full

Videoconferencing for multidisciplinary team meetings in the coronavirus disease era - human factors awareness and recognition
Background: The coronavirus disease 2019 pandemic has led to the birth of videoconference multidisciplinary teams, which are now commonplace. This remote way of deciding care demands a new set of rules to ensure the quality of the complex decisions that are made for the patient group needing multidisciplinary care. Videoconference multidisciplinary teams bring with them novel forms of distraction that are under-appreciated and can impair decision-making. **Method:** A practical checklist was generated as applied to videoconference multidisciplinary teams using the principles of human factors awareness and recognition. **Results:** Some of the strategies that should be adopted to minimise errors arising from human

factors are: information technology support, a suitable environment to dial in, a global checklist employed prior to the videoconference, visible participants, avoiding distractions from other sources (e.g. e-mail, mobile phone), a videoconference sign-out and rapid dissemination of the outcomes sheet.
Conclusion: This article presents a framework that uses human factors principles applied in this setting, which will contribute to enhanced patient safety, team working and a reduction in medical errors.
Kerawala et al. 2020.
The Journal of Laryngology and Otology, no.4.

Keywords: COVID-19; multi-disciplinary team; patient safety.
Evidence Level: 6A
Link: https://www.cambridge.org/core/journals/journal-of-laryngology-and-otology/article/videoconferencing-for-multidisciplinary-team-meetings-in-the-coronavirus-disease-era-human-factors-awareness-and-recognition/18CB837BBF228C3BBED64699D18C5C3C

Guiding and Supporting Mental Health and Wellbeing

Relationship between phobic anxiety in work and leisure activity situations, and optimistic bias associated with COVID-19 among South Koreans
Because of the ongoing COVID-19 pandemic, the public is unable to maintain a proper balance between work and leisure, and an increase in community-based infections is causing severe phobic anxiety. Therefore, the present study investigated the differences in phobic anxiety between work and leisure activities according to optimistic bias among 533 South Korean citizens. Frequency analysis, descriptive statistical analysis, *t*-tests, and a one-way analysis of variance were conducted to examine the data. The results showed that for leisure activities, women showed a higher perception of phobic anxiety. In addition, the group showing high optimistic bias had a higher perception of phobic anxiety in both work and leisure activity situations. Therefore, support measures to lower phobic anxiety among women are needed at the government level, while support and interest from family members are needed at home. Moreover, local governments must ensure active involvement to mitigate phobic anxiety among individuals, and measures are needed to more actively implement infectious disease prevention behaviors.
Kim et al. 2020.
International Journal of Environmental Research and Public Health, vol.17, no.22.

Keywords: COVID-19; South Korean; leisure activity; optimistic bias; phobic anxiety; work.
Evidence Level: 5B
Link: https://www.mdpi.com/1660-4601/17/22/8436

Predictors of managers' mental health during the COVID-19 pandemic
This study reports early evidence of managers' mental health and its predictors during the Coronavirus disease 2019 (COVID-19) pandemic in May 2020. In a sample of 646 managers from 49 countries, 5.3% (32) of managers reached the cut-off levels for disorders in distress (Kessler Psychological Distress Scale-6; K-6), 7.3% (38) experienced anxiety (General Anxiety Disorder-7; GAD-7), and 10.7% (56) had depression (Patient Health Questionnaire-9; PHQ-9). Age, relative income, and work status each predicted at least one of the conditions. Managers' 'illegitimate tasks' caused by COVID-19 predicted all three. Particularly noteworthy is the finding that the degree of downsizing an organization experienced during COVID-19 significantly predicted distress, anxiety, and depression for managers at the highest level (board members) only. This study helps identify managers in need of healthcare services as the COVID-19 pandemic affects organizations and their managers around the world.
Graf-Vlachy et al. 2020.
European Journal of Psychotraumatology, vol.11, no. 1.

Keywords: 2019-nCoV; corporate managers; downsizing; epidemic; executives; psychiatric screening; risk factors.

Evidence Level: 5A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7682649/

The prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients: a systematic review and meta-regression
Background: Stress, anxiety, and depression are some of the most important research and practice challenges for psychologists, psychiatrists, and behavioral scientists. Due to the importance of issue and the lack of general statistics on these disorders among the Hospital staff treating the COVID-19 patients, this study aims to systematically review and determine the prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients. **Methods:** In this research work, the systematic review, meta-analysis and meta-regression approaches are used to approximate the prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients. The keywords of prevalence, anxiety, stress, depression, psychopathy, mental illness, mental disorder, doctor, physician, nurse, hospital staff, 2019-nCoV, COVID-19, SARS-CoV-2 and Coronaviruses were used for searching the SID, MagIran, IranMedex, IranDoc, ScienceDirect, Embase, Scopus, PubMed, Web of Science (ISI) and Google Scholar databases. The search process was conducted in December 2019 to June 2020. In order to amalgamate and analyze the reported results within the collected studies, the random effects model is used. The heterogeneity of the studies is assessed using the I^2 index. Lastly, the data analysis is performed within the Comprehensive Meta-Analysis software. **Results:** Of the 29 studies with a total sample size of 22,380, 21 papers have reported the prevalence of depression, 23 have reported the prevalence of anxiety, and 9 studies have reported the prevalence of stress. The prevalence of depression is 24.3% (18% CI 18.2-31.6%), the prevalence of anxiety is 25.8% (95% CI 20.5-31.9%), and the prevalence of stress is 45% (95% CI 24.3-67.5%) among the hospitals' Hospital staff caring for the COVID-19 patients. According to the results of meta-regression analysis, with increasing the sample size, the prevalence of depression and anxiety decreased, and this was statistically significant ($P < 0.05$), however, the prevalence of stress increased with increasing the sample size, yet this was not statistically significant ($P = 0.829$). **Conclusion:** The results of this study clearly demonstrate that the prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients is high. Therefore, the health policy-makers should take measures to control and prevent mental disorders in the Hospital staff.
Salari et al. 2020.
Human Resources for Health, vol. 18, no. 1.

Keywords: Anxiety; COVID-19; depression; healthcare workers; stress.
Evidence Level: 1A
Link: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-020-00544-1

Depressive symptoms in the front-line non-medical workers during the COVID-19 outbreak in Wuhan
Background: The outbreak of Coronavirus Disease 2019 (COVID-19) has been raising global anxiety and fear to the real or perceived health threat from the virus. This study aimed to investigate the psychological impacts and depression in the front-line non-medical workers in Wuhan, the first and the worst hit place by COVID-19. **Methods:** A total of 191 front-line non-medical workers in Wuhan were recruited by online survey. The Positive and Negative Affect Schedule (PANAS), the Stress Reaction Questionnaire (SRQ) and the Patient Health Questionnaire-9 (PHQ) were used. **Results:** The results showed that 50.3% (96) participants reported the clinically significant symptoms of depression. Among them, 33.0% (63) participants were with mild depression, 10.5% (20) participants with moderate depression, 5.8% (11) with moderately severe depression, and 1.0% (2) with severe depression. Participants with depression tend to be post-90 s (the generation born after 1990s), females, with increased levels of stress reactions, increased negative affects, but lower positive affects compared to these without depression. The stepwise logistic regression analysis revealed that post-90 s ($\beta = 0.908$, $P = 0.016$), the emotional reaction ($\beta = 0.122$, $P = 0.005$) and physical reaction ($\beta = 0.124$, $P = 0.020$) in SQR were significant independent responsible for the development of depression. **Conclusion:** The findings of the present study suggest the targeted psychological intervention measures should be developed to improve the mental health of non-medical workers on the front-line of COVID-19 epidemic, especially the females and younger individuals.

Fang et al. 2020.
Journal of Affective Disorders, vol. 276.

Keywords: COVID-19; depression; mental health; non-medical workers; post-90s.
Evidence Level: 5B
Link: https://www.sciencedirect.com/science/article/pii/S0165032720324757?via%3Dihub

Enabling Healthy and Safe Workplaces

Risk assessment of the step-by-step return-to-work policy in Beijing following the COVID-19 epidemic peak

Novel coronavirus (COVID-19) is a new strain of coronavirus first identified in Wuhan, China. As the virus spread worldwide causing a global pandemic, China reduced transmission at considerable social and economic cost. Post-lockdown, resuming work safely, that is, while avoiding a second epidemic outbreak, is a major challenge. Exacerbating this challenge, Beijing hosts many residents and workers with origins elsewhere, making it a relatively high-risk region in which to resume work. Nevertheless, the step-by-step approach taken by Beijing appears to have been effective so far. To learn from the epidemic progression and return-to-work measures undertaken in Beijing, and to inform efforts to avoid a second outbreak of COVID-19, we simulated the epidemiological progression of COVID-19 in Beijing under the real scenario of multiple stages of resuming work. A new epidemic transmission model was developed from a modified SEIR model for SARS, tailored to the situation of Beijing and fitted using multi-source data. Because of strong spatial heterogeneity amongst the population, socio-economic factors and medical capacity of Beijing, the risk assessment was undertaken spatiotemporally with respect to each district of Beijing. The epidemic simulation confirmed that the policy of resuming work step-by step, as implemented in Beijing, was sufficient to avoid a recurrence of the epidemic. Moreover, because of the structure of the model, the simulation provided insights into the specific factors at play at different stages of resuming work, allowing district-specific recommendations to be made with respect to monitoring at different stages of resuming work . As such, this research provides important lessons for other cities and regions dealing with outbreaks of COVID-19 and implementing return-to-work policies.

Zhang et al. 2020.
Stochastic Envionmental Research and Risk Assessment.
Keywords: Beijing; COVID-19; heterogeneity; resuming work; socio-economic activities.
Evidence Level: 6B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7664171/

Caught between Scylla and Charybdis: How economic stressors and occupational risk factors influence workers' occupational health reactions to COVID-19

Workers and their families bear much of the economic burden of COVID-19. Even though they have declined somewhat, unemployment rates are considerably higher than before the start of the pandemic. Many workers also face uncertainty about their future employment prospects and increasing financial strain. At the same time, the workplace is a common source of transmission of COVID-19 and many jobs previously seen as relatively safe are now viewed as potentially hazardous. Thus, many workers face dual threats of economic stress and COVID-19 exposure. This paper develops a model of workers' responses to these dual threats, including risk perception and resource depletion as mediating factors that influence the relationship of economic stress and occupational risk factors with COVID-19 compliance-related attitudes, safe behavior at work, and physical and mental health outcomes. The paper also describes contextual moderators of these relationships at the individual, unit, and regional level. Directions for future research are discussed.

Sinclair et al. 2020.
Applied Psychology, vol. 10.
Keywords: Scylla; Charybdis; COVID; stressors; occupational risk factors; occupational health.

Evidence Level: 6B
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7753445/

Joint prevalence of physical activity and sitting time during COVID-19 among US adults in April 2020
The COVID-19 pandemic significantly altered much of US life with shifts to working-from-home and social distancing changing day-to-day behavior. We aimed to determine the self-reported prevalence of meeting US physical activity guidelines, stratified by sitting time during the early lockdown phase of COVID-19 in US adults. We conducted two cross-sectional internet-based studies April 3rd-May 4th, 2020 in convenience samples of US adults. Participants self-reported daily sitting time and weekly moderate-to-vigorous physical activity (MVPA) via questions from the International Physical Activity Questionnaire. A total of 5036 US adults (65.3% women, 30.2% with chronic conditions) provided complete physical activity and sitting time data (80.3% of total). Overall, 42.6% of participants reported sitting for > 8 h/day (95% CI: 41.2%-44.0%) and 72.5% (71.2%-73.7%) reported being either sufficiently (150-300 MVPA minutes) or highly active (>300 min). The greatest proportion of people self-reported being highly active and sitting for > 8 h/day (24.0%; 22.8%-25.2%), followed by being highly active and sitting for 6-8 h/day (20.9%; 19.8%-22.1%). Sitting and activity appeared similar between sexes, while there was evidence of some age differences. For example, more young adults (ages 18-34) appeared to self-report being inactive and more appeared to sit for > 8 h/day compared to older adults. High sitting time was reported by US adults (>40% sitting > 8 h/day) during April 2020. However, high levels of physical activity (>70% meeting guidelines) were also reported. Since physical activity cannot eliminate the negative health effects of sitting, maintaining activity and limiting sitting during periods of large workplace and societal shifts is encouraged.
Meyer et al. 2020.
Preventitive Medicine Reports, vol. 20.

Keywords: Coronavirus; exercise; pandemic; sedentary behavior; US guidelines.
Evidence Level: 4B
Link: https://www.sciencedirect.com/science/article/pii/S221133552030214X?via%3Dihub

Estimating the impact of physical distancing measures in containing COVID-19: an empirical analysis
Background: Epidemic modelling studies predict that physical distancing is critical in containing COVID-19. However, few empirical studies have validated this finding. Our study evaluates the effectiveness of different physical distancing measures in controlling viral transmission. **Methods:** We identified three distinct physical distancing measures with varying intensity and implemented at different times-international travel controls, restrictions on mass gatherings, and lockdown-type measures-based on the Oxford COVID-19 Government Response Tracker. We also estimated the time-varying reproduction number (R_t) for 142 countries and tracked R_t temporally for two weeks following the 100th reported case in each country. We regressed R_t on the physical distancing measures and other control variables (income, population density, age structure, and temperature) and performed several robustness checks to validate our findings. **Findings:** Complete travel bans and all forms of lockdown-type measures have been effective in reducing average R_t over the 14 days following the 100th case. Recommended stay-at-home advisories and partial lockdowns are as effective as complete lockdowns in outbreak control. However, these measures have to be implemented early to be effective. Based on the observed median timing across countries worldwide, lockdown-type measures are considered early if they were instituted about two weeks before the 100th case and travel bans a week before detection of the first case. **Interpretation:** A combination of physical distancing measures, if implemented early, can be effective in containing COVID-19-tight border controls to limit importation of cases, encouraging physical distancing, moderately stringent measures such as working from home, and a full lockdown in the case of a probable uncontrolled outbreak.
Koh et al. 2020.
International Journal of Infectious Diseases, no.100.

Keywords: COVID-19; non-pharmaceutical interventions; physical distancing; SARS-CoV-2; transmission.
Evidence Level: 5A
Link: https://www.ijidonline.com/article/S1201-9712(20)30655-X/fulltext

Occupational heat stress and practical cooling solutions for healthcare and industry workers during the COVID-19 pandemic
Treatment and management of severe acute respiratory syndrome coronavirus-2, which causes coronavirus disease (COVID-19), requires increased adoption of personal protective equipment (PPE) to be worn by workers in healthcare and industry. In warm occupational settings, the added burden of PPE threatens worker health and productivity, a major lesson learned during the West-African Ebola outbreak which ultimately constrained disease control. In this paper, we comment on the link between COVID-19 PPE and occupational heat strain, cooling solutions available to mitigate occupational heat stress, and practical considerations surrounding their effectiveness and feasibility. While the choice of cooling solution depends on the context of the work and what is practical, mitigating occupational heat stress benefits workers in the healthcare and industrial sectors during the COVID-19 disease outbreak.
Foster et al. 2020.
Annals of Work Exposures and Health, vol. 64, no. 9.
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Keywords: COVID-19; PPE; cooling; coronavirus; heat; occupational heat strain; protective clothing; respirators.
Evidence Level: 6A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7543286/

A rapid review of the use of face mask in preventing the spread of COVID-19
Introduction: The original use of face masks was to help protect surgical wounds from staff-generated nasal and oral bacteria. Currently governments across the world have instituted the mandatory use of masks and other face coverings so that face masks now find much broader usage in situations where close contact of people is frequent and inevitable, particularly inside public transport facilities, shopping malls and workplaces in response to the COVID-19. **Objective:** We conducted a rapid review to investigate the impact face mask use has had in controlling transmission of respiratory viral infections. **Method:** A rapid review was conducted in line with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidance. Five electronic databases (CINAHL, Embase, Medline, PsycINFO and Global Health) were searched from database inception to date, using pre-defined search terms. We included all studies of any design and used descriptive analysis to report summary statistics of search results. Data were extracted including sample characteristics, study design, respiratory virus being controlled, type of face masks used and their effectiveness. **Results:** 58 out of 84 studies met the inclusion criteria, of which 13 were classified as systematic reviews and 45 were quantitative studies (comprising randomised controlled trials, retrospective cohort studies, case control, cross-sectional, surveys, observational and descriptive studies). N = 27 studies were conducted amongst healthcare workers wearing face masks, n = 19 studies among the general population, n = 9 studies among healthcare workers the general population and patients wearing masks, and n = 3 among only patients. Face masks use have shown a great potential for preventing respiratory virus transmission including COVID-19. **Conclusion:** Regardless of the type, setting, or who wears the face mask, it serves primarily a dual preventive purpose; protecting oneself from getting viral infection and protecting others. Therefore, if everyone wears a face mask in public, it offers a double barrier against COVID-19 transmission.
Abboah-Offei et al. 2020.
International Journal of Nursing Studies Advances, vol. 3.
User License: *Elsevier Connect COVID-19 resource centre*
Keywords: COVID-19; face mask; pandemic; prevention; rapid review; respiratory viral infection.
Evidence Level: 6A
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7718106/

Workplace health and safety training, employees' risk perceptions, behavioral safety compliance, and perceived job insecurity during COVID-19: Data of Vietnam

This paper presents the dataset of a survey on workplace health and safety training, employees' risk perceptions, behavioral safety compliance, and perceived job insecurity in Vietnam during COVID-19 pandemic. The data were collected through an online questionnaire completed by Vietnamese full-time employees between April and June 2020. Using E-mail, LinkedIn, and Facebook, the online questionnaire was sent to respondents who filled it out voluntarily. A two-wave survey was conducted in order to lessen the common method bias. Totally, we received complete matched data for 732 full-time employees. All data were processed through SPSS 22.0, AMOS 23.0 and Smart PLS 3.0. Besides descriptive statistics, the results of the explanatory factor analysis and the confirmation factor analysis were included in this paper, which may serve as a good reference for future studies.

Chi et al. 2020.

Data Brief, vol. 33.

Keywords: COVID-19; job insecurity; risk perceptions; safety compliance; workplace health and safety training.

Evidence Level: 5B

Link: https://www.sciencedirect.com/science/article/pii/S2352340920312397?via%3Dihub

Occupancy-aided ventilation for both airborne infection risk control and work productivity

Reducing airborne infectious risk is crucial for controlling infectious respiratory diseases (*e.g.*, COVID-19). The airborne transmissibility of COVID-19 is high so that the common ventilation rate may be insufficient to dilute the airborne pathogens, particularly in public buildings with a relatively large occupancy density. Reducing occupancy can reduce the pathogen load thereby reducing airborne infection risk. However, reduced occupancy deteriorates work productivity due to the lost hours of work. This study proposes an occupancy-aided ventilation strategy for constraining the airborne infection risk and minimizing the loss of work productivity. Firstly, two mechanisms of occupancy schedule (alternative changeovers between normal occupancy and reduced occupancy) for reducing the airborne infection risk and loss of work productivity are revealed based on analyzing features of the indoor concentration profile of exhaled aerosols. Secondly, optimization of the occupancy schedule is developed to maximize the total time length of normal occupancy for the minimum loss in work productivity while satisfying the constraint on airborne infection risk (*e.g.*, with the reproduction number less than one). The airborne infection risk is evaluated with the rebreathed fraction model. Case studies on COVID-19 in a classroom demonstrate that the proposed occupancy-aided ventilation is effective with an earning ratio of 1.67 (the ratio of the improvement in health outcome to the loss in work productivity) and is robust to the variable occupancy loads and occupancy flexibilities.

Zhang et al. 2020.

Building and Environment, vol. 188.

Keywords: Airborne infection risk; Occupancy schedule; Occupancy-aided ventilation; Rebreathed fraction; Work productivity.

Evidence Level: 6B

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7718782/