



Emerging Evidence Alert August 2021

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

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Monthly research highlight

Healthy lifestyle interventions for workers during COVID-19

COVID-19 continues to have a significant impact on the health and wellbeing of workers. The reinstatement of lockdowns and associated restrictions contribute to increased sedentary behaviours, decreased physical activity and often poor dietary choices, such as snacking and higher consumption of alcohol.

A [research trial](#) among university employees aimed to turn this trend around by conducting three supervised interventions over 18 weeks:

- Education on healthy habits
- Mediterranean diet for nutrition
- Telematic (supervised in real-time) aerobic and strength exercises.

Participants were surveyed six months after completing the interventions and the results showed employees adhered to a healthier lifestyle. Sitting time was reduced by 2.5 hours per day, physical activity levels increased, and health-related quality of life improved by more than four points, which is of clinical significance.

These positive results suggest employers could consider healthy lifestyle programs and services for workers during COVID-19 and beyond, especially those workers that continue working from home as part of ongoing flexible working arrangements.

For more information about adhering to healthy lifestyles and supporting mental health during COVID-19, visit the [Comcare website](#). Our website has guidance on working from home, practical tips about important topics such as Striking the Balance with Flexible Work and the Looking After Your Mental Health factsheet series developed in partnership with the Australian Public Service Commission.

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

Healthy minds: group cognitive-behavioral intervention for sustainable return to work after a sick leave due to depression

Background: Depression is one of the major causes for sick leave and loss of productivity at work. Many studies have investigated return to work (RTW) interventions for people with common mental disorders. However, a paucity of studies has targeted depressive symptoms in the workplace, as well as work productivity. **Objectives:** This study presents preliminary results on a novel group intervention based on cognitive behavioral principles in order to optimize sustainable RTW, by reducing clinical symptoms (anxiety and depression) and improving work productivity. **Method:** This pilot study followed a quasi-experimental design, with participants randomly receiving the group intervention (N = 19) or only receiving usual services (N = 11, control group). The group intervention called Healthy Minds for Sustainable RTW consists of eight sessions based on cognitive behavioral therapy principles and techniques. Outcome measures on depressive and anxiety symptoms and work productivity were administered at baseline (i.e. the start of return-to-work or gradual RTW), as well 2 months later (post-intervention), and at 6-month follow-up. **Results:** The results did not show a time × group interaction for symptoms of depression or anxiety (p = 0.07). Those who received the group intervention however did see a within-group reduction in anxiety and depressive symptoms over time, clinically significant for the group intervention only. A significant time × group interaction for work productivity was found, with those in the intervention group improving over time compared to the control condition. **Conclusion:** Although replication is needed, these results suggest that a brief group cognitive-behavioral intervention specifically tailored to work-related issues is promising. Future studies are warranted, particularly with larger samples and remote webconferencing delivery.

Corbière et al. 2021.

Journal of Occupational Rehabilitation, vol. 19.

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Keywords: Cognitive behavioral therapy; depression; group intervention; return-to-work; workplace.

Evidence Level: 3A

Link: <https://link.springer.com/article/10.1007%2Fs10926-021-09991-6>

A randomised feasibility trial of an employer-based intervention for enhancing successful return to work of cancer survivors (MiLES intervention)

Background: Employers express a need for support during sickness absence and return to work (RTW) of cancer survivors. Therefore, a web-based intervention (MiLES) targeted at employers with the objective of enhancing cancer survivors' successful RTW has been developed. This study aimed to assess feasibility of a future definitive randomised controlled trial (RCT) on the effectiveness of the MiLES intervention. Also preliminary results on the effectiveness of the MiLES intervention were obtained. **Methods:** A randomised feasibility trial of 6 months was undertaken with cancer survivors aged 18-63 years, diagnosed with cancer < 2 years earlier, currently in paid employment, and sick-listed < 1 year. Participants were randomised to an intervention group, with their employer receiving the MiLES intervention, or to a waiting-list control group (2:1). Feasibility of a future definitive RCT was determined on the basis of predefined criteria related to method and protocol-related uncertainties (e.g. reach, retention, appropriateness). The primary effect measure (i.e. successful RTW) and secondary effect measures (e.g. quality of working life) were assessed at baseline and 3 and 6 months thereafter. **Results:** Thirty-five cancer survivors were included via medical specialists (4% of the initially invited group) and open invitations, and thereafter randomised to the intervention (n = 24) or control group (n = 11). Most participants were female (97%) with breast cancer (80%) and a permanent employment contract (94%). All predefined criteria for feasibility of a future definitive RCT were achieved, except that concerning the study's reach (90 participants). After 6 months, 92% of the intervention group and 100% of the control group returned to work (RR: 0.92, 95% CI: 0.81-1.03); no difference were found with regard to secondary effect measures. **Conclusions:** With the current design a future definitive RCT on the effectiveness of the MiLES intervention on successful RTW of cancer

survivors is not feasible, since recruitment of survivors fell short of the predefined minimum for feasibility. There was selection bias towards survivors at low risk of adverse work outcomes, which reduced generalisability of the outcomes. An alternative study design is needed to study effectiveness of the MiLES intervention.

Greidanus et al. 2021.

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

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Keywords: Employer; employment; feasibility studies; internet-based intervention; manager; neoplasms; occupational health services; pilot randomised controlled trial; sick leave; supervisor.

Evidence Level: 3A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11357-9>

Presenteeism and Absenteeism

Predictors of working days lost due to sickness absence and disability pension

Objective: To identify social and health-related predictors of the number of days lost due to sickness absence (SA) and disability pension (DP) among initially 55-year-old public-sector workers. **Methods:** The data from the Finnish Helsinki Health Study included participants aged 55 years at the baseline (in 2000-2002, N = 1630, 81% women), and were enriched with register-based information on SA and DP. The cumulative number of calendar days lost due to SA \geq 1 day or DP between ages 55 and 65 was calculated. Negative binomial regression model was used to identify the predictors of days lost. **Results:** The average calendar days lost was 316 days (about 220 working days) during a 10-year follow-up, and 44% were due to SA and 56% due to DP. Smoking [incidence rate ratio (IRR) = 1.19, 95% CI 1.01-1.40 for past and IRR = 1.30, CI 1.07-1.58 for current], binge drinking (IRR = 1.22, CI 1.02-1.46), lifting or pulling/pushing heavy loads (IRR = 1.35, CI 1.10-1.65), awkward working positions (IRR = 1.24, CI 1.01-1.53), long-standing illness limiting work or daily activities (IRR = 2.32, CI 1.93-2.79), common mental disorder (IRR = 1.52, CI 1.30-1.79), and multisite pain (IRR = 1.50, CI 1.23-1.84) increased the number of days lost, while high level of education (IRR = 0.66, CI 0.52-0.82) and moderate level of leisure-time physical activity (IRR = 0.80, CI 0.67-0.94) reduced the number of days lost. **Conclusions:** Modifiable lifestyle risk factors, workload factors, common mental disorder, and multisite pain substantially increase the number of days lost. However, the findings of this study could be generalized to female workers in the public sector. Future research should also consider shorter SA spells in estimating working years lost and working life expectancy.

Shiri et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: Chronic disease; healthy lifestyle; life expectancy; occupations; sick leave; work engagement; workload.

Evidence Level: 4B

Link: <https://link.springer.com/article/10.1007%2Fs00420-020-01630-6>

Working Hours

A generalized structural equation model approach to long working hours and near-misses among healthcare professionals in Japan

Background: Near-miss incidents are the foundation of major injuries. They are warning signs that loss is imminent. Long working hours are a risk factor for near-misses along with sleep problems, job-related stress, and depressive symptoms. This study aimed to evaluate the indirect effects of long working hours via mediating variables on near-miss occurrences among Japanese healthcare professionals. (2) **Methods:** 1490 Japanese healthcare professionals' reports from a web-based survey of workers in October 2018 were analyzed to evaluate total, direct, and indirect effects of long working hours on near-misses. We applied a generalized structural equation model with three mediating variables: sleep problems, job-related stress, and depressive symptoms. (3) **Results:** The total effect and direct effect of the categories of working hours longer than 41 h per week (h/w) for occurrence of near-misses were not significantly higher than that of 35-40 h/w. However, for indirect effects on occurrence of near-misses that first passed through job-related

stress, there were higher reports for each category compared to 35-40 h/w, with odds ratios (OR) and 95% confidence intervals (95% CI) of OR = 1.12, 95% CI (1.07, 1.21) for 41-50 h/w; 1.25, (1.14, 1.41) for 51-60 h/w; and 1.31, (1.18, 1.51) for ≥ 61 h/w. (4) **Conclusion:** The results suggest that reducing working hours might improve job-related stress, which could reduce near-misses and prevent injuries.

Anzai et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 13.

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Keywords: Generalized structural equation model; healthcare professional; indirect effect; near-miss.

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/18/13/7154>

Impact of long working hours on health based on observations in China

Background: Health should be a key focus in considerations of long working hours. Little is known about for which groups of people working longer hours is more harmful to their health. Additionally, the definition of long working hours varies slightly due to country differences in working hours systems. Therefore, this study aims to explore the association between long working hours and the self-rated health (SRH) level, taking into account gender and educational differences. **Method:** Data were collected from two waves (2016 and 2018) of the China Family Panel Studies (CFPS). A total of 6972 workers were available for analysis. Descriptive statistical analysis, an ordered probit (oprobit) model and conditional mixed process (CMP) regression analyses were used to analyze the data. Furthermore, I conducted a stratified analysis by gender and education groups. **Result:** This study observed a negative association between long working hours and SRH. Compared to other education groups, labor with long working hours had a more negative impact on the SRH of those with higher education. Long working hours had a more negative influence on the SRH of male workers. In contrast, no clear association was found among female workers. **Conclusion:** This study estimates SRH of those with long working hours in China. Among workers, long working hours have a negative impact on the health of workers with college degrees or beyond. One possible explanation is that they do not exercise, their diet is unreasonable, and their working conditions involve chronic exposure to computer radiation. The negative health effects of long working hours on males are four times greater than those on females. This study provides valuable insights into the health of the workforce, working time regulations and overtime rules.

Chu et al. 2021.

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

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Keywords: CMP; China; long working hours; self-rated health.

Evidence Level: 4B

Link: <https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-021-11190-0>

Effect of long working hours and insomnia on depressive symptoms among employees of Chinese internet companies

Background: In China, long working hours and insomnia are relatively common among internet company employees. Considering that both can affect mental health, we examined their independent and interaction effects on these employees' depressive symptoms (DS). **Methods:** We analyzed data from the 2016 occupational health questionnaire survey conducted in 35 large-, medium-, and small-scale internet companies. Overall, 3589 full-time employees were recruited to evaluate the association among working hours, insomnia, and DS. The Patient Health Questionnaire (PHQ-9) was used to assess DS. The association of DS (PHQ-9 ≥ 10) with working hours (≤ 40 , 41-50, 51-60, and > 60 h/week), insomnia (with or without), and interaction of both was estimated using multivariable logistic regression analysis. **Results:** Compared with the group working for ≤ 40 h/week, the adjusted odds ratios (ORs) for DS among participants who worked for 41-50 h/week, 51-60 h/week, and > 60 h/week were 1.32 (1.11-1.56), 1.74 (1.35-2.24), and 2.54 (1.90-3.39), respectively. The ORs for DS among those with insomnia were 2.36 (2.04-2.74) after adjusting for general characteristics. The ORs for DS related to insomnia were similar [1.91 (1.46-2.50), 2.00 (1.61-2.50), respectively] in the participants who worked for < 50 h/week. However, among participants working for 51-60 h or > 60 h/week, the adjusted ORs for DS substantially increased to 4.62 (2.90-7.37) and 5.60

(3.36-9.33), respectively. Moreover, among the participants with insomnia, working overtime showed a greater association with DS. **Conclusions:** We showed that long working hours and insomnia are independent factors associated with the prevalence of DS; furthermore, an interaction effect of long working hours and insomnia on DS was observed. For relieving DS in internet company employees, it is important to reduce insomnia.

Liu et al. 2021.

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

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Keywords: Depressive symptom; insomnia; interaction effect; long working hours.

Evidence Level: 4B

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11454-9>

Long working hours are associated with a higher risk of non-alcoholic fatty liver disease: A large population-based Korean cohort study

Background: Non-alcoholic fatty liver disease (NAFLD), a common chronic liver disease, may progress to fibrosis, cirrhosis, hepatocellular carcinoma, and liver failure. But only a few cross-sectional studies have reported an association of NAFLD with working hours. This cohort study further examined the association between working hours and the development of NAFLD. **Methods:** We included 79,048 Korean adults without NAFLD at baseline who underwent a comprehensive health examination and categorized weekly working hours into 35-40, 41-52, 53-60, and >60 hours. NAFLD was defined as the presence of fatty liver, in the absence of excessive alcohol use, as observed by ultrasound. **Results:** During a median follow-up of 6.6 years, 15,095 participants developed new-onset NAFLD (incidence rate, 5.55 per 100 person-years). After adjustment for confounders, the hazard ratios (95% confidence interval) for the development of NAFLD in 41-52, 53-60, and >60 working hours compared with that in 35-40 working hours were 1.07 (1.02-1.13), 1.06 (1.00-1.13), and 1.13 (1.05-1.23), respectively. Furthermore, the association remained significant after confounders were treated as time-varying covariates. **Conclusion:** In this large-scale cohort, long working hours, especially >60 working hours a week, were independently associated with incident NAFLD. Our findings indicate that long working hours are a risk factor for NAFLD.

Lee et al. 2021.

PLoS One, vol. 16, no. 7.

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Keywords: Working hours; risk; fatty liver disease; non-alcoholic; Korea.

Evidence Level: 4B

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0255118>

Building Employer Capability

Wellness Programs

Adherence to a lifestyle exercise and nutrition intervention in University employees during the COVID-19 pandemic: a randomized controlled trial

Healthy lifestyles should be encouraged in the workplace through the occupational health teams of the companies. The objective of the present study was to evaluate the adherence to a lifestyle intervention carried out in university employees during the COVID-19 pandemic and its impact on health-related quality of life (HrQoL). A randomized controlled trial following the CONSORT guidelines was performed, consisting of three supervised interventions lasting for 18 weeks: an educational intervention on healthy habits, a nutritional intervention, and a telematic aerobic and strength exercise intervention. Lifestyle and HrQoL were analyzed six months post-intervention to assess adherence. Twenty-three middle-aged participants completed the study. The intervention group significantly improved their lifestyle according to the Health Promoting Lifestyle Profile II questionnaire, especially in the categories of Health Responsibility, Physical Activity, and Nutrition, with a large effect size. Sitting time was reduced by 2.5 h per day, with a moderate effect size. Regarding HrQoL, the intervention group showed a clinically significant improvement in the

Physical Component Summary. Despite the lockdown and the mobility restrictions caused by the COVID-19 pandemic, this intervention performed on university employees achieved adherence to a healthier lifestyle and improved their HrQoL, which is of great clinical relevance.

García Pérez de Sevilla et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: COVID-19 pandemic; Mediterranean diet; adherence; intervention; lifestyle; physical exercise; telematic; workplace.

Evidence Level: 2B

Link: <https://pubmed.ncbi.nlm.nih.gov/34299960/>

Job Design

Productivity, satisfaction, work environment and health after relocation to an activity-based flex office-the active office design study

Implementation of activity-based flex offices (AFOs) are becoming increasingly common. The aim of this study was to evaluate the effects of an AFO on perceived productivity, satisfaction, work environment and health. Questionnaire data from the longitudinal, quasi-experimental Active Office Design Study was used. The study evaluates a public organization relocating staff to either an AFO or to cell offices. Measures from baseline, 6 and 18 months after relocation, were analyzed. Employees in the AFO experienced a decreased productivity and satisfaction with the office design. Lack of privacy as well as increased noise disturbance, less satisfaction with sit comfort and work posture were reported. Employees in the AFO with work tasks requiring a high degree of concentration experienced lower productivity while those with a high proportion of teamwork rated productivity to be continually high. No significant group differences were found between the two office types in general health, cognitive stress, salutogenic health indicators or pain in the neck, shoulder or back. The study highlights the importance of taking work characteristics into account in the planning and implementation process of an AFO. Flexible and interactive tasks seem more appropriate in an AFO, whereas individual tasks demanding concentration seem less fit.

Öhrn et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Activity-based work; job performance; longitudinal study; new ways of working; occupational health; office worker.

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/18/14/7640>

Shift Work

Shift work, low-grade inflammation, and chronic pain: A 7-year prospective study

Objectives: We investigated prospective associations of shift work with chronic pain and C-reactive protein (CRP), an indicator of inflammation. Furthermore, we elucidated CRP as a possible mediator and/or moderator of effects of shift work on pain. **Methods:** Data from a 7 years follow-up study were analyzed (N = 2323). Shift work and chronic pain of "neck/shoulder", "arm/hand", "upper back", "low back", "hip/leg/feet", and "other regions" were measured by questionnaires. "Chronic widespread pain", "number of chronic pain sites", and "any chronic pain" were computed. CRP was measured in serum samples. Logistic and Poisson regressions were conducted. Mediation was assessed by casual mediation analyses and moderation by the Relative Excess Risk due to Interaction (RERI). **Results:** Shift work was not associated with any chronic pain variable and no mediation was detected. CRP was associated with low back pain, hip/leg pain, and "number of pain sites", and also with the combination of shift work and CRP of 1-2.99 mg/L (compared to: no shiftwork and CRP < 1). Additionally, shiftwork and CRP 1-2.99 mg/L was associated with risk of "any chronic pain" (OR: 1.76, 95% CI: 1.12, 2.85), which was not associated with CRP alone. Moderation analyses suggested the risks for "any chronic pain" and "number of pain regions" increased when individuals with elevated CRP worked shifts-beyond what the separate effects of CRP and shift would

suggest. **Conclusions:** We found no evidence of shift work in general affecting CRP or chronic pain. However, shift work and elevated CRP combined may influence chronic pain.

Christensen et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: Chronic widespread pain; C-reactive protein; number of pain sites; shift work; working time; hs-CRP.

Evidence Level: 4A

Link: <https://link.springer.com/article/10.1007%2Fs00420-020-01626-2>

A longitudinal study of the relationship between shift work and prostate-specific antigen in healthy male workers

As shift work has become prevalent globally, it is important to evaluate the health effects of shift work on employees. Several studies have demonstrated a positive association between shift work and prostate cancer. Therefore, we aimed to further examine the relationship between shift work and elevated prostate-specific antigen (PSA). Our study collected data from 66,817 male participants at baseline and followed up for about 6 years. We categorized shift worker status and shift schedule types. To evaluate the risk of elevated PSA on shift workers, we estimated hazard ratios using the Cox proportional hazards regression analyses. During a median follow-up of 4.1 years, 1030 participants developed elevated PSA. The multivariable-adjusted hazard ratio (HR) of elevated PSA for shift workers compared with daytime workers was 1.37 (1.04-1.80). Among shift workers, rotating shift workers (HR = 1.47, 95% CI 1.06-2.03) showed a significantly increased risk of elevated PSA compared with daytime workers. Our longitudinal study provides evidence for an association between shift work, especially rotating shift work, and elevations of PSA.

Lee et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Kangbuk Samsung Health Study; cohort study; longitudinal study; prostate cancer; prostate-specific antigen; rotating shift work; shift work.

Evidence Level: 4A

Link: <https://www.mdpi.com/1660-4601/18/14/7458>

Adapting to the Future of Work

Aging Workforce

Is working in later life good for your health? A systematic review of health outcomes resulting from extended working lives

Background: Work, rather than unemployment, is recognised as being good for health, but there may be an age when the benefits are outweighed by adverse impacts. As countries around the world increase their typical retirement age, the potential effect on population health and health inequalities requires scrutiny.

Methods: We carried out a systematic review of literature published since 2011 from developed countries on the health effects of employment in those over 64 years of age. We completed a narrative synthesis and used harvest plots to map the direction and volume of evidence for the outcomes reported. We followed the Preferred Reporting Items for Systematic Reviews (PRISMA) checklist in our methods and reporting.

Results: We identified seventeen relevant studies, which were of cohort or cross-sectional design. The results indicate evidence of beneficial or neutral effects from extended working on overall health status and physical health for many employees, and mixed effects on mental health. The benefits reported however, are most likely to be for males, those working part-time or reducing to part-time, and employees in jobs which are not low quality or low reward. **Conclusions:** Extending working life (particularly part time) may have benefits or a neutral effect for some, but adverse effects for others in high demand or low reward jobs. There is the potential for widening health inequalities between those who can choose to reduce their working hours, and those who need to continue working full time for financial reasons. There

is a lack of evidence for effects on quality of life, and a dearth of interventions enabling older workers to extend their healthy working life.

Baxter et al. 2021.

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

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Keywords: Employment; extending working; health; older workers; retirement; systematic review.

Evidence Level: 1A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11423-2>

The psychosocial work environment and perceived stress among seniors with physically demanding jobs: the SeniorWorkingLife study

Background: Poor psychosocial work conditions are known to foster negative health consequences. While the existing literature on this topic focus mainly on white-collar workers, the influence of different aspects of the psychosocial work environment in physically demanding jobs remain understudied. Likewise, senior workers represent a population of the workforce at increased risk of adverse health outcomes and premature exit from the labour market. This study investigates the association between psychosocial work factors and perceived stress among the senior work force. **Methods:** Utilizing cross-sectional findings, this study reports associations between psychosocial factors (organizational justice, cooperation and collegial support, decision latitude, clarity of tasks, and quality of leadership) and the outcome of perceived stress quantified by Cohen's Perceived Stress Scale (CPSS). Currently employed senior workers with physically demanding jobs were included in the analyses (n = 3386). Associations were modeled using general linear models with weights to make the estimates representative. **Results:** For all individually adjusted psychosocial variables, the category of "good" was consistently associated with lower stress scores compared to the categories of both "moderate" and "poor" (all p < 0.0001). Likewise, in the mutually adjusted analysis, the category of "good" was statistically different from "poor" for all included variables, while the category of "moderate" remained different from "poor" for "clarity of tasks", "cooperation and collegial support", and "decision latitude". **Conclusions:** Among senior workers with physically demanding jobs, poor ratings of organizational factors related to the psychosocial work environment are consistently associated with high stress scores. Blue-collar occupations focusing primarily on physical risk factors are recommended to increase awareness on psychosocial aspects that may be relevant to the local work environment.

Vinstrup et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Cohen; blue-collar workers; physical exertion; psychological stress; workload.

Evidence Level: 4A

Link: <https://www.mdpi.com/1660-4601/18/14/7437>

Challenges arising for older workers from participating in a workplace intervention addressing work ability: A qualitative study from Germany

Objective: Studies examining what renders workplace interventions to sustain and promote work ability of older workers successful have largely neglected older workers' perspective. This paper outlines the results of a study with regard to older workers' experiences and expectations of a workplace intervention. Based on these findings, some reflections on how to improve the design and the implementation of workplace interventions for older workers are provided. **Methods:** Semi-structured interviews were conducted with older workers (N = 8) participating in a workplace intervention undertaken at one production site of a large manufacturing company in Baden-Wurtemberg/Germany. The interview guide included questions on participants' experiences with and expectations of the intervention. The interviews were recorded, transcribed verbatim and analyzed using qualitative content analysis according to Mayring (2014). **Results:** Older workers' reported some challenges they face due to their participation in the workplace intervention. These resulted from the work environment (physical challenges), the work process design (new long work cycle), the work organization (tight time allowances, little job rotation, change of teams, age stereotypes) and the management of the workplace intervention (bad information, feeling of occupational insecurity)

and lack of being valued). **Conclusions:** The study shows that challenges arising for older workers from their participation in the workplace intervention may have counteracted the promotion of work ability. As findings suggest, some of these challenges might have been avoided either by considering workers' perspective during design and implementation of an intervention or by referring to evidence on aging and work ability.

Sippli et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: Aging; aging workforce; older worker; work ability; workplace intervention.

Evidence Level: 5B

Link: <https://link.springer.com/article/10.1007%2Fs00420-020-01639-x>

Smart workplaces for older adults: Coping 'ethically' with technology pervasiveness

Pervasive technologies such as Artificial Intelligence, Virtual Reality and the Internet of Things, despite their great potential for improved workability and well-being of older workers, entail wide ethical concerns. Aligned with these considerations we emphasize the need to present from the viewpoint of ethics the risks of personalized ICT solutions that aim to remedy health and support the well-being of the ageing population at workplaces. The ethical boundaries of digital technologies are opaque. The main motivation is to cope with the uncertainties of workplaces' digitization and develop an ethics framework, termed SmartFrameWoRK, for personalized health support through ICT tools at workplace environments. SmartFrameWoRK is built upon a five-dimensional approach of ethics norms: autonomy, privacy, transparency, trustworthiness and accountability to incite trust in digital workplace technologies. A typology underpins these principles and guides the ethical decision-making process with regard to older worker particular needs, context, data type-related risks and digital tools' use throughout their lifecycle. Risk analysis of pervasive technology use and multimodal data collection, highlighted the imperative for ethically aware practices for older workers' activity and behaviour monitoring. The SmartFrameWoRK methodology has been applied in a case study to provide evidence that personalized digital services could elicit trust in users through a well-defined framework. Ethics compliance is a dynamic process from participants' engagement to data management. Defining ethical determinants is pivotal towards building trust and reinforcing better workability and well-being in older workers.

Segkouli et al. 2021.

Universal Access in the Information Society, vol. 20.

User License: *PMC Open Access Subset*

Keywords: Ethics framework; older workers; pervasive technology; workplaces.

Evidence Level: 6B

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8294306/>

Technology

Fatigue, boredom and objectively measured smartphone use at work

Nowadays, many people take short breaks with their smartphone at work. The decision whether to continue working or to take a smartphone break is a so-called labour versus leisure decision. Motivational models predict that people are more likely to switch from labour (work) to leisure (smartphone) the more fatigue or boredom they experience. In turn, fatigue and boredom are expected to decrease after the smartphone was used. However, it is not yet clear how smartphone use at work relates to fatigue and boredom. In this study, we tested these relationships in both directions. Participants ($n = 83$, all PhD candidates) reported their current level of fatigue and boredom every hour at work while an application continuously logged their smartphone use. Results indicate that participants were more likely to interact with their smartphone the more fatigued or bored they were, but that they did not use it for longer when more fatigued or bored. Surprisingly, participants reported increased fatigue and boredom after having used the smartphone (more). While future research is necessary, our results (i) provide real-life evidence for the notion that fatigue and boredom are temporally associated with task disengagement, and (ii) suggest that taking a short break with the smartphone may have phenomenological costs.

Dora et al. 2021.

Royal Society Open Science, vol. 8, no. 7.

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Keywords: Motivation; opportunity costs; phenomenology; smartphone use; work.

Evidence Level: 5B

Link: <https://royalsocietypublishing.org/doi/10.1098/rsos.201915>

Guiding and Supporting Mental Health and Wellbeing

Mental Health

Workplace mental state monitoring during VR-based training for offshore environment

Adults are constantly exposed to stressful conditions at their workplace, and this can lead to decreased job performance followed by detrimental clinical health problems. Advancement of sensor technologies has allowed the electroencephalography (EEG) devices to be portable and used in real-time to monitor mental health. However, real-time monitoring is not often practical in workplace environments with complex operations such as kindergarten, firefighting and offshore facilities. Integrating the EEG with virtual reality (VR) that emulates workplace conditions can be a tool to assess and monitor mental health of adults within their working environment. This paper evaluates the mental states induced when performing a stressful task in a VR-based offshore environment. The theta, alpha and beta frequency bands are analysed to assess changes in mental states due to physical discomfort, stress and concentration. During the VR trials, mental states of discomfort and disorientation are observed with the drop of theta activity, whilst the stress induced from the conditional tasks is reflected in the changes of low-alpha and high-beta activities. The deflection of frontal alpha asymmetry from negative to positive direction reflects the learning effects from emotion-focus to problem-solving strategies adopted to accomplish the VR task. This study highlights the need for an integrated VR-EEG system in workplace settings as a tool to monitor and assess mental health of working adults.

Abu Hasan et al. 2021.

Sensors, vol. 21, no. 14.

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Keywords: EEG; mental state; offshore training; virtual reality.

Evidence Level: 5B

Link: <https://www.mdpi.com/1424-8220/21/14/4885>

How do employment conditions and psychosocial workplace exposures impact the mental health of young workers? A systematic review

This systematic review synthesizes the evidence about how employment conditions and psychosocial workplace exposures impact the mental health of young workers. A range of factors were identified including employment conditions, workplace sexual harassment, psychosocial job quality, work stressors, and job control. Further research is needed in this area.

Shields et al. 2021.

Social Psychiatry and Psychiatric Epidemiology, vol. 56, no. 7.

Keywords: Employment conditions; mental health; psychosocial workplace exposure; review; risk of bias; work; young people.

Evidence Level: 1A

Link: <https://link.springer.com/article/10.1007/s00127-021-02077-x>

Workplace interventions to reduce depression and anxiety in small and medium-sized enterprises: A systematic review

Background: Depression and anxiety are the most prevalent mental health difficulties in the workplace, costing the global economy \$1 trillion each year. Evidence indicates that symptoms may be reduced by interventions in the workplace. This paper is the first to systematically review psychosocial interventions for depression, anxiety, and suicidal ideation and behaviours in small-to medium-size enterprises (SMEs).

Methods: A systematic search following PRISMA guidelines, registered in PROSPERO (CRD42020156275), was conducted for psychosocial interventions targeting depression, anxiety, and suicidal ideation/behaviour in SMEs. The PubMed, PsycINFO, Scopus, and two specific occupational health databases were searched, as well as four databases for grey literature, without time limit until 2nd December 2019. **Results:** In total, 1283 records were identified, 70 were retained for full-text screening, and seven met the inclusion criteria: three randomised controlled trials (RCTs), three before and after designs and one non-randomised trial, comprising 5111 participants. Study quality was low to moderate according to the Quality Assessment Tool for Quantitative Studies. Five studies showed a reduction in depression and anxiety symptoms using techniques based on cognitive behavioural therapy (CBT), two reported no significant change. **Limitations:** Low number and high heterogeneity of interventions and outcomes, high attrition and lack of rigorous RCTs. **Conclusions:** Preliminary evidence indicates CBT-based interventions can be effective in targeting symptoms of depression and anxiety in SME employees. There may be unique challenges to implementing programmes in SMEs. Further research is needed in this important area.

Hogg et al. 2021.

Journal of Affective Disorders, vol. 1, no. 290.

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Keywords: Anxiety; depression; psychosocial; small- and medium-sized enterprises; suicide.

Evidence Level: 1A

Link: <https://pubmed.ncbi.nlm.nih.gov/34082284/>

ADHD at the workplace: ADHD symptoms, diagnostic status, and work-related functioning

Adults diagnosed with attention-deficit/hyperactivity disorder (ADHD) commonly experience impairments in multiple domains of daily living. Work has a central role in daily life and is susceptible to ADHD due to its cognitive demands. The present study seeks to examine the nature of work-related problems and impairments of adults with ADHD, and explores the association to ADHD symptoms and neuropsychological test performance. A community sample of 1231 individuals took part in this study and completed a set of questionnaires assessing ADHD symptoms and work-related problems. Furthermore, a clinical sample of 134 adults diagnosed with ADHD were recruited from an ADHD outpatient clinic, who completed the same set of questionnaires. A subsample of 51 patients with ADHD additionally performed a neuropsychological assessment using tests of attention and executive functions. Work-related problems were found both in individuals of the community sample with symptoms of ADHD and individuals diagnosed with ADHD. Individuals with ADHD reported work related problems particularly in not meeting their own standards and perceived potential, yet it less commonly manifests in negative performance evaluations at work or job loss. ADHD symptoms, in particular symptoms of inattention, were found to be strongly associated with work-related problems, whereas neuropsychological test performance was no meaningful predictor of functioning at work. This study emphasizes the susceptibility of individuals' functioning at work to ADHD symptoms and impairments associated with ADHD. ADHD related difficulties at work should be considered in the clinical evaluation and targeted screening at the work place to provide support when indicated.

Fuermaier et al. 2021.

Journal of Neural Transmission, vol. 128, no. 7.

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Keywords: ADHD; daily functioning; occupational functioning; real life functioning; work.

Evidence Level: 5A

Link: <https://link.springer.com/article/10.1007%2Fs00702-021-02309-z>

Psychosocial Issues

Care for joy: evaluation of a humor intervention and its effects on stress, flow experience, work enjoyment, and meaningfulness of work

The media increasingly speak of a care crisis. Systematic support is needed to prepare nursing apprentices for the high demands of their profession and to reduce the number of nurses who finally quit. Particularly

in stressful jobs like nursing, humor as a coping strategy can have a beneficial effect on perceived stress and overall work enjoyment. In this study, we used a humor intervention among nursing staff in training and evaluated its effects on humor, stress, work enjoyment, the meaningfulness of work, and flow experience. The sample consists of 104 nurses in training. The intervention group received a 3-h humor intervention, while the control group received no intervention. Positive and negative affect were measured immediately before and after the intervention. Humor was measured before the intervention (t_0) and again 6 months later (t_1); at t_1 , we again measured humor and also stress, work meaningfulness, work enjoyment, and flow experience. Our analyses showed a beneficial change in positive and negative affect right after the intervention. By means of repeated measures ANOVA we could further confirm an effect of the intervention on reported humor 6 months later. Humor mediated positive effects of the humor intervention on perceived meaningfulness of work, work enjoyment, and on the frequency of flow at work. Also, we found a significant negative relationship between humor and stress measured at t_1 . The results of this study confirm the effectiveness of humor interventions in promoting humor, and, through this, the meaningfulness of work, work enjoyment, and the frequency of flow experience. Implications of the use of humor interventions in the nursing profession are discussed.

Bartzik et al. 2021.

Frontiers in Public Health, vol. 2, no. 9.

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

Keywords: Flow experience; humor; intervention; meaningfulness of work; nurse; stress; work enjoyment.

Evidence Level: 3B

Link: <https://www.frontiersin.org/articles/10.3389/fpubh.2021.667821/full>

The relationship among sleep reactivity, job-related stress, and subjective cognitive dysfunction: a cross-sectional study using path analysis

Insomnia, job-related stress, and cognitive dysfunction affect the mental health of workers. However, the relationships among sleep reactivity, job-related stress, and subjective cognitive dysfunction in workers remains not fully understood. Therefore, this study seeks to investigate the relationships among these variables in Japanese adult workers. In total, 536 adult workers in Japan were evaluated using the Japanese version of Ford Insomnia Response to Stress Test, Brief Job Stress Questionnaire, and Cognitive Complaints in Bipolar Disorder Rating Assessment to assess sleep reactivity, job-related stress, and subjective cognitive function, respectively. Path analysis was also carried out. The results of the path analysis showed that sleep reactivity significantly influenced on subjective cognitive dysfunction directly and indirectly via job stressors and stress reaction. Our results may not be generalizable to underage workers because only adult workers were included, which is a limitation of this study. The results of the present study suggest that job-related stress mediates the effect of sleep reactivity on subjective cognitive dysfunction in Japanese adult workers. This underscores the need to evaluate the mediating effect of job-related stress in addressing the subjective cognitive dysfunction associated with insomnia in workers.

Toyoshima et al. 2021.

Industrial Health, vol. 14.

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Keywords: Job stress; mediator; sleep reactivity; subjective cognitive function; workers.

Evidence Level: 4B

Link: https://www.jstage.jst.go.jp/article/indhealth/advpub/0/advpub_2020-0251/article

Personality traits, workers' age, and job satisfaction: the moderated effect of conscientiousness

Job satisfaction has gained increasing interest in the world of work and a vast field of research has been stimulated regarding its antecedents. Among these, personality traits have received consistent and significant attention, with a particular emphasis on conscientiousness. To delve deeper and detail these aspects, in the present research, a moderation model was hypothesized, with the aim of investigating the effect of age on the association between conscientiousness (and its subdimensions scrupulousness and perseverance) and job satisfaction. The age-moderated interactions of the other Big Five personality traits were also explored. The study involved 202 Italian workers (92 men, 110 women) with a mean age of 44.82

years (SD = 10.56) who completed the Big Five Questionnaire and the Job Satisfaction Scale. The results showed a positive association between conscientiousness and job satisfaction. This was moderated by age to the extent that it was significant for younger and average-age workers and was less significant for older workers. Similar results were found for the subdomain of perseverance, while the relationship between scrupulousness and job satisfaction was not significant. Furthermore, no age-moderated interaction between the other Big Five personality traits and Job satisfaction were found. Such data supports interactive models that highlight the need to integrate personality traits with other factors in exploring the antecedents of job satisfaction. These findings provide additional elements to an understanding of the factors contributing to workers satisfaction, and could have important applicative implications in a framework for healthy organizations and the well-being movement.

Topino et al. 2021.

PLoS One, vol. 16, no. 7.

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Keywords: Job satisfaction; personality traits; worker's age; employee; conscientiousness.

Evidence Level: 4B

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252275>

Job stress and burnout among employees working in terrorist-ridden areas

This article examines the relationship of effort-reward imbalance (ERI) on employee stress by considering job burnout (BO), organizational (in)justice (OJ), and sensitivity to terrorism (STT). This study uses the effort-reward imbalance (ERI) framework as a job stress model. After describing terrorism and a brief discussion on organizational justice and some of its challenges, we introduced "sensitivity to terrorism" as a moderator in the ERI framework. Using a 432 sample size of questionnaire data collected from two big cities where terrorist attacks are rampant and received during a period when terrorist attacks were at a peak. After analyzing data in EFA, results from the hierarchical regression analysis provided support for our developed model. Overall, the statistical model is significant ($p < 0.05$). We found significant relationships between ERI and facets of BO. Organizational (in)justice mediated the influence of ERI on facets of BO. We also found that STT significantly moderated ERI and facets of burnout. The article concludes with some implications and guidelines for future research.

Soomro et al. 2021.

Frontiers in Psychology, vol. 1.

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Keywords: Burnout - professional; effort reward imbalance model; job stress and strain; organizational injustice; psychology; terrorism salience.

Evidence Level: 4B

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8294454/>

Sometimes it's personal: differential outcomes of person vs. job at risk threats to job security

The current paper expands an under-addressed concept within the job insecurity literature, namely, whether threats to job security are specific to the jobholder (person-at-risk threats) or specific to the job (job-at-risk threats). Using a between-person experimental vignette design, 136 employed participants were asked to imagine themselves in either a Person-at-Risk or a Job-at-Risk scenario. As expected, participants in a person-at-risk scenario indicated more negative reactions to job insecurity, as captured by greater anticipated negative affect and poorer perceived social exchanges and organization-based self-esteem. They also reported reduced intention for interpersonal citizenship behavior and greater intention to engage in one form of impression management compared to individuals in a job-at-risk scenario. We interpret these findings in terms of their implications on individual versus group identity, as well as on well-being and the behavioral consequences of job insecurity.

Carusone et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Identity threat; job insecurity; organization based self-esteem; self.

Evidence Level: 5A

Link: <https://www.mdpi.com/1660-4601/18/14/7379>

How to use questionnaire results in psychosocial risk assessment: calculating risks for health impairment in psychosocial work risk assessment

Psychosocial risk questionnaires are common instruments in occupational safety and health promotion. Organizations use psychosocial risk questionnaires to obtain an economic overview of psychological job stressors and job resources. However, the procedures to assess if a result for a given workplace group is critical and calls for further action differ significantly and are often based on an arbitrary rule of thumb instead of empirically based evaluations. This article presents a method to translate questionnaire results into risk values for the occurrence of health impairment. We test this method on a dataset including the job stressors, job resources, and emotional exhaustion of 4210 employees from different industries. We applied logistic regression analysis to calculate the risks for impaired psychological health, indicated by high values of the burnout indicator emotional exhaustion. The results indicate significantly different health impairment risks (probabilities) for different scores on the job stressors and job resources scales as well as for scale score combinations. The risk values can be used to define cutoff values between high- and low-risk workplaces that are empirically based on stressor-strain relationships and are easily understandable by all stakeholders in the psychosocial risk assessment process, including laypersons.

Dettmers et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 13.

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Keywords: Cutoff values; job resources; job stressors; psychological health impairment; psychosocial risk assessment; questionnaires.

Evidence Level: 5A

Link: <https://www.mdpi.com/1660-4601/18/13/7107>

Psychosocial work factors and blood pressure among 63 800 employees from The Netherlands in the Lifelines Cohort Study

Objectives: Previous studies on the association between psychosocial work factors and blood pressure mainly focused on specific occupations or populations and had limited sample sizes. We, therefore, investigated the associations between psychosocial work factors and blood pressure in a large general working population in the Netherlands. **Methods:** We included 63 800 employees from the Netherlands, aged 18-65 years, with blood pressure measurements and a reliable job code at baseline. Psychosocial work factors (job strain, effort-reward imbalance (ERI) and emotional demands) in the current job were estimated with three recently developed psychosocial job exposure matrices. To examine the associations, regression analyses adjusted for covariates (age, sex, body mass index, education, monthly income, pack-years, smoking, alcohol consumption and antihypertensive medication (not included for hypertension)) were performed. **Results:** Higher job strain was associated with higher systolic blood pressure (SBP) (B (regression coefficients) (95% CI) 2.14 (1.23 to 3.06)) and diastolic blood pressure (DBP) (B (95% CI) 1.26 (0.65 to 1.86)) and with higher odds of hypertension (OR (95% CI) 1.43 (1.17 to 1.74)). Higher ERI was associated with higher DBP (B (95% CI) 4.37 (3.05 to 5.68)), but not with SBP or hypertension. Higher emotional demands were associated with lower SBP (B (95% CI) -0.90 (-1.14 to -0.66)) and lower odds of hypertension ((OR) (95% CI) 0.91 (0.87 to 0.96)). **Conclusions:** In the general working population, employees in jobs with high job strain and ERI have higher blood pressure compared with employees with low job strain and ERI. Emotional demands at work are inversely associated with blood pressure.

Faruque et al. 2021.

Journal of Epidemiology and Community Health, vol. 2.

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

Keywords: Blood pressure; hypertension; occupational health.

Evidence Level: 4B

Link: <https://jech.bmj.com/content/early/2021/07/02/jech-2021-216678.long>

Resilience

Linking employee resilience with organizational resilience: the roles of coping mechanism and managerial resilience

Background: Environmental uncertainty has become the normal surviving and development environment for organizations. Resilience is the key to manage the crisis and abrupt crush, and the relationship between employee resilience and organizational resilience still needs to be explored in Chinese context. The study is to uncover the black box between employee resilience and organizational resilience. **Methods:** Based on the conservation of resource theory, this study introduced managerial resilience, problem-focused coping and emotion-focused coping into the relational mechanism between employee resilience and organizational resilience. The study adopted structural equations, bootstrapping methods, and analyzed 329 multi-point employee-manager matching data as the research basis from high-tech industries, service industries, and traditional manufacturing industries. **Results:** This study demonstrated that employee resilience is positively associated with organizational resilience; The indirect effects of employee resilience on organizational resilience through problem-focused coping and emotion-focused coping were statistically significant; moreover, managerial resilience positively moderated the relation between employee resilience and emotion-focused coping, and it also moderated the indirect effect of employee resilience on organizational resilience through emotion-focused coping. **Conclusion:** This study adds value to the literature by revealing employee resilience boots problem-focused coping and emotion-focused coping, resulting in more or less organizational resilience in the context of Chinese enterprises. It is suggested that in the daily management of the organization, we should pay more attention to cultivate and develop employee resilience to improve organizational resilience.

Liang et al. 2021.

Psychology Research and Behavior Management, vol. 20, no. 14.

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Keywords: Emotion-focused coping; employee resilience; managerial resilience; organizational resilience; problem-focused coping.

Evidence Level: 5B

Link: <https://www.dovepress.com/linking-employee-resilience-with-organizational-resilience-the-roles-of-peer-reviewed-fulltext-article-PRBM>

Enabling Healthy and Safe Workplaces

Health and Wellbeing

The use of fitness testing to predict occupational performance in tactical personnel: a critical review

Tactical personnel work in an occupation that involves tasks requiring a high level of cardiovascular fitness as well as muscular strength and endurance. The aim of this literature review was to identify and critique studies investigating the relationship between physical fitness, quantified by fitness assessment measures, and occupational task performance. Databases were searched for relevant articles which assessed a fitness measure and a measure of occupational performance. A total of 15 articles were included and were deemed to be of acceptable methodological quality (8.4/12 on the Critical Appraisal Skills Programme checklist). Included articles assessed a variety of fitness attributes and occupational tasks. Across tactical groups, there appear to be no standardized fitness tests that can determine occupational performance, with aerobic fitness, anaerobic fitness, strength, endurance, power, and agility all being associated with occupational task performance. A wide range of fitness assessments appears to be required to predict occupational performance within tactical personnel. Efforts should be made to base fitness assessments on occupational demands unique to both the environment and requirements of each individual tactical unit.

Orr et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Assessment; injury risk; task performance.

Evidence Level: 6A

Link: <https://www.mdpi.com/1660-4601/18/14/7480>

A dual path model of work-related well-being in healthcare and social work settings: the interweaving between trait emotional intelligence, end-user job demands, coworkers related job resources, burnout, and work engagement

Framing the job demands-resources (JD-R) model, the present study deepened how trait emotional intelligence (TEI, i.e., perception about one's own emotional realm) contributes to the work-related well-being of healthcare professionals. A total of 302 healthcare professionals were involved in the study and completed an anonymous self-report questionnaire. The results of the structural equation modeling revealed that TEI was directly and indirectly-mediated by end-user job demands-negatively associated with burnout, and directly and indirectly-mediated by coworkers related job resources- associated with work engagement. According to the health impairment and motivational processes of JD-R, the present study highlights that TEI could targets burnout and work engagement through different paths. The first path revealed that TEI would reduce burnout protecting by the insurgence harmful relationships with service end-users and the second showed that TEI would support work engagement sustaining the development of positive relationship with coworkers.

Tesi et al. 2021.

Frontiers in Psychology, vol. 1.

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Keywords: Burnout; healthcare; path model; social work; trait emotional intelligence; well-being; work engagement.

Evidence Level: 5A

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8280767/>

Part-time work and other occupational risk factors for suicide among working women in the Swiss National Cohort

Objective: The aim of this study was to describe the factors associated with mortality by suicide among working women focusing on work-related factors. **Methods:** The study population consisted in all Swiss residents recorded in the 1990 and/or the 2000 compulsory national censuses and were linked to emigration and mortality registers. We selected all women aged 18-65 and at work at the official census dates. Following work-related variables were available: socio-economic status, weekly hours of work, the sector of activity and the job title coded according to the International Standard Classification of Occupations (ISCO). The risk of suicide was modelled using negative binomial regression. **Results:** The cohort comprised 1,771,940 women and 2526 deaths by suicide corresponding to 24.9 million person-years. The most significant non-occupational predictors of suicide were age, period, civil status, religion, nationality and geographical regions. Adjusted on these factors, part-time work was associated with increased suicide rates. According to job codes, health and social activities, in particular care-worker had the highest suicide risks. **Conclusion:** Suicide among working women depended on work-related factors even taking into account other socio-demographic factors.

Wild et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: Cohort study; epidemiology; female; occupational factors; part-time work; suicide mortality.

Evidence Level: 4B

Link: <https://link.springer.com/article/10.1007%2Fs00420-020-01629-z>

Workaholism prevention in occupational medicine: a systematic review

Introduction: Given the extent of workaholism identified in the literature, it seems essential to consider effective preventive measures. The purpose of this article is to summarize literature data on possible collective and individual preventive measures against workaholism, especially in occupational medicine. **Method:** We conducted a systematic literature review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. **Results:** 155 articles were retrieved in March 2019, but only 15 well-designed studies providing concrete measures to prevent workaholism were included. The various measures were classified using the traditional distinction between three levels of prevention. At the

first level of prevention, workaholism can be avoided by implementing a protective organizational culture. The second level of prevention rather focuses on individual training and counselling to address the negative consequences of workaholism. Finally, the third level of prevention combines cognitive and behavioral interventions that enable professional and social reintegration of workaholics. **Discussion:** This literature review confirms the multifactorial origin of workaholism and the involvement of organizational factors, supporting the necessary contribution of companies in its prevention. This review also reinforces the growing perception of workaholism as a behavioral addiction. Occupational physicians play a key role in this preventive approach as they can influence both working conditions and individual care. The highlighted preventive measures seem to be not only favorable to workaholics, but also to companies. **Conclusion:** This review provides field tools that can be used at the various levels of workaholism prevention. Nevertheless, intervention studies are required to confirm the effectiveness of the measures presented.

Cossin et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 13.

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Keywords: Occupational physician; organizational prevention; prevention; work addiction; workaholism.

Evidence Level: 1A

Link: <https://www.mdpi.com/1660-4601/18/13/7109>

Heart rate during work and heart rate variability during the following night: a day-by-day investigation on the physical activity paradox among blue-collar workers

Objectives: Contrary to leisure-time physical activity, occupational physical activity (OPA) may have harmful health effects, called the physical activity paradox. A proposed mechanism is that OPA can elevate the heart rate (HR) for several hours per day. We aimed to investigate the association between the mean intensity of OPA and HR variability (HRV) indices the following night. **Methods:** Three cohorts (NOMAD, DPhacto, and Physical Workload and Fitness) involving blue-collar workers from different sectors were merged in this study. HR monitors (Actiheart) recorded 24-hour inter-beat intervals (IBI) for up to four consecutive days. The relative intensity of the mean HR during work was estimated by HR reserve (%HRR), and time-domain indices of HRV were analyzed during the following night. Data were analyzed using a multilevel growth model to test the association between mean %HRR during work and HRV indices at night in a day-by-day analysis adjusted for age, BMI, alcohol consumption, smoking, and occupation. **Results:** The dataset included a sample of 959 Danish blue-collar workers, with a mean %HRR during work of 31%, and 42% worked at an intensity $\geq 30\%$ HRR. The multilevel model showed negative within- and between-subject associations between %HRR during work and HRV indices at night. **Conclusions:** Our results indicate a higher %HRR during work to associate with lower HRV indices the following night and a higher HR, reflecting an imbalanced autonomic cardiac modulation. This finding supports a high mean HR during work to be a potential underlying mechanism for the harmful health effect of OPA.

Korshøj et al. 2021.

Scandinavian Journal of Work, Environment & Health, vol. 47, no. 5.

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Keywords: Heart rate; heart rate variability; blue collar workers; physical activity; employee health.

Evidence Level: 4A

Link: <https://www.sjweh.fi/article/3965>

Work Health and Safety

Australian bus drivers' modifiable and contextual risk factors for chronic disease: A workplace study

Introduction: Little is known about workplace health promotion for bus drivers. Bus drivers are at-risk of chronic disease because they are exposed to the risk factor combination of poor nutrition, low levels of physical activity, high levels of sedentary time and are often overweight or obese. The purpose of this paper is to situate the quantitative baseline data collected from bus drivers within qualitative findings about the socio-cultural context of the workplace. **Materials and methods:** Baseline data about physical activity, dietary intake and sedentary hours was collected from 58 drivers employed by a large bus company in southeast Queensland. Ten drivers and seven key workplace informants participated in

interviews and discussion groups about driver health behaviours, workplace structure, culture, and resources. **Results:** The quantitative results of our study reveal bus drivers have a cluster of poor health behaviours-limited physical activity, lower than recommended consumption of fruit and vegetables and high levels of sitting time during working-hours-which contribute to a high prevalence of overweight and obesity and a heightened risk of chronic disease. The qualitative findings suggest there are individual and structural barriers to improving drivers' modifiable health behaviours. Individual barriers include ingrained poor habits and more pressing life concerns, while structural barriers in the context of the workplace include time constraints, shift work, long days, a lack of work amenities and a general disconnect of drivers with their workplace. **Conclusion:** In this workplace, health promotion strategies for bus drivers should be prioritised as a means of improving drivers' health. To maximise uptake and effectiveness, these strategies should make use of existing workplace resources and consider the context of workplace health behaviour change. Further research is warranted in a broader sample of Australian bus companies to explore the context of workplace health behavior change so targeted strategies to improve bus drivers' health can be developed.

Brodie et al. 2021.

PLoS One, vol. 16, no. 7.

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Keywords: Chronic disease; risk factors; bus driver; transport; health promotion.

Evidence Level: 5A

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0255225>

Risk perception and coping behavior of construction workers on occupational health risks- a case study of Nanjing, China

To reduce harm caused by occupational health risks of construction workers exposed to working environments, especially those for interior decoration, it is crucial for them to actively recognize and prevent these risks. Therefore, how to improve their occupational health risks perception and regulate their coping behaviors should be of great concern. However, most prior studies target construction worker safety, and little research focuses on risk analysis from the psychological level of workers. Hence, construction workers' occupational health risk perception level and coping behavior level in Nanjing and the influencing factors were analyzed through statistical analysis with 341 valid questionnaires.

Bootstrapping was applied to test the mediating effects of risk perception on the proposed factors and coping behaviors. This study revealed that construction workers have a high-level of occupational health risk perception, yet low-level coping behavior. Gender, age, education level, and unit qualification cause differences in individual risk perception level. Personal knowledge and group effects significantly affect the level of risk perception, which subsequently affect coping behavior. Education level, monthly income, and personal knowledge influence the coping behavior through risk perception. Recommendations were put forward for risk perception and coping behavior improvement from the perspectives of construction workers themselves, enterprises, and governments. This study sheds new light for research areas of occupational health and risk management and provides beneficial practice for improving construction workers' responses to occupational health risks.

Liu et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 13.

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Keywords: Construction workers; health risks; occupational health; risk coping behavior; risk perception.

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/18/13/7040>

Risk Assessment

The causes of occupational accidents and injuries in Romanian firms: an application of the Johansen Cointegration and Granger Causality Test

Organizational risks are present in any activity, so it is important to manage them properly. The jobs are dynamic and involve a series of processes and activities. The entire human resource is exposed to several

risks. If these risks are approached correctly, the organizational capacity to achieve its objectives and vision will increase considerably. This paper aims to investigate the relationships between work accidents (fatal and non-fatal) and the causes that contribute to their occurrence (causes dependent on the executor, causes dependent on the means of production, workload-dependent causes, and work-dependent causes-the work environment). The augmented Dickey-Fuller (ADF) test is employed to check the data stationarity series, while the Johansen test determines the cointegration relation of variables. The data have been collected from Romanian organizations. The vector error correction model (VECM) and Granger causality test are applied for speed of adjustment, nature, and direction of variables' relationship. This research demonstrated that both data series are free from the unit-root problem at first difference. The lag length criteria select the third lag for model fitness, and Johansen cointegration declares that variables are cointegrated for the long term. The vector error correction model shows the speed of adjustment from the short to the long run is 83.35% and 42.60% for work and fatal accidents. The study results show that fatal accidents have a series relationship with selected cases for the short run and have a long-run relationship with the means of production. Fatal accidents are directly related to means of production. Fatal accidents are not designed by executors, workload-dependent causes, or work environments in the short run. Fatal accidents are directly related to the means of production and sudden incidents happening in the long run. Fatal accidents are considered by executors, workload-dependent causes, or work environments in the short run. In the long run, fatal accidents are directly related to the means of production and sudden incidents happening.

Ivascu et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: ARDL model; accident risk; occupational and fatal accident; safety management; workplace health.

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/18/14/7634>

Chronic Health Issues

Occupation and subcategories of asthma: a population-based incident case-control study

Background: We hypothesised that occupational exposures differently affect subtypes of adult-onset asthma.

Objective: We investigated potential relations between occupation and three subtypes of adult asthma, namely atopic asthma, non-atopic asthma and asthma-COPD overlap syndrome (ACOS).

Methods: This is a population-based case-control study of incident asthma among working-age adults living in Pirkanmaa Hospital District in Southern Finland. The determinant of interest was occupation at the time of diagnosis of asthma or the job that the subject had quit due to respiratory symptoms. Asthma was divided into three mutually exclusive subtypes on the basis of any positive IgE antibody (atopic and non-atopic asthma) and presence of persistent airways obstruction in spirometry (ACOS). We applied unconditional logistic regression analysis to estimate adjusted OR (aOR), taking into account gender, age and smoking.

Results: The following occupational groups showed significantly increased risk of atopic asthma: chemical industry workers (aOR 15.76, 95% CI 2.64 to 94.12), bakers and food processors (aOR 4.69, 95% CI 1.18 to 18.69), waiters (aOR 4.67, 95% CI 1.40 to 15.56) and those unemployed (aOR 3.06, 95% CI 1.52 to 6.17). The following occupations showed clearly increased risk of non-atopic asthma: metal workers (aOR 8.37, 95% CI 3.77 to 18.59) and farmers and other agricultural workers (aOR 2.36, 95% CI 1.10 to 5.06). Some occupational groups showed statistically significantly increased OR of ACOS: electrical and electronic production workers (aOR 30.6, 95% CI 6.10 to 153.35), fur and leather workers (aOR 16.41, 95% CI 1.25 to 215.85) and those retired (aOR 5.55, 95% CI 1.63 to 18.97).

Conclusions: Our results show that different occupations are associated with different subtypes of adult-onset asthma.

Jaakkola et al. 2021.

Occupational and Environmental Medicine, vol. 19

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Keywords: Clinical medicine; epidemiology; occupational health practice; public health; respiratory.

Evidence Level: 5A

Link: <https://oem.bmj.com/content/early/2021/07/18/oemed-2020-106953.long>

Does Chronic Obstructive Pulmonary Disease affect workers' health?

During recent decades, the elevation of workers' health has become the utmost point of concern since it is considered among the primary indicators of economies. The economies, especially the emerging ones, are primarily focusing on every indicator to uplift their businesses. Along with the other aspects, it is also required to assess the impact of Chronic Obstructive Pulmonary Disease (COPD) on workers' health conditions in small- and medium-scale enterprises (SMEs). With this aim, we are presenting a detailed analysis to reveal useful insights regarding the COPD-workers' health nexus. The sample set of 1,008 workers is working in various SMEs in Beijing and Tianjin from September, 2020. The findings infer that a rise in COPD concerning wages will uplift the worker health problems due to COPD affecting worker health. Whereas, the working condition and tools, smoking years, and health safety training have a statistically adverse effect on workers' health concerning wages. The outcomes in terms of insights would be useful for planning future perspectives.

Yao et al. 2021.

Frontiers in Public Health, vol. 5.

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Keywords: COPD; China; SMEs; probit model; workers health.

Evidence Level: 5A

Link: <https://www.frontiersin.org/articles/10.3389/fpubh.2021.711629/full>

Occupational Exposure

Tremor measurements in a 22-year cohort study of workers exposed to hand-held vibrating tools

Objectives: The objectives of this cohort study were to evaluate possible long-term effects of occupational exposure to hand-arm vibration (HAV) in terms of increased tremor. The aims were to evaluate whether exposure during follow-up, baseline hand-arm vibration syndrome (HAVS), baseline manual dexterity or current medical conditions or life-style habits might be associated with increased tremor. A further aim was to compare two different activation conditions: postural vs rest tremor. **Methods:** Forty men (current age: 60.4 years) who had previously worked as manual workers in a specialized engineering and construction company enrolled in the study. Their hand functions had been examined in 1994. At the baseline examination, 27 had been diagnosed with HAVS, while 13 were not exposed. The follow-up examination in 2016-2017 comprised the CATSYS Tremor Pen® for measuring postural and rest tremor and the Grooved Pegboard Test for assessing manual dexterity. Blood samples were taken for assessing biomarkers that might have impact on tremor. **Results:** Neither cumulative exposure to HAV during follow-up nor HAVS at baseline were associated with increased tremor. A test for manual dexterity at baseline was significantly associated with increased tremor (Tremor Intensity) at follow-up. Blood markers of current medical conditions and tobacco consumption were associated with increased tremor. Rest tremor frequency was higher than postural tremor frequency ($p < 0.001$). **Conclusions:** The main findings of this 22-year cohort study were no indications of long-term effects on tremor related to HAV exposure and previous HAVS status. However, baseline manual dexterity was significantly associated with increased tremor at follow-up. Activation conditions (e.g., hand position) are important when testing tremor.

Bast-Pettersen et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: CATSYS Tremor pen®; Free thyroxine (s-ft4); Glycated hemoglobin (HbA1c); Grooved Pegboard test; Hand-held vibrating tools.

Evidence Level: 4A

Link: <https://link.springer.com/article/10.1007%2Fs00420-020-01612-8>

Carcinogenic assessment of cobalt-containing alloys in medical devices or cobalt in occupational settings: A systematic review and meta-analysis of overall cancer risk from published epidemiologic studies

In 2020, the European Commission up-classified pure cobalt metal to a Category 1B hazard, based primarily on data from rodent inhalation carcinogenicity studies of metallic cobalt. The European Commission review did not evaluate cobalt-containing alloys in medical devices, which have very different properties vs. pure cobalt metal and did not include a systematic epidemiologic review. We performed a systematic review and meta-analysis of published, peer-reviewed epidemiologic studies evaluating the association between overall cancer risk and exposure to orthopedic implants containing cobalt alloys or cobalt particulates in occupational settings. Study-specific estimates were pooled using random-effects models. Analyses included 20 papers on orthopedic implants and 10 occupational cohort papers (~1 million individuals). The meta-analysis summary estimates (95% confidence intervals) for overall cancer risk were 1.00 (0.96-1.04) overall and 0.97 (0.94-1.00) among high-quality studies. Results were also similar in analyses stratified by type of exposure/data sources (occupational cohort, implant registry or database), comparators (general or implant population), cancer incidence or mortality, follow-up duration (latency period), and study precision. In conclusion, meta-analysis found no association between exposure to orthopedic implants containing cobalt alloys or cobalt particulates in occupational settings and overall cancer risk, including an analysis of studies directly comparing metal-on-metal vs. non-metal-on-metal implants.

Zhang et al. 2021.

Regulatory Toxicology and Pharmacology, vol. 3.

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Keywords: Cobalt; joint prosthesis; neoplasms; occupational exposure; review literature as topic; risk.

Evidence Level: 1A

Link: <https://www.sciencedirect.com/science/article/pii/S0273230021001288?via%3Dihub>

Cancer and occupational exposure to pesticides: an umbrella review

Purpose: The aim was to identify the scope of the epidemiology literature reviewed regarding the risk of cancer as related to occupational exposure to pesticides and to compare regulatory toxicity results where feasible. **Methods:** Review studies of breast, lung, prostate, non-Hodgkin lymphoma, and colorectal cancer were identified from the published literature from 2010 to 2020 using a priori inclusion and exclusion criteria. Epidemiology observations were first assessed and then compared against carcinogenicity profiles derived from regulatory toxicology studies. **Results:** Several active ingredients were associated with specific cancer but overall, there was neither strong nor consistent epidemiologic data supportive of a positive association between pesticide exposure in occupational settings and cancer. Authors noted common themes related to the heterogeneity of exposure, study design, control for confounders, and the challenge to collect these data reliably and validly with an adequate sample size. Toxicology studies in laboratory animals that assessed carcinogenic potential did not reveal cancer outcomes that were concordant with reported epidemiologic findings. **Conclusions:** Farming and pesticides represent diverse exposures that are difficult to quantify in epidemiologic studies. Going forward, investigators will need creative and novel approaches for exposure assessment. Integration of epidemiologic and toxicological studies with attention to biological plausibility, mode of toxicological action and relevance to humans will increase the ability to better assess associations between pesticides and cancer.

Burns et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: Cancer; epidemiology; farming; pesticides; toxicology.

Evidence Level: 1A

Link: <https://link.springer.com/article/10.1007%2Fs00420-020-01638-y>

Presumed exposure to chemical pollutants and experienced health impacts among warehouse workers at logistics companies: a cross-sectional survey

During intercontinental shipping, freight containers and other closed transport devices are applied. These closed spaces can be polluted with various harmful chemicals that may accumulate in poorly ventilated environments. The major pollutants are residues of pesticides used for fumigation as well as volatile organic compounds (VOCs) released from the goods. While handling cargos at logistics companies, workers

can be exposed to these pollutants, frequently without adequate occupational health and safety precautions. A cross-sectional questionnaire survey was conducted among potentially exposed warehouse workers and office workers as controls at Hungarian logistics companies (1) to investigate the health effects of chemical pollutants occurring in closed spaces of transportation and storage and (2) to collect information about the knowledge of and attitude toward workplace chemical exposures as well as the occupational health and safety precautions applied. Pre-existing medical conditions did not show any significant difference between the working groups. Numbness or heaviness in the arms and legs (AOR = 3.99; 95% CI = 1.72-9.26) and dry cough (AOR = 2.32; 95% CI = 1.09-4.93) were significantly associated with working in closed environments of transportation and storage, while forgetfulness (AOR = 0.40; 95% CI = 0.18-0.87), sleep disturbances (AOR = 0.36; 95% CI = 0.17-0.78), and tiredness after waking up (AOR = 0.40; 95% CI = 0.20-0.79) were significantly associated with employment in office. Warehouse workers who completed specific workplace health and safety training had more detailed knowledge related to this workplace chemical issue (AOR = 8.18; 95% CI = 3.47-19.27), and they were significantly more likely to use certain preventive measures. Warehouse workers involved in handling cargos at logistics companies may be exposed to different chemical pollutants, and the related health risks remain unknown if the presence of these chemicals is not recognized. Applied occupational health and safety measures at logistics companies are not adequate enough to manage this chemical safety issue, which warrants awareness raising and the introduction of effective preventive strategies to protect workers' health at logistics companies.

Lovas et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 13.

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Keywords: Chemical pollutant; freight container; logistics; pesticide; volatile organic compound; warehouse.

Evidence Level: 4A

Link: <https://www.mdpi.com/1660-4601/18/13/7052>

Occupational exposure to carcinogens and occupational epidemiological cancer studies in Iran: a review

Introduction: The extent of exposure to occupational carcinogens is not well characterized in Iran, and little is known about the burden of occupational cancer. **Objectives:** This study aimed to describe exposure to occupational carcinogens and occupational epidemiology studies in Iran. **Methods:** Relevant studies up to January 2021 in Iran were identified through three databases (PubMed, Web of Science, and Google Scholar). **Results:** Forty-nine publications from 2009 to 2020 (one cohort, 11 case-control, 34 exposure monitoring studies, and three cancer burden studies) were included. The exposure monitoring studies were conducted mainly in the petroleum industry, metal industry, manufacturing of electronics, manufacturing of plastics, construction industry, and service industry. A few of the case-control studies also reported increased risk of cancers in relation to work in those industries. **Conclusions:** Occupational cancer epidemiology in Iran is at an early stage. Both epidemiological and exposure monitoring studies are generally limited in size to provide robust evidence of occupational cancer risks. A coherent strategy to estimate the occupational cancer burden in Iran should start with conducting epidemiological studies along with systematic monitoring of occupational carcinogens for use in hazard control and research.

Hosseini et al. 2021.

Cancers, vol. 13, no. 14.

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Keywords: Iran; cancer; exposure measurement; occupation; occupational exposures.

Evidence Level: 6B

Link: <https://www.mdpi.com/2072-6694/13/14/3581>

The impacts of sun exposure on worker physiology and cognition: multi-country evidence and interventions

Background: A set of four case-control ($n = 109$), randomized-controlled ($n = 7$), cross-sectional ($n = 78$), and intervention ($n = 47$) studies was conducted across three countries to investigate the effects of sun exposure on worker physiology and cognition. **Methods:** Physiological, subjective, and cognitive performance data were collected from people working in ambient conditions characterized by the same

thermal stress but different solar radiation levels. **Results:** People working under the sun were more likely to experience dizziness, weakness, and other symptoms of heat strain. These clinical impacts of sun exposure were not accompanied by changes in core body temperature but, instead, were linked with changes in skin temperature. Other physiological responses (heart rate, skin blood flow, and sweat rate) were also increased during sun exposure, while attention and vigilance were reduced by 45% and 67%, respectively, compared to exposure to a similar thermal stress without sunlight. Light-colored clothes reduced workers' skin temperature by 12-13% compared to darker-colored clothes. **Conclusions:** Working under the sun worsens the physiological heat strain experienced and compromises cognitive function, even when the level of heat stress is thought to be the same as being in the shade. Wearing light-colored clothes can limit the physiological heat strain experienced by the body.

Ioannou et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Core temperature; heart rate; heat; labor; occupational; performance; skin blood flow; skin temperature; solar radiation; sweat rate.

Evidence Level: 5A

Link: <https://www.mdpi.com/1660-4601/18/14/7698>

Vibration related symptoms and signs in quarry and foundry workers

Purpose: The development of vascular and neurosensory findings were studied in two groups of long-term exposed quarry and foundry workers with different vibration exposures, working conditions and work tasks. **Methods:** The study included 10 quarry workers (mean age 43 yrs., mean exposure time 16 yrs.) and 15 foundry workers (35 yrs.; 11 yrs.) at two plants in Sweden. All participants completed a basic questionnaire and passed a medical examination including a number of neurosensory tests, e.g. the determination of vibration (VPT) and temperature (TPT) perception thresholds as well as a musculoskeletal examination of the neck, shoulders, arms and hands. **Results:** A high prevalence of neurosensory findings (40%) was found among the quarry workers. Both groups, however, showed a low prevalence of vibration white fingers (VWF). Foundry workers showed significantly better sensitivity than quarry workers for all monofilament tests ($p \leq 0.016$), TPT warmth in dig 2 ($p = 0.048$) and 5 dexter ($p = 0.008$), and in dig 5 sinister ($p = 0.005$). They also showed a better VPT performance in dig 5 dexter ($p = 0.031$). **Conclusions:** Despite high vibration exposure, the prevalence of VWF was low. The high prevalence of neurosensory findings among the quarry workers may depend on higher A(8) vibration exposure and higher exposure to high-frequency vibrations. An age-effect and exposure to cold could also be contributing factors. The nervous system seems to be more susceptible to high-frequency vibrations than the vascular system. For neurosensory injuries, the current ISO 5349-1 standard is not applicable.

Gerhardsson et al. 2021.

International Archives of Occupational and Environmental Health, vol. 94, no. 5.

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Keywords: Vibration related symptoms; vibration related signs; quarry workers; foundry workers

Evidence Level: 5A

Link: <https://link.springer.com/article/10.1007%2Fs00420-021-01660-8>

Characterizing exposures to flame retardants, dioxins, and furans among firefighters responding to controlled residential fires

Firefighters may encounter items containing flame retardants (FRs), including organophosphate flame retardants (OPFRs) and polybrominated diphenyl ethers (PBDEs), during structure fires. This study utilized biological monitoring to characterize FR exposures in 36 firefighters assigned to interior, exterior, and overhaul job assignments, before and after responding to controlled residential fire scenarios. Firefighters provided four urine samples (pre-fire and 3-h, 6-h, and 12-h post-fire) and two serum samples (pre-fire and approximately 23-h post-fire). Urine samples were analyzed for OPFR metabolites, while serum samples were analyzed for PBDEs, brominated and chlorinated furans, and chlorinated dioxins. Urinary concentrations of diphenyl phosphate (DPhP), a metabolite of triphenyl phosphate (TPhP), bis(1,3-dichloro-2-propyl) phosphate (BDCPP), a metabolite of tris(1,3-dichloro-2-propyl) phosphate (TDCPP), and bis(2-

chloroethyl) phosphate (BCeTP), a metabolite of tris(2-chloroethyl) phosphate (TCEP), increased from pre-fire to 3-hr and 6-hr post-fire collection, but only the DPhP increase was statistically significant at a 0.05 level. The 3-hr and 6-hr post-fire concentrations of DPhP and BDCPP, as well as the pre-fire concentration of BDCPP, were statistically significantly higher than general population levels. BDCPP pre-fire concentrations were statistically significantly higher in firefighters who previously participated in a scenario (within the past 12 days) than those who were responding to their first scenario as part of the study. Similarly, firefighters previously assigned to interior job assignments had higher pre-fire concentrations of BDCPP than those previously assigned to exterior job assignments. Pre-fire serum concentrations of 2,3,4,7,8-pentachlorodibenzofuran (23478-PeCDF), a known human carcinogen, were also statistically significantly above the general population levels. Of the PBDEs quantified, only decabromodiphenyl ether (BDE-209) pre- and post-fire serum concentrations were statistically significantly higher than the general population. These results suggest firefighters absorbed certain FRs while responding to fire scenarios.

Mayer et al. 2021.

International Journal of Hygiene and Environmental Health, vol. 236.

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Keywords: Biomonitoring; firefighters; furans; occupational exposure; organophosphate flame retardants (OPFRs); polybrominated diphenyl ethers (PBDEs).

Evidence Level: 5B

Link: <https://www.sciencedirect.com/science/article/pii/S1438463921000973?via%3Dihub>

The effects of genetic polymorphisms on benzene-exposed workers: A systematic review

Background and aims: Benzene is a group I carcinogen, which has been associated with leukemia and myelodysplastic syndrome. Moreover, it has been proposed that polymorphisms in benzene metabolizing genes influence the outcomes of benzene exposure in the human body. This systematic review aims to elucidate the existent relationship between genetic polymorphisms and the risk of developing adverse health effects in benzene-exposed workers. **Methods:** Three databases were systematically searched until April 2020. The preferred reporting items for systematic reviews and meta-analyses method was used to select articles published between 2005 and 2020. Quality assessment and risk of bias were evaluated by the Newcastle-Ottawa scale. **Results:** After full-text evaluation, 36 articles remained out of 645 initially screened. The most studied health effects within the reviewed papers were chronic benzene poisoning, hematotoxicity, altered urinary biomarkers of exposure, micronucleus/chromosomal aberrations, and gene methylation. Furthermore, some polymorphisms on NQO1, GSTT1, GSTM1, MPO, and CYP2E1, among other genes, showed a statistically significant relationship with an increased risk of developing at least one of these effects on benzene-exposed workers. However, there was no consensus among the reviewed papers on which specific polymorphisms were the ones associated with the adverse health-related outcomes, except for the NQO1 rs1800566 and the GSTT1 null genotypes. Additionally, the smoking habit was identified as a confounder, demonstrating worse health outcomes in exposed workers that smoked. **Conclusion:** Though there is a positive relationship between genetic polymorphisms and detrimental health outcomes for benzene-exposed workers, broader benzene-exposed cohorts that take into account the genetic diversity of the population are needed in order to determine which specific polymorphisms incur in health risks.

Ramírez-Lopera et al. 2021.

Health Science Reports, vol. 4, no. 3.

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Keywords: Benzene; chronic benzene poisoning; genetic polymorphisms; hematotoxicity; occupational health.

Evidence Level: 1A

Link: <https://onlinelibrary.wiley.com/doi/10.1002/hsr2.327>

Asbestosis and Mesothelioma

Increased risk of Gastric Cancer in asbestos-exposed workers: a retrospective cohort study based on Taiwan Cancer Registry 1980-2015

Asbestos has been recognized as a human carcinogen associated with malignant mesothelioma, cancers of lung, larynx, and ovary. However, a putative association between gastric cancer and asbestos exposure remains controversial. In this study, we aimed to explore gastric cancer risk of workers potentially exposed to asbestos in Taiwan. The asbestos occupational cohort was established from 1950 to 2015 based on the Taiwan Labor Insurance Database, and Taiwan Environmental Protection Agency regulatory datasets, followed by the Taiwan Cancer Registry for the period 1980-2015. Standardized incidence ratios (SIRs) for cancer were computed for the whole cohort using reference rates of the general population, and also reference labor population. Compared with the general population, SIR of the asbestos occupational cohort for the gastric cancer increased both in males (1.05, 95% confidence interval (CI): 1.02-1.09) and females (1.10, 95% CI: 1.01-1.18). A total of 123 worksites were identified to have cases of malignant mesothelioma, where increased risk for gastric cancer was found with a relative risk of 1.76 (95% CI: 1.63-1.90). This 35-year retrospective cohort study of asbestos-exposed workers in Taiwan may provide support for an association between occupational exposure to asbestos and gastric cancer.

Fang et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Asbestos; gastric cancer; malignant mesothelioma; occupational cancer; standardized incidence ratio.

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/18/14/7521>

Sedentary Practices

Understanding the implementation of "Sit Less at Work" interventions in three organisations: a mixed methods process evaluation

Long periods of workplace sitting are associated with poor health outcomes. Interventions to reduce workplace sitting time have had variable impacts, the reasons for which require further investigation. In this paper, we report on a process evaluation aiming to determine the intervention fidelity of three "sit less at work" interventions and to explore barriers and enablers to implementation, using a mixed methods "before and after" intervention study design. Convenience samples of staff were recruited from three diverse organisations to participate in pre- and post-intervention online questionnaires, objective measures of sitting time (using activPAL3™ devices) and post-intervention focus groups. Intervention implementers and key personnel were also recruited to participate in post-intervention focus groups and interviews. The process evaluation found that none of the interventions were implemented as intended, with no consistent reductions in sitting time. Contextual and organisational cultural barriers included workload pressures and the social norms of sitting, competing priorities, lack of management buy-in, and perceptions of where the responsibility for behaviour change should come from. To ensure effective implementation of future initiatives, deeper organisational-level change, requiring buy-in from all levels of management and staff, may be needed to shift organisational culture and associated social norms.

Mackenzie et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Occupational; organisational culture; process evaluation; sedentary behaviour; sitting; workplace.

Evidence Level: 5A

Link: <https://www.mdpi.com/1660-4601/18/14/7361>

The "Worktivity" mHealth intervention to reduce sedentary behaviour in the workplace: a feasibility cluster randomised controlled pilot study

Background: Office work generally consists of high amounts of sedentary behaviour (SB) which has been associated with negative health consequences. We developed the "Worktivity" mobile app to help office workers reduce their SB through self-monitoring and feedback on sedentary time, prompts to break sedentary time, and educational facts. The aim of this paper is to report the feasibility of delivering the Worktivity intervention to desk-based office workers in the workplace setting and describe methodological considerations for a future trial. **Methods:** We conducted a three-arm feasibility cluster randomised controlled pilot study over an 8-week period with full time-desk based employees. Clustered randomisation was to one of three groups: Worktivity mobile app (MA; n = 20), Worktivity mobile app plus SSWD (MA+SSWD; n = 20), or Control (C; n = 16). Feasibility was assessed using measures of recruitment and retention, intervention engagement, intervention delivery, completion rates and usable data, adverse events, and acceptability. **Results:** Recruitment of companies to participate in this study was challenging (8% of those contacted), but retention of individual participants within the recruited groups was high (81% C, 90% MA + SSWD, 95% MA). Office workers' engagement with the app was moderate (on average 59%). Intervention delivery was partially compromised due to diminishing user engagement and technical issues related to educational fact delivery. Sufficient amounts of useable data were collected, however either missing or unusable data were observed with activPAL™, with data loss increasing at each follow up time point. No serious adverse events were identified during the study. The majority of participants agreed that the intervention could be implemented within the workplace setting (65% MA; 72% MA + SSWD) but overall satisfaction with the intervention was modest (58% MA; 39% MA + SSWD). **Conclusions:** The findings suggest that, in principle, it is feasible to implement a mobile app-based intervention in the workplace setting however the Worktivity intervention requires further technical refinements before moving to effectiveness trials. Challenges relating to the initial recruitment of workplaces and maintaining user engagement with the mHealth intervention over time need to be addressed prior to future large-scale implementation. Further research is needed to identify how best to overcome these challenges.

Stephenson et al. 2021.

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

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Keywords: Digital health; health behaviour; mobile apps; occupational health; office work; sedentary lifestyle; sit-stand work desk.

Evidence Level: 3A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11473-6>

Physical Activity

Changes in kinematics and work physiology during progressive lifting in healthy adults

Purpose: To analyze progression of changes in kinematics and work physiology during progressive lifting in healthy adults. **Methods:** Healthy participants were recruited. A standardized lifting test from the WorkWell Functional Capacity Evaluation (FCE) was administered, with five progressive lifting low series of five repetitions. The criteria of the WorkWell observation protocol were studied: changes in muscle use (EMG), heart rate (heart rate monitor), base of support, posture and movement pattern (motion capture system). Repeated measures ANOVA's were used to analyze changes during progressive workloads.

Results: 18 healthy young adults participated (8 men, 10 women; mean age 22 years). Mean maximum weight lifted was 66 (± 3.2) and 44 (± 7.4) kg for men and women, respectively. With progressive loads, statistically significant ($p < 0.01$) differences were observed: increase in secondary muscle use at moderate lifting, increase of heart rate, increase of base of support and movement pattern changes were observed; differences in posture were not significant. **Conclusions:** Changes in 4 out of 5 kinematic and work physiology parameters were objectively quantified using lab technology during progressive lifting in healthy adults. These changes appear in line with existing observation criteria.

Bieleman et al. 2021.

Applied Ergonomics, vol. 94.

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Keywords: Electromyography; functional capacity evaluation; heart rate; WorkWell functional capacity evaluation; motion analyses; observation.

Evidence Level: 3A

Link: <https://www.sciencedirect.com/science/article/pii/S0003687021000430?via%3Dihub>

Brief Exercise at Work (BE@Work): a mixed methods pilot trial of a workplace high-intensity interval training intervention

Introduction: The efficacy of high-intensity interval training (HIIT) for improving markers of physical fitness and cardiometabolic health is promising. The workplace is one non-laboratory setting where the effectiveness of HIIT could be explored. The aim of this study was to undertake a mixed-methods exploratory pilot trial of a workplace HIIT intervention named Brief Exercise at Work (BE@Work). **Methods:** Fifty-four healthy employees (mean \pm standard deviation [SD] age 46 ± 10 years) from two workplaces in Northeast England were allocated to 8 weeks of thrice-weekly workplace HIIT based on boxing, stair climbing and stepping, comprising 4-7 60 s high-intensity intervals interspersed with 75 s rest ($n = 30$), or a no-intervention control ($n = 24$). The primary outcome was the change SD of predicted maximal oxygen consumption ($\text{VO}_{2\text{max}}$). Markers of physical fitness, cardiometabolic health and mental well-being were also measured at baseline and follow-up. Participant perceptions of the intervention were explored in post-intervention focus groups ($n = 9$). **Results:** Mean (\pm SD) session attendance was 82% ($\pm 15\%$). Mean peak heart rate across the intervention was 87% of age-predicted maximal heart rate with a within- and between-subject SD of 5.5% and 3.7%, respectively. The SD of changes in predicted $\text{VO}_{2\text{max}}$ was $6.6 \text{ mL}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ across both groups, which can be used to inform sample size estimations for a future full trial. The control-adjusted mean increase (95% confidence interval) in predicted $\text{VO}_{2\text{max}}$ was $3.9 (-0.2 \text{ to } 8.1) \text{ mL}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$, corresponding to a Cohen's D of 0.47. We also observed preliminary evidence of small to moderate effects in favour of the intervention group for non-dominant leg extensor muscle power, markers of health-related quality of life, well-being and perceived stress and small to moderate effects in favour of the controls in perceived pain, physical activity and high-density lipoprotein cholesterol. During HIIT, focus group participants reported physiological responses they perceived as unpleasant or tiring (e.g., breathlessness, local muscular fatigue), but also that they felt alert and energised afterwards. **Conclusion:** The findings of this exploratory pilot trial support the implementation of a definitive randomised controlled trial to quantify the effectiveness of a workplace HIIT intervention.

Burn et al. 2021.

Frontiers in Sport and Active Living, vol. 2.

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Keywords: High-intensity interval training; intervention; mixed method; pilot trial; workplace.

Evidence Level: 5A

Link: <https://www.frontiersin.org/articles/10.3389/fspor.2021.699608/full>

Individual cardiovascular responsiveness to work-matched exercise within the moderate- and severe-intensity domains

Purpose: We investigated the cardiovascular individual response to 6 weeks (3 \times /week) of work-matched within the severe-intensity domain (high-intensity interval training, HIIT) or moderate-intensity domain (moderate-intensity continuous training, MICT). In addition, we analyzed the cardiovascular factors at baseline underlying the response variability. **Methods:** 42 healthy sedentary participants were randomly assigned to HIIT or MICT. We applied the region of practical equivalence-method for identifying the levels of responders to the maximal oxygen uptake ($\dot{\text{V}}\text{O}_{2\text{max}}$) response. For investigating the influence of cardiovascular markers, we trained a Bayesian machine learning model on cardiovascular markers. **Results:** Despite that HIIT and MICT induced significant increases in $\dot{\text{V}}\text{O}_{2\text{max}}$, HIIT had greater improvements than MICT ($p < 0.001$). Greater variability was observed in MICT, with approximately 50% classified as "non-responder" and "undecided". 20 "responders", one "undecided" and no "non-responders" were observed in HIIT. The variability in the $\Delta\dot{\text{V}}\text{O}_{2\text{max}}$ was associated with initial cardiorespiratory fitness, arterial stiffness, and left-ventricular (LV) mass and LV end-diastolic diameter in HIIT; whereas, microvascular responsiveness and right-ventricular (RV) excursion velocity showed a

significant association in MICT. **Conclusion:** Our findings highlight the critical influence of exercise-intensity domains and biological variability on the individual $\dot{V}O_{2\max}$ response. The incidence of "non-responders" in MICT was one third of the group; whereas, no "non-responders" were observed in HIIT. The incidence of "responders" was 11 out of 21 participants in MICT, and 20 out of 21 participants in HIIT. The response in HIIT showed associations with baseline fitness, arterial stiffness, and LV-morphology; whereas, it was associated with RV systolic function in MICT.

Maturana et al. 2021.

European Journal of Applied Physiology, vol. 121, no. 7.

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Keywords: Cardiorespiratory; cardiovascular; exercise training; individual response; responders.

Evidence Level: 3A

Link: <https://link.springer.com/article/10.1007%2Fs00421-021-04676-7>

The effect of leisure time physical activity and sedentary behaviour on the health of workers with different occupational physical activity demands: A systematic review

Background: Although it is generally accepted that physical activity reduces the risk for chronic non-communicable disease and mortality, accumulating evidence suggests that occupational physical activity (OPA) may not confer the same health benefits as leisure time physical activity (LTPA). It is also unclear if workers in high OPA jobs benefit from LTPA the same way as those in sedentary jobs. Our objective was to determine whether LTPA and leisure time sedentary behaviour (LTSB) confer the same health effects across occupations with different levels of OPA. **Methods:** Searches were run in Medline, Embase, PsycINFO, ProQuest Public Health and Scopus from inception to June 9, 2020. Prospective or experimental studies which examined the effects of LTPA or LTSB on all-cause and cardiovascular mortality and cardiovascular disease, musculoskeletal pain, diabetes, metabolic syndrome, arrhythmias and depression among adult workers grouped by OPA (low OPA/sitters, standers, moderate OPA/intermittent movers, high OPA/heavy labourers) were eligible. Results were synthesized using narrative syntheses and harvest plots, and certainty of evidence assessed with GRADE. **Results:** The review includes 38 papers. Across all outcomes, except cardiovascular mortality, metabolic syndrome and atrial fibrillation, greater LTPA was consistently protective among low OPA, but conferred less protection among moderate and high OPA. For cardiovascular mortality and metabolic syndrome, higher levels of LTPA were generally associated with similar risk reductions among all OPA groups. Few studies examined effects in standers and none examined effects of LTSB across OPA groups. **Conclusions:** Evidence suggests that LTPA is beneficial for all workers, but with larger risk reductions among those with low compared to high OPA jobs. This suggests that, in our attempts to improve the health of workers through LTPA, tailored interventions for different occupational groups may be required. More high-quality studies are needed to establish recommended levels of LTPA/LTSB for different OPA groups.

Prince et al. 2021.

International Journal of Behavioral Nutrition and Physical Activity, vol. 18, no. 1.

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Keywords: Cardiovascular disease; leisure; mortality; occupation; physical activity; sedentary behaviour.

Evidence Level: 1A

Link: <https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-021-01166-z>

Musculoskeletal Health

Occupational health: does compliance with physical activity recommendations have a preventive effect on musculoskeletal symptoms in computer workers? a cross-sectional study

A lack of physical activity in computer workers (CW) can contribute to the development of musculoskeletal symptoms (MSS). Aim: (i) Evaluate MSS over a 12 month and 7 days period, (ii) determine physical activity (PA) levels and compliance with World Health Organization (WHO) PA recommendations, and (iii) assess the relationship between compliance with WHO PA recommendations and MSS. Methods: A cross-sectional observational study comprising 119 computer workers. The Nordic Musculoskeletal Questionnaire (NMQ) was used to evaluate the MSS and the International Physical Activity Questionnaire (IPAQ) was used to

analyse the perception of the level of PA. Results: MSS occurred in the lumbar region (56.3%), neck (43.7%), and shoulders (39.5%). 44.7% of the participants reported a low level of PA. The percentage of compliance was similar among women and men (62.2% vs. 58.5%, respectively). Negative correlations were found between pain intensity and metabolic equivalent values. The participants who followed the WHO PA recommendations reported a lower frequency of MSS compared to those who did not, but the differences were not statistically significant. Conclusion: It was possible to conclude that computer workers presented a higher frequency of MSS in the lower back, neck, and shoulders. Regarding the level of PA, participants were mostly classified as low. Participants who followed the WHO PA recommendations reported lower MSS than those who did not. This finding could be important in obtaining successful programs that promote health-oriented physical activity in this group of workers.

Moreira et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Computer workers; musculoskeletal symptoms; occupational health; physical activity level; workplace.

Evidence Level: 4A

Link: <https://www.mdpi.com/1660-4601/18/14/7604>

Developing a practice and evidence-based guideline for occupational health and safety professionals to prevent and handle musculoskeletal pain in workplaces

Practice guidelines can facilitate the translation of evidence-based knowledge into better occupational health and safety (OHS) prevention. This paper describes the development process, findings and content of a practice and evidence-based guideline for musculoskeletal pain (MSP) to OHS professionals in Denmark. We used a participatory process with involvement of more than 100 OHS professionals in the development of the guideline. The guideline contains three sections: 1) Rapid review of risk factors for MSP (Push/pull, Screen work, Lifting, Awkward postures and Psychosocial factors related to MSP) and single- and multi-stranded interventions targeting MSP. 2) Process recommendations for use of the guideline by a three-phase participatory process 3) Practical recommendations that contain advice and methods for the three-phase participatory process. This paper can promote future guideline development, as it provides specific insight into how OHS professionals can be included in the development of practice and evidence-based guideline through a participatory process.

Schmidt et al. 2021.

Applied Ergonomics, vol. 97.

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Keywords: Guideline; musculoskeletal pain; occupational health and safety.

Evidence Level: 6A

Link: <https://www.sciencedirect.com/science/article/pii/S0003687021001678?via%3Dihub>

COVID 19

Adapting to the Future of Work

Unemployment syndrome during COVID-19: a comparison of three population groups

Introduction: Of the serious problems that characterise the current crisis in Spain, the most alarming and revealing is unemployment, which, despite being so common, continues to be quite a negative experience for most people, often with serious negative effects on their biopsychosocial health. The perpetuation of this situation has given rise to a new syndrome of the unemployed. If these effects of economic downsizing are accompanied by the magnitude of the current situation brought about by COVID-19, the results can be devastating for the individuals and families experiencing it. **Objective:** To compare the symptoms of the unemployed syndrome in three population groups. **Method:** Three groups were studied: short-term unemployed ($n = 91$), long-term unemployed ($n = 150$), and those unemployed during the COVID-19 pandemic ($n = 94$). Unemployment syndrome was assessed with the Unemployment Syndrome Scale (USS). The three population groups were contacted through web pages, social networks, etc. and answered the

instruments online in a single session. Once the responses were obtained, their information was encoded in a database and analysed through the SPSS v. 21 program. Population groups were compared using the ANOVA analysis and the Bonferroni post hoc test. **Results:** The unemployed individuals who lost their job during the pandemic reported higher scores in the symptoms of the Unemployed Syndrome Scale compared to the long- and short-term unemployed individuals. ANOVA analyses for symptoms of USS were all significant in the different groups considering a significance level of <0.005. Participants who were unemployed for less than one year had lower scores in the USS than the long-term unemployed participants and those unemployed during the COVID-19 pandemic that reported a significantly higher number of symptoms in the USS.

Bocchino et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: COVID-19; symptoms; unemployed syndrome scale.

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/18/14/7372>

Work from home during the COVID-19 outbreak: the impact on employees' remote work productivity, engagement, and stress

Objective: The COVID-19 pandemic made working from home (WFH) the new way of working. This study investigates the impact that family-work conflict, social isolation, distracting environment, job autonomy, and self-leadership have on employees' productivity, work engagement, and stress experienced when WFH during the pandemic. **Methods:** This cross-sectional study analyzed data collected through an online questionnaire completed by 209 employees WFH during the pandemic. The assumptions were tested using hierarchical linear regression. **Results:** Employees' family-work conflict and social isolation were negatively related, while self-leadership and autonomy were positively related, to WFH productivity and WFH engagement. Family-work conflict and social isolation were negatively related to WFH stress, which was not affected by autonomy and self-leadership. **Conclusion:** Individual- and work-related aspects both hinder and facilitate WFH during the COVID-19 outbreak.

Galanti et al. 2021.

Journal of Occupational and Environmental Medicine, vol. 63, no. 7.

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: COVID-19; work from home; remote work; productivity; engagement; stress

Evidence Level: 4A

Link:

https://journals.lww.com/joem/Fulltext/2021/07000/Work_From_Home_During_the_COVID_19_Outbreak_The.16.aspx

Return-to-work, disabilities and occupational health in the age of COVID-19

We have read with great interest the two editorials by Burdorf et al: "The COVID-19 pandemic: one year later - an occupational perspective" (1) and "The COVID-19 (Coronavirus) pandemic: consequences for occupational health" (2). The authors highlight the importance of the societal consequences of the outbreak and changes in the world of work to manage occupational health. The key points identified - such as individual socio-economic factors, psychological effects and occupations with highest risk of contamination - modify return-to-work approaches. It is estimated that around 800 million people of working age worldwide were living with disabilities before the SARS-CoV-2 pandemic. In early January 2021, the cumulative COVID-19 hospitalisation rate reached 207.4/100 000 (18-49-year-olds) and 505.7/100 000 (50-64-year-olds), respectively, in the United States (3). In France, the hospitalisation rate was 411.5/100 000 across all ages (4). A recent cohort study of working-age men who were hospitalised for COVID-19 highlighted the long-term health consequences of such a disease (5). The SARS-CoV-2 pandemic creates new challenges for occupational health, shifting attention away from return-to-work after health problems to resuming work during an outbreak, dealing with lockdown, and taking special account of workers with vulnerabilities (6, 7). We recommend considering three different aspects of occupational medicine during a

pandemic. Firstly, for most workers at high-risk of severe COVID-19, the issues of work disability and resuming work had never occurred before the epidemic. Recommendations such as physical and social distancing and wearing a facemask are highly advisable to protect against infection but may not be enough to enable some individuals to resume work. Therefore, decision-making requires individual comprehensive assessments of the underlying medical condition, the SARS-CoV-2 contamination risk associated with either regular work or teleworking, and vaccination opportunities. The second situation concerns workers who have suffered from COVID-19. Preliminary studies suggest that long recovery duration is related to high severity (7), but this is still a matter of debate for patients suffering from "long COVID-19" (5, 8, 9), a condition for which the long-term effects remain unknown. Any long-running recovery must be considered to be a potential sign of long COVID-19. These long-lasting syndromes occur among patients with severe symptoms but have also been reported independently of acute phase severity, hospitalisation and receiving medical oxygen (8, 9). Researchers worldwide are currently investigating such syndromes. Strategies promoting return to work for these workers will need to be implemented and could be similar to programmes developed for other chronic conditions. Moreover, numerous more serious sequelae following critical illness suggest the need for enhanced support by rehabilitation and occupational health specialists. Finally, the consequences of the epidemic must be evaluated over time for people who suffered from functional limitations before COVID-19 as their physical and mental condition may be modified by the epidemic and, specifically, the consequences of lockdown (10). In all of these situations, medical, social, financial and working contexts are key elements. In addition to a medical assessment, the use of scales such as the Work Ability Index (WAI) (11) or the Work Productivity and Activity Impairment (WPAI) (12) can help perform long-term follow-up and provide information about work capacity and workload. It also gives a "back to basics" perspective, urging politicians to move towards a 'decent-work-for-all' policy, as advocated by the United Nation's Sustainable Development Goal (SDG) 8, which the WHO has endorsed.

Godeau et al. 2021.

Scandinavian Journal of Work, Environment & Health, vol. 47, no. 5.

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Keywords: COVID-19; disabilities; return to work; health.

Evidence Level: 6B

Link: <https://www.sjweh.fi/article/3960>

Re-engineering the human resource strategies amid and post-pandemic crisis: Probing into the moderated mediation model of the high-performance work practices and employee's outcomes

By incorporating the conservation of resource theory, this study examines how high-performance work practices (HPWPs) affect the employee's in-role performance (EIRP) and employee's task performance (ETP) during the coronavirus disease 2019 (COVID-19) pandemic. Furthermore, this study investigates how organization-based self-esteem (OBSE) and positive psychological capital (PPC) affect the relationship between HPWPs and outcomes of employees such as EIRP and ETP. A quantitative technique based on the survey method was used to gather the primary data of the investigation. Two hundred and eleven bank employees working in different banks of Punjab and Pakistan participated in the survey process. The PROCESS-macro was used to test the relationship among the study constructs. Our results supported all the study hypotheses, however positive psychological capital did not moderate the indirect effect of high performance work practices on employee's task performance via organization based self-esteem. This study is the earliest of its kind that focuses on HPWPs and outcomes of employees amid the COVID-19 pandemic in a developing country like Pakistan. The findings of this study provide practical implications in the post and continuing pandemic situation for organizations to human resource management to redesign workforce strategies to increase their contribution and responses to realize organizational priorities. Although researchers have explored the topic in different sectors, scant studies have investigated the potential impact, barriers, and enabling mechanisms that function as a catalyst in HPWPs during the pandemic situation.

Zhiqiang et al. 2021.

Frontiers in Psychology, vol. 9.

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Keywords: COVID-19 pandemic; employee's in-role performance; employee's task performance; high-performance work practices; organization-based self-esteem; positive psychological capital.

Evidence Level: 5B

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8299709/>

Working in the eye of the pandemic: local COVID-19 infections and daily employee engagement

The COVID-19 pandemic has drastically changed many aspects of our society and work life. This study assesses how daily variations in employees' work engagement are affected by daily variations in infection rates in employees' communities. Applying the conceptual framework of event system theory, we argue that surging COVID-19 cases have an impact on employee engagement, depending on the individual sensemaking processes of the pandemic. We assume that employee age and received leader support are key context factors for these sensemaking processes and that particularly older employees and employees who receive little leader consideration react with lower work engagement levels toward rising local COVID-19 infections in their proximity. We find support for most of our proposed relationships in an 8-day diary study of German employees, which we integrate with official COVID-19 case statistics on the county level. We discuss the implications of these results for the literature on extreme events and individual workplace behavior. Furthermore, these findings have important implications for companies and executives who are confronted with local COVID-19 outbreaks or other extreme societal events.

Reinwald et al. 2021.

Frontiers in Psychology, vol. 12.

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Keywords: COVID-19; aging; diary study; leadership; work engagement.

Evidence Level: 5B

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8282194/>

Social media opinions on working from home in the United States during the COVID-19 pandemic: observational study

Background: Since March 2020, companies nationwide have started work from home (WFH) owing to the rapid increase of confirmed COVID-19 cases in an attempt to help prevent the disease from spreading and to rescue the economy from the pandemic. Many organizations have conducted surveys to understand people's opinions toward WFH. However, the findings are limited owing to a small sample size and the dynamic topics over time. **Objective:** This study aims to understand public opinions regarding WFH in the United States during the COVID-19 pandemic. **Methods:** We conducted a large-scale social media study using Twitter data to portray different groups of individuals who have positive or negative opinions on WFH. We performed an ordinary least squares regression analysis to investigate the relationship between the sentiment about WFH and user characteristics including gender, age, ethnicity, median household income, and population density. To better understand the public opinion, we used latent Dirichlet allocation to extract topics and investigate how tweet contents are related to people's attitude. **Results:** On performing ordinary least squares regression analysis using a large-scale data set of publicly available Twitter posts (n=28,579) regarding WFH during April 10-22, 2020, we found that the sentiment on WFH varies across user characteristics. In particular, women tend to be more positive about WFH (P<.001). People in their 40s are more positive toward WFH than those in other age groups (P<.001). People from high-income areas are more likely to have positive opinions about WFH (P<.001). These nuanced differences are supported by a more fine-grained topic analysis. At a higher level, we found that the most negative sentiment about WFH roughly corresponds to the discussion on government policy. However, people express a more positive sentiment when discussing topics on "remote work or study" and "encouragement." Furthermore, topic distributions vary across different user groups. Women pay more attention to family activities than men (P<.05). Older people talk more about work and express a more positive sentiment regarding WFH. **Conclusions:** This paper presents a large-scale social media-based study to understand the public opinion on WFH in the United States during the COVID-19 pandemic. We hope that this study can contribute to policymaking both at the national and institution or company levels to improve the overall population's experience with WFH.

Xiong et al. 2021.

JMIR Medical Informatics, vol. 9, no. 7.

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Keywords: COVID-19; Twitter; characterization; social media; topic modeling; work from home.

Evidence Level: 4A

Link: <https://pubmed.ncbi.nlm.nih.gov/34254941/>

Guiding and Supporting Mental Health and Wellbeing

Challenges facing essential workers: a cross-sectional survey of the subjective mental health and well-being of New Zealand healthcare and 'other' essential workers during the COVID-19 lockdown

Objectives: To compare psychological outcomes, experiences and sources of stress over the COVID-19 lockdown in New Zealand in essential workers (healthcare and 'other' essential workers) with that of workers in nonessential work roles. **Design:** Online cross-sectional survey. **Setting:** Conducted in New Zealand over level 4 lockdown in April/May 2020. **Participants:** Findings from employed participants (2495) are included in this report; 381 healthcare workers, 649 'other' essential workers and 1465 nonessential workers. **Primary and secondary outcome measures:** Measures included psychological distress (Kessler Psychological Distress Scale (K10)), anxiety (Generalised Anxiety Disorder (GAD-7)), well-being (WHO-5), alcohol use, subjective experiences and sources of stress. Differences between work categories were quantified as risk ratios or χ^2 tests. **Results:** After controlling for confounders that differed between groups of essential and nonessential workers, those in healthcare and those in 'other' essential work were at 71% (95% CI 1.29 to 2.27) and 59% (95% CI 1.25 to 2.02) greater risk respectively, of moderate levels of anxiety (GAD-7 ≥ 10), than those in nonessential work. Those in healthcare were at 19% (95% CI 1.02 to 1.39) greater risk of poor well-being (WHO-5 < 13). There was no evidence of differences across work roles in risk for psychological distress (K10 ≥ 12) or increased alcohol use. Healthcare and 'other' essential workers reported increased workload ($p < 0.001$) and less uncertainty about finances and employment than those in nonessential work ($p < 0.001$). Healthcare and nonessential workers reported decreased social contact. No difference by work category in health concerns was reported; 15% had concerns about participants' own health and 33% about other people's health. **Conclusions:** During the pandemic lockdown, essential workers (those in healthcare and those providing 'other' essential work) were at increased risk of anxiety compared with those in nonessential work, with those in healthcare also being at increased risk of poor well-being. This highlights the need to recognise the challenges this vital workforce face in pandemics.

Bell et al. 2021.

BMJ Open, vol. 11, no. 7.

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Keywords: COVID-19; epidemiology; mental health; public health.

Evidence Level: 4A

Link: <https://bmjopen.bmj.com/content/11/7/e048107.long>

COVID-19, physical distancing in the workplace and employees' mental health: implications and insights for organizational interventions - Narrative review

Physical distancing has been used to prevent the spread of COVID-19. Although it appears to be effective in, its use in the workplace may affect employees' mental health. This paper reviews the literature regarding the impact of physical distancing in the workplace on employees' mental health.

Hamouche et al. 2021.

Psychiatria Danubina, vol. 33, no. 2.

Keywords: COVID-19; physical distancing; mental health; employee wellbeing; workplace.

Evidence Level: 6A

Link: http://www.psychiatria-danubina.com/UserDocImages/pdf/dnb_vol33_no2/dnb_vol33_no2_202.pdf

Remote work, work stress, and work-life during pandemic times: A Latin America situation

The COVID-19 pandemic affected the relationship between work and life almost everywhere on the planet. Suddenly, remote work became the mainstream way of working for millions of workers. In this context, we

explore how the relationship between remote work, work stress, and work-life developed during pandemic times in a Latin America context. In a sample of 1285 responses collected between April and May 2020, through a PLS-SEM model, we found that remote work in pandemic times increased perceived stress ($\beta = 0.269$; $p < 0.01$), reduced work-life balance ($\beta = -0.225$; $p < 0.01$) and work satisfaction ($\beta = -0.190$; $p < 0.01$), and increased productivity ($\beta = 0.120$; $p < 0.01$) and engagement ($\beta = 0.120$; $p < 0.01$). We also found a partial moderating effect, competitive and complementary, of perceived stress, and one significant gender difference: when working remotely, perceived stress affects men's productivity more acutely than women's productivity.

Sandoval-Reyes et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 13.

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Keywords: COVID-19; Latin America; perceived stress; remote work; work–life.

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/18/13/7069>

Homeworking, well-being and the COVID-19 pandemic: A diary study

As a response to the COVID-19 pandemic, many governments encouraged or mandated homeworking wherever possible. This study examines the impact of this public health initiative on homeworkers' well-being. It explores if the general factors such as job autonomy, demands, social support and work-nonwork conflict, which under normal circumstances are crucial for employees' well-being, are outweighed by factors specific to homeworking and the pandemic as predictors of well-being. Using data from four-week diary studies conducted at two time periods in 2020 involving university employees in the UK, we assessed five factors that may be associated with their well-being: job characteristics, the work-home interface, home location, the enforced nature of the homeworking, and the pandemic context. Multi-level analysis confirms the relationship between four of the five factors and variability in within-person well-being, the exception being variables connected to the enforced homeworking. The results are very similar in both waves. A smaller set of variables explained between-person variability: psychological detachment, loneliness and job insecurity in both periods. Well-being was lower in the second than the first wave, as loneliness increased and the ability to detach from work declined. The findings highlight downsides of homeworking, will be relevant for employees' and employers' decisions about working arrangements post-pandemic, and contribute to the debate about the limits of employee well-being models centred on job characteristics.

Wood et al. 2021.

International Journal of Environmental Research and Public Health, vol. 18, no. 14.

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Keywords: Covid-19 pandemic; job autonomy; detachment from work; homeworking; loneliness; social support; work–nonwork conflict.

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/18/14/7575>

Enabling Healthy and Safe Workplaces

Human factors and ergonomics and the management of existential threats: A work domain analysis of a COVID-19 return from lockdown restrictions system

Following strict "lockdown" restrictions designed to control the spread of the COVID-19 virus, many jurisdictions are now engaged in a process of easing restrictions in an attempt to stimulate economic and social activity while continuing to suppress virus transmission. This is challenging and complex, and in several regions, new outbreaks have emerged. We argue that systems Human Factors and Ergonomics methods can assist in understanding and optimizing the return from lockdown. To demonstrate, we used work domain analysis to develop an abstraction hierarchy model of a generic "return from lockdown restrictions" system. The model was assessed to identify (a) issues preventing a successful return from lockdown; and (b) leverage points that could be exploited to optimize future processes. The findings show that the aim of continuing to suppress virus transmission conflicts with the aims of returning to pre-virus

economic and social activity levels. As a result, many functions act against each other, ensuring that the system cannot optimally achieve all three of its primary aims. Potential leverage points include modifying the goals and rules of the system and enhancing communications and feedback. Specifically, it is argued that moderating economic aims and modifying how social and community activities are undertaken will result in longer term suppression of the virus.

Salmon et al. 2021.

Human Factors and Ergonomics in Manufacturing & Service, vol. 31, no. 4.

Keywords: COVID-19; cognitive work analysis; pandemics; systems thinking; work domain analysis.

Evidence Level: 5B

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8250482/>

Work-related and personal predictors of COVID-19 transmission: evidence from the UK and USA

Objective: To develop evidence of work-related and personal predictors of COVID-19 transmission.

Setting and respondents: Data are drawn from a population survey of individuals in the USA and UK conducted in June 2020.

Background methods: Regression models are estimated for 1467 individuals in which reported evidence of infection depends on work-related factors as well as a variety of personal controls.

Results: The following themes emerge from the analysis. First, a range of work-related factors are significant sources of variation in COVID-19 infection as indicated by self-reports of medical diagnosis or symptoms. This includes evidence about workplace types, consultation about safety and union membership. The partial effect of transport-related employment in regression models makes the chance of infection over three times more likely while in univariate analyses, transport-related work increases the risk of infection by over 40 times in the USA. Second, there is evidence that some home-related factors are significant predictors of infection, most notably the sharing of accommodation or a kitchen. Third, there is some evidence that behavioural factors and personal traits (including risk preference, extraversion and height) are also important. **Conclusions:** The paper concludes that predictors of transmission relate to work, transport, home and personal factors. Transport-related work settings are by far the greatest source of risk and so should be a focus of prevention policies. In addition, surveys of the sort developed in this paper are an important source of information on transmission pathways within the community.

Anand et al. 2021.

Journal of Epidemiology and Community Health, vol. 12.

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Keywords: Environmental epidemiology; health inequalities; multilevel modelling; policy; psychosocial factors.

Evidence Level: 4A

Link: <https://jech.bmj.com/content/early/2021/07/11/jech-2020-215208.long>

Wearing a mask - For yourself or for others? Behavioral correlates of mask wearing among COVID-19 frontline workers

Human behavior can have effects on oneself and externalities on others. Mask wearing is such a behavior in the current pandemic. What motivates people to wear face masks in public when mask wearing is voluntary or not enforced? Which benefits should the policy makers rather emphasize in information campaigns-the reduced chances of getting the SARS-CoV-2 virus (benefits for oneself) or the reduced chances of transmitting the virus (benefits for others in the society)? In this paper, we link measured risk preferences and other-regarding preferences to mask wearing habits among 840 surveyed employees of two large Swiss hospitals. We find that the leading mask-wearing motivations change with age: While for older people, mask wearing habits are best explained by their self-regarding risk preferences, younger people are also motivated by other-regarding concerns. Our results are robust to different specifications including linear probability models, probit models and Lasso covariate selection models. Our findings thus allow drawing policy implications for effectively communicating public-health recommendations to frontline workers during the COVID-19 pandemic.

Asri et al. 2021.

PLoS, vol. 16, no. 7.

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Keywords: Mask; mask use; COVID-19; frontline workers; behavior; protection; pandemic.

Evidence Level: 5A

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0253621>

A rapid scoping review of COVID-19 and vulnerable workers: Intersecting occupational and public health issues

Background: This article reports the results of a rapid scoping review of the literature on COVID-19 transmission risk to workers in essential sectors such as retail, health care, manufacturing, and agriculture, and more particularly the experiences of workers in precarious employment and social situations.

Methods: Following scoping review methods, we included 30 studies that varied in terms of methodology and theoretical approaches. The search included peer-reviewed articles and grey literature published between March and September 2020. **Results:** Based on the studies reviewed, we found that COVID-19 infection and death rates increased not only with age and comorbidities, but also with discrimination and structural inequities based on racism and sexism. Racial and ethnic minority workers, including migrant workers, are concentrated in high-risk occupations and this concentration is correlated to lower socioeconomic conditions. The COVID-19 pandemic appears in the occupational health and safety spotlight as an exacerbator of already existing socioeconomic inequalities and social inequalities in health, especially in light of the intersection of issues related to racism, ethnic minority status, and sexism. **Conclusions:** This review provides early evidence about the limitations of institutions' responses to the pandemic, and their capacity to provide a safe and decent working environment for all workers, regardless of their employment status or the social protections they may enjoy under normal circumstances. It is also important to think about these issues in the postpandemic context, when conditions of precariousness and vulnerability persist and possibly worsen.

Côté et al. 2021.

American Journal of Industrial Medicine, vol. 64, no. 7.

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

Keywords: COVID-19; health inequities; occupational health; precariousness; public health; racial/ethnic disparities; review; vulnerable workers.

Evidence Level: 6A

Link: <https://onlinelibrary.wiley.com/doi/10.1002/ajim.23256>