



Emerging Evidence Alert March 2020

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 February 2020 only.

Contents

Description of evidence levels definitions used in this review	3
Fostering Work Participation.....	4
Return to Work.....	4
Presenteeism and Absenteeism	5
Working Hours.....	9
Building Employer Capability.....	10
Wellness Programs	10
Organisational Issues.....	11
Shift Work.....	11
Management and Leadership.....	12
Adapting to the Future of Work	13
Work Environment	13
Aging Workforce.....	13
Guiding and Supporting Mental Health and Wellbeing	15
Mental Health.....	15
Bullying and Harassment.....	17
Psychosocial Issues – Risk Factors	18
Enabling Healthy and Safe Workplaces	20
Health and Wellbeing	20
Work Health and Safety.....	24
Risk Assessment.....	26
Chronic Health Issues	26
Occupational Exposure.....	28
Asbestosis and Mesothelioma.....	31
Sedentary Practices	32
Musculoskeletal Health	34

COVID-19: challenges and opportunities

COVID-19 is having a major impact on workplaces around the world. For the first time, many employers and workers are facing the possibility of prolonged working from home arrangements. Self-isolation and quarantine are two other measures people are taking to protect themselves and research shows there is some good news.

A February 2020 review examined the [psychological impact of quarantine and how to reduce it](#). It found post-traumatic stress symptoms, confusion, and anger were commonly experienced by quarantined workers, however regular communication and activities from the employer can help minimise the psychological impacts for workers.

Also, a [cross-sectional study of workers with flexible work arrangements](#) from Sweden found that organisations are more effective when there are clear expectations for workers, established guidelines and policies for flexible work, and a leadership style that builds trust. While the study focuses on the association between work-life balance and flexible working, which does not directly relate to the current COVID-19 environment, the insights from the 2,960 workers that participated in the study are still relevant and valuable for employers.

The study found that over-commitment, expectations of availability, and working beyond the scheduled hours were associated with poor work-life balance. Conversely, social support from colleagues, a culture encouraging flexible work, and supportive leadership behaviours were associated with greater work-life balance. These insights can help inform working from home policies and procedures, and provide a starting point for employers and workers beginning to navigate the impacts of COVID-19.

Comcare resources: Working from Home

It is important that employers take appropriate and reasonable steps to ensure that workers working from home are healthy and safe. This should include monitoring their mental health, maintaining open channels of communication and as far as possible, providing a safe working environment. To support employers and workers, Comcare has released a [Working from home checklist](#).

For more information about the Coronavirus and work health and safety please visit:

Comcare website: [Coronavirus](#)

Safe Work Australia: [Coronavirus \(COVID-19\): Advice for Employers](#)

Department of Health: [Coronavirus \(COVID-19\) health alert](#)

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

Sick-listed workers' experiences with motivational interviewing in the return to work process: a qualitative interview study

Background: When returning to work after being on long-term sick leave, individuals may experience varying levels of motivation and self-efficacy. Motivational interviewing (MI) is a counseling style that aims to increase motivation towards change, and it may be useful in the return to work (RTW) process. The aim of this study was to explore sick-listed workers' experiences with MI in the RTW process. **Methods:** This qualitative study was part of a randomised controlled trial evaluating the effects of MI on the RTW process, and it was administered by caseworkers at the Norwegian Labor and Welfare Administration. Sixteen sick-listed individuals, aged 33-60, participated in semi-structured interviews. All had a sick leave status of 50-100% for at least 8 weeks when interviewed and all had completed 2 MI sessions. The data was analyzed with systematic text condensation. **Results:** Participants' experiences of the MI sessions were categorized into three themes: (1) relationship with the MI caseworker, (2) normalising sick leave, and (3) adjusting RTW strategies. The MI sessions were experienced as a positive encounter due to the supportive relationship that was built between the MI caseworker and the sick-listed worker. Being sick listed led to feelings of guilt and stigmatisation, but acceptance and support from the MI caseworkers helped normalize the situation for the sick-listed workers. Furthermore, MI sessions allowed for personalized feedback and discussions on adjustments to their RTW strategies. **Conclusions:** Sick-listed workers experienced MI as positive due to the good relationship that developed with the MI caseworker, how this normalised sick leave, and the help they received with adjusting their RTW strategies. Professionals working with individuals attempting to RTW may benefit from using MI as a method for helping sick-listed workers to RTW.

Foldal et al. 2020.

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

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Keywords: Motivational interviewing; professional–patient relationship; qualitative research; return to work; self-efficacy; sick leave

Evidence Level: 5A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8382-9>

Identifying return to work trajectories among employees on sick leave due to mental health problems using latent class transition analysis

Objectives: To develop effective return to work (RTW) interventions for employees on sick leave due to mental health problems (MHPs), a better understanding of individual variation in the RTW process is needed. We investigated which RTW trajectories can be identified among employees with MHPs in terms of RTW duration and relapse occurrence during the RTW process. Additionally, we examined how different RTW trajectories can be described in terms of personal and work characteristics. **Methods:** Longitudinal sickness absence registry data were collected retrospectively from the largest Dutch occupational health service. Quantitative RTW information as well as personal and work characteristics were extracted. In total, 9517 employees with a sickness absence due to MHPs were included in the analyses (62 938 data points; RTW durations from 29 to 730 days). **Results:** A latent class transition analysis revealed five distinct RTW trajectories, namely (1) fast RTW with little chance of relapse, (2) slow RTW with little chance of relapse, (3) fast RTW with considerable chance of relapse, (4) slow RTW with considerable chance of relapse and (5) very fast RTW with very small chance of relapse. Differences between employees in the slower and faster trajectories were observed regarding gender, age, type of MHP, organisation sector and organisation size but not regarding part-time work. **Conclusions:** RTW trajectories among employees with MHPs showed large individual variability and differed on personal and work characteristics. Knowledge on different RTW trajectories and their characteristics contributes to the development of personalised RTW treatments, tailored to specific individuals and organisations.

Spronken et al. 2020.

BMJ Open, vol. 10, no. 2.

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Keywords: Latent class transition analysis; mental health problems; return to work; sick leave; trajectories

Evidence Level: 4A

Link: <https://bmjopen.bmj.com/content/10/2/e032016.long>

Combining breastfeeding and work: findings from the Epifane population-based birth cohort

Background: Return to work is often cited as a reason for early cessation of breastfeeding (BF). Our objectives were to study the time span during which women employed prior to pregnancy returned to work according to BF duration category, and to identify sociodemographic, behavioral and pregnancy characteristics of women who continued BF after returning to work. **Methods:** Information on BF mode and work status was prospectively collected in a French nation-wide birth cohort up to 1 year after delivery. Time of return to work according to BF category was addressed using Kaplan-Meier curves and Poisson regression adjusted on co-variables. Multiple logistic regression enabled to identify characteristics associated with the combination of BF with work. **Results:** Among 2480 women holding jobs prior to pregnancy, 82.0% returned to work within a year postpartum. Women who breastfed > 4 months returned at median of 6.5 months, whereas those who did not breastfeed at all returned to their jobs at 4.0 months, those who had breastfed for less than 1 month returned at 4.5 months, and those who had breastfed for 1 to 4 months returned at 4.0 months. Around one-third of women (34.5%) combined BF and work, and breastfed for a longer duration (median: 213 days, vs. 61 days for women who stopped BF before returning to work). Women born outside of France or who were self-employed were more likely to combine BF and work, while intermediate employees, manual workers, women who quit smoking during pregnancy, who had smoked before and during pregnancy, or who had given birth by cesarean section were less likely to combine BF and work. **Conclusion:** Women who had breastfed for less than 4 months, or not at all, returned to their jobs at comparable times. This suggests that working women should be encouraged to breastfeed, even for a short duration. Moreover, only one-third of working women succeeded in combining BF and work, highlighting the need for a support system that would encourage flexibility.

Castetbon et al. 2020.

BMC Pregnancy and Childbirth, vol. 20, no. 1.

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Keywords: Birth cohort; breastfeeding; employment; maternity leave; mothers; social determinants

Evidence Level: 4A

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7027215/>

Presenteeism and Absenteeism

Effect of discrimination on presenteeism among aging workers in the United States: Moderated mediation effect of positive and negative affect

This study aimed to examine how perceived everyday discrimination influences presenteeism and how conscientiousness moderates the relationship between discrimination and positive affect among older workers. Structural equation modeling (SEM) was used to examine the mediating effect. The moderated mediation model was examined by PROCESS. The results of the final SEM model showed that discrimination was directly positively associated with presenteeism. Furthermore, positive affect was significantly inversely correlated with discrimination and presenteeism. In addition, negative affect was significantly positively correlated with discrimination and presenteeism. The significant indirect effect between perceived everyday discrimination and positive affect was significantly mediated by positive and negative affect. In addition, the results of the moderated mediation model indicate that positive affect was more likely to be influenced by perceived everyday discrimination among older workers with less conscientiousness, as compared with those with greater conscientiousness. To enhance work outcomes of aging workers in the United States, managers should foster highly conscientious aging workers, award those who are hardworking and goal-oriented, and combine personal goals and organizational goals through bonuses, holidays, and benefits. Policymakers should be mindful of the negative impact of discrimination on presenteeism and should target lowly conscientious older workers.

Deng et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4.

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Keywords: Conscientiousness; discrimination; negative affect; positive affect; presenteeism; public data

Evidence Level: 6A

Link: <https://www.mdpi.com/1660-4601/17/4/1425>

Associations of sickness absence for pain in the low back, neck and shoulders with wider propensity to pain

Objectives: To explore the association of sickness absence ascribed to pain at specific anatomical sites with wider propensity to musculoskeletal pain. **Methods:** As part of the CUPID (Cultural and Psychosocial Influences on Disability) study, potential risk factors for sickness absence from musculoskeletal pain were determined for 11 922 participants from 45 occupational groups in 18 countries. After approximately 14 months, 9119 (78%) provided follow-up information about sickness in the past month because of musculoskeletal pain, including 8610 who were still in the same job. Associations with absence for pain at specific anatomical sites were assessed by logistic regression and summarised by ORs with 95% CIs. **Results:** 861 participants (10%) reported absence from work because of musculoskeletal pain during the month before follow-up. After allowance for potential confounders, risk of absence ascribed entirely to low back pain (n=235) increased with the number of anatomical sites other than low back that had been reported as painful in the year before baseline (ORs 1.6 to 1.7 for ≥ 4 vs 0 painful sites). Similarly, associations with wider propensity to pain were observed for absence attributed entirely to pain in the neck (ORs up to 2.0) and shoulders (ORs up to 3.4). **Conclusions:** Sickness absence for pain at specific anatomical sites is importantly associated with wider propensity to pain, the determinants of which extend beyond established risk factors such as somatising tendency and low mood. Better understanding of why some individuals are generally more prone to musculoskeletal pain might point to useful opportunities for prevention.

Coggon et al. 2020.

Occupational and Environmental Medicine.

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Keywords: Epidemiology; longitudinal studies; musculoskeletal

Evidence Level: 4A

Link: <https://oem.bmj.com/content/early/2020/02/20/oemed-2019-106193.long>

Predicting the duration of sickness absence spells due to back pain: a population-based study from Sweden

Objectives: We aimed to develop and validate a prediction model for the duration of sickness absence (SA) spells due to back pain (International Statistical Classification of Diseases and Related Health Problems 10th Revision: M54), using Swedish nationwide register microdata. **Methods:** Information on all new SA spells >14 days from 1 January 2010 to 30 June 2012 and on possible predictors were obtained. The duration of SA was predicted by using piecewise constant hazard models. Nine predictors were selected for the final model based on a priori decision and log-likelihood loss. The final model was estimated in a random sample of 70% of the SA spells and later validated in the remaining 30%. **Results:** Overall, 64 048 SA spells due to back pain were identified during the 2.5 years; 74% lasted ≤ 90 days, and 9% >365 days. The predictors included in the final model were age, sex, geographical region, employment status, multimorbidity, SA extent at the start of the spell, initiation of SA spell in primary healthcare and number of SA days and specialised outpatient healthcare visits from the preceding year. The overall c-statistic (0.547, 95% CI 0.542 to 0.552) suggested a low discriminatory capacity at the individual level. The c-statistic was 0.643 (95% CI 0.634 to 0.652) to predict >90 days spells, 0.686 (95% CI 0.676 to 0.697) to predict >180 spells and 0.753 (95% CI 0.740 to 0.766) to predict >365 days spells. **Conclusions:** The model discriminates SA spells >365 days from shorter SA spells with good discriminatory accuracy.

Ropponen et al. 2020.

Occupational and Environmental Medicine vol. 77, no. 2.

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Keywords: Epidemiology; occupational health practice; public health; risk assessment; sickness absence

Evidence Level: 4A

Link: <https://oem.bmj.com/content/77/2/115.long>

Personality factors and sick leave days. Evidence from a Nationally Representative Longitudinal Study in Germany

Background: The question of whether employees' sickness absence from the workplace depends on personality has been researched. Existing evidence mostly stems from cross-sectional studies, mainly showing that personality factors were not associated with the number of sick leave days, except for neuroticism, which was positively associated with sick leave days. Based on the above, it remains an under researched question whether intraindividual changes in personality factors are associated with changes in sick leave days. Thus, based on a nationally representative sample, the current study aimed to investigate the relationship between personality factors and sick leave days longitudinally based on a nationally representative sample of individuals in Germany. **Methods:** The present study used data from the German Socio-Economic Panel (GSOEP), a longitudinal survey of private households in Germany. Information from the years 2005, 2009, 2013 were used. The Big Five Inventory-GSOEP (BFI-S) was used to measure personality. Sick leave days in the preceding year were recorded. Poisson fixed effects regressions were used. **Results:** Adjusting for potential confounders, regressions showed that increases in neuroticism were associated with increased sick leave days. The longitudinal association between extraversion and sick leave days was marginally significant ($p < 0.10$). Other personality factors were not significantly associated with sick leave days. In addition, sick leave days increased with worsening self-rated health, presence of severe disability and increasing age. **Conclusions:** The findings of the current study highlight the association between neuroticism and sick leave days longitudinally. Further research is required to elucidate the underlying mechanisms.

Raynik et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 3.

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Keywords: GSOEP; longitudinal studies; personality; public mental health (PMH); sick leave days

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/17/3/1089>

Presenteeism among Chinese workers in Japan and its relationship with mental health and health-promoting lifestyles

This study aimed to investigate factors related to presenteeism among Chinese workers residing in Japan by assessing their mental state and health-promoting lifestyles. An anonymous, self-reported questionnaire was administered to 450 Chinese workers living in Hiroshima Prefecture, of whom, 313 completed it in its entirety. Results showed that 40.6% reported suffering from depression (Center for Epidemiologic Studies Depression Scale, CES-D). Sociodemographic characteristics such as being female, having a lower educational background, being widowed/divorced, having fewer years of residence, fluency in basic-level Japanese, being employed part-time, being an engineer, and workplace environment (having no health education in the workplace) increased the likelihood of depression. Path analysis indicated that marital status (being married) was negatively associated with presenteeism on the Work Limitations Questionnaire-Chinese version via work-related stress. There was a positive correlation between work-related stress and presenteeism through mental health (CES-D). Health-promoting lifestyles (Health-Promoting Lifestyle Profile II) showed a negative correlation with presenteeism, via work-related stress and mental health. Furthermore, health-promoting lifestyles showed a direct negative association with presenteeism. Thus, health education that emphasizes mental health was a significant factor for improving presenteeism. Furthermore, the provision of health education shortly after Chinese workers had arrived in Japan is important.

Li et al. 2020.

Industry Health, vol. 58, no. 1.

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Keywords: Center for epidemiologic studies depression scale; Chinese; health-promoting lifestyle; labor productivity; mental health; presenteeism; work limitations questionnaire

Evidence Level: 5B

Link: https://www.istage.jst.go.jp/article/indhealth/58/1/58_2018-0201/article

BMI and medically certified long-term sickness absence among Japanese employees

Objective: In contrast to the association between excess weight and sickness absence (SA), the association in relation to underweight has been under-researched. This study aimed to examine the effects of BMI at both extremes of its distribution on SA. **Methods:** Data came from the Japan Epidemiology Collaboration on Occupational Health study of 77,760 workers aged 20 to 59 years (66,166 males, 11,594 females). Information was collected on medically certified long-term SA (LTSA) (i.e., SA lasting ≥ 30 consecutive days) from April 2012 to March 2017. A sex-specific Cox proportional hazards model was used to investigate the associations. **Results:** Among males, both obesity (hazard ratio [HR] = 1.81, 95% CI: 1.50-2.17) and underweight (HR = 1.56, 95% CI: 1.23-1.96) were significantly associated with LTSA compared with normal weight. This U-shaped association between BMI categories and LTSA was observed both for mental and physical disorders. Among females, an elevated risk was observed among those with overweight (HR = 1.54, 95% CI: 1.16-2.05). **Conclusions:** In a cohort of the Japanese working-age population, both obesity and underweight were associated with a greater risk of LTSA in males. Future research should not overlook the excess risk of LTSA associated with underweight.

Endo et al. 2020.

Obesity, vol. 28, no. 2.

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

Keywords: BMI; sickness absence; long term; Japanese employees

Evidence Level: 5B

Link: <https://onlinelibrary.wiley.com/doi/full/10.1002/oby.22703>

Neurodevelopmental disorders among young adults and the risk of sickness absence and disability pension: a nationwide register linkage study

Objectives: Attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorders (ASD) and learning disabilities (LD) have an early onset and often persist into adulthood, although their relative contribution to incapacity for work is unclear. We examined this issue among young adults with ADHD, ASD or LD taking into account socioeconomic factors and comorbid mental disorders. **Methods:** Recorded diagnoses between the ages of 10-35 years between 2001 and 2010 were derived from nationwide inpatient and specialized outpatient hospital registers in Sweden. We identified 15 632 individuals with a main diagnosis of ADHD, 8238 with ASD, and 1038 with LD, and the matched control group without recorded mental disorders (N=124 536). The outcome was the number of register-based sickness absence and work disability pension (SA-DP) days during a maximum of three years follow-up. **Results:** Among men, the rate ratio (RR) of SA-DP was 11.17 [95% confidence interval (CI) 9.89-12.60] for ADHD, 35.59 (95% CI 30.30-41.81) for ASD, and 9.20 (95% CI 5.76-14.70) for LD, in comparison to those in the reference group. The corresponding risks among women were RR 12.05 (95% CI 10.30-14.09) for ADHD, RR 28.36 (95% CI 22.96-35.02) for ASD, and RR 9.60 (95% CI 5.83-15.81) for LD. The findings were, to a large extent, similar when individuals on DP at baseline were excluded. Comorbid mental disorders further increased the risk of SA-DP. Educational differences were smaller among the patients than in the reference group. **Conclusions:** Early-onset neurodevelopmental disorders, particularly with comorbidity, have a far-reaching impact on adult life in terms of SA and DP.

Virtanen et al. 2020.

Scandinavian Journal of Public Health, vol.20

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Keywords: Attention-deficit; hyperactivity disorder; Autism Spectrum Disorder, neurodevelopmental, disability pension

Evidence Level: 4A

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3888

Working Hours

Association of long working hours with accidents and suicide mortality in Korea.

Objectives: The deleterious health effects of long working hours have been previously investigated, but there is a dearth of studies on mortality resulting from accidents or suicide. This prospective study aims to examine the association between working hours and external-cause mortality (accidents and suicide) in Korea, a country with some of the longest working hours in the world. **Methods:** Employed workers (N=14 484) participating in the Korean National Health and Nutrition Examination Survey (KNHANES) were matched with the Korea National Statistical Office's death registry from 2007-2016 (person-years = 81 927.5 years, mean weighted follow-up duration = 5.7 years). Hazard ratios (HR) for accident (N=25) and suicide (N=27) mortality were estimated according to weekly working hours, with 35-44 hours per week as the reference. **Results:** Individuals working 45-52 hours per week had higher risk of total external cause mortality compared to those working 35-44 hours per week [HR 2.79, 95% confidence interval (CI) 1.22-6.40], adjusting for sex, age, household income, education, occupation, and depressive symptoms. Among the external causes of death, suicide risk was higher (HR 3.89, 95% CI 1.06-14.29) for working 45-52 hours per week compared to working 35-44 hours per week. Working >52 hours per week also showed increased risk for suicide (HR 3.74, 95% CI 1.03-13.64). No statistically significant associations were found for accident mortality. **Conclusions:** Long working hours are associated with higher suicide mortality rates in Korea.

Lee et al. 2020.

Scandinavian Journal of Work and Environmental Health.

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Keywords: Depression; injury; karoshi; KNHANES; Korean National Health and Nutrition Examination Survey; mental health; occupational; overwork; work hour; working time; work time.

Evidence Level: 4B

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3890

Perceptions of the impact of non-standard work schedules on health in Australian graduates: an exploratory study

Non-standard working hours are associated with negative health outcomes. However, little is known about the early years of exposure to non-standard work hours, or whether workers new to these work schedules perceive their work as impacting their health. This limits our ability to develop meaningful intervention strategies for transitioning into non-standard work hour schedules. This exploratory study investigated whether recent Australian graduates in various non-standard workhour schedules perceive that their work schedule negatively impacts their health. The responses of 120 graduates within four years of completing their tertiary qualification collected from an online survey were analysed. Graduates were asked whether they perceived their work arrangements as impacting their health. Significantly more of those who were engaged in non-standard work schedules or worked beyond contracted hours perceived their working arrangements as having an impact on their health. This study highlights the importance of studying workers' perceptions of the impact of work hours on health, particularly when workers may be experiencing good global health but be at risk for negative health outcomes in future.

Crowther et al. 2020.

Industrial Health, vol. 58, no. 1.

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Keywords: Australian workforce; extended working hours; health risk perception; non-standard work schedules; work beyond contracted hours

Evidence Level: 5A

Link: https://www.jstage.jst.go.jp/article/indhealth/58/1/58_2019-0036/article

Building Employer Capability

Wellness Programs

Process evaluation of a workplace-based health promotion and exercise cluster-randomised trial to increase productivity and reduce neck pain in office workers: A RE-AIM approach

Background: This study uses the RE-AIM framework to provide a process evaluation of a workplace-based cluster randomised trial comparing an ergonomic plus exercise intervention to an ergonomic plus health promotion intervention; and to highlight variations across organisations; and consider the implications of the findings for intervention translation. **Method:** This study applied the RE-AIM (reach, effectiveness, adoption, implementation, maintenance) methodology to examine the interventions' implementation and to explore the extent to which differences between participating organisations contributed to the variations in findings. Qualitative and quantitative data collected from individual participants, research team observations and organisations were interrogated to report on the five RE-AIM domains. **Results:** Overall reach was 22.7% but varied across organisations (range 9 to 83%). Participants were generally representative of the recruitment pool though more females (n = 452 or 59%) were recruited than were in the pool (49%). Effectiveness measures (health-related productivity loss and neck pain) varied across all organisations, with no clear pattern emerging to indicate the source of the variation. Organisation-level adoption (66%) and staffing level adoption (91%) were high. The interventions were implemented with minimal protocol variations and high staffing consistency, but organisations varied in their provision of resources (e.g. training space, seniority of liaisons). Mean adherence of participants to the EET intervention was 56% during the intervention period, but varied from 41 to 71% across organisations. At 12 months, 15% of participants reported regular EET adherence. Overall mean (SD) adherence to EHP was 56% (29%) across organisations during the intervention period (range 28 to 77%), with 62% of participants reporting regular adherence at 12 months. No organisations continued the interventions after the follow-up period. **Conclusion:** Although the study protocol was implemented with high consistency and fidelity, variations in four domains (reach, effectiveness, adoption and implementation) arose between the 14 participating organisations. These variations may be the source of mixed effectiveness across organisations. Factors known to increase the success of workplace interventions, such as strong management support, a visible commitment to employee wellbeing and participant engagement in intervention design should be considered and adequately measured for future interventions.

Welch et al. 2020.

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

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Keywords: Effectiveness; evaluation; musculoskeletal diseases; occupational health; workplace

Evidence Level: 6A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8208-9>

Size matters: A latent class analysis of workplace health promotion knowledge, attitudes, practices and likelihood of action in small workplaces

Workplace health programs (WHPs) have been shown to improve employee health behaviours and outcomes, increase productivity, and decrease work-related costs over time. Nonetheless, organizational characteristics, including size, prevent certain workplaces from implementing these programs. Past research has examined the differences between small and large organizations. However, these studies have typically used a cut-off better suited to large countries such as the USA. Generalizing such studies to countries that differ based on population size, scale of economies, and health systems is problematic. We investigated differences in WHP knowledge, attitudes, and practices between organizations with under 20 employees, 20-99 employees, and more than 100 employees. In 2017-2018, a random sample of employers from 528 workplaces in Alberta, Canada, were contacted for participation in a cross-sectional survey. Latent Class Analysis (LCA) was used to identify underlying response pattern and to group clusters of similar responses to categorical variables focused on WHP knowledge, attitudes, practices and likelihood of action. Compared to large organizations, organizations with fewer than 20 employees were more likely to be members of the Medium-Low Knowledge of WHP latent class ($p = 0.01$), the Low Practices for WHP latent class ($p < 0.001$), and more likely to be members of Low Likelihood of Action in place latent class ($p =$

0.033). While the majority of workplaces, regardless of size, recognized the importance and benefits of workplace health, capacity challenges limited small employers' ability to plan and implement WHP programs. The differences in capacity to implement WHP in small organizations are masked in the absence of a meaningful cut-off that reflects the legal and demographic reality of the region of study.

Jessiman-Perreault et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4

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Keywords: Health promotion; small workplace; workplace health

Evidence Level: 4A

Link: <https://www.mdpi.com/1660-4601/17/4/1251>

Organisational Issues

Work-family conflict and job outcomes for construction professionals: The mediating role of affective organizational commitment.

This study developed and tested a model, which involves the effects of work-family conflicts on job satisfaction and job performance of construction professionals, with a focus on the mediating role of affective organizational commitment. A structured questionnaire survey was conducted among construction professionals in China, resulting in 317 valid responses. The results, generated from structural equation modelling, revealed two interrelated dimensions of work-family conflicts, work's interfering with family life and family life's interfering with work. We found these two types of work-family conflicts directly, negatively affected affective organizational commitments and job satisfaction but not job performance. Additionally, affective organizational commitment positively affected job satisfaction and job performance, and mediated the effects of work-family conflicts on job satisfaction. This study advances our understanding of how or why work-family conflicts produce dysfunctional effects on employees' job outcomes in the context of construction projects.

Cao et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4.

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Keywords: Affective organizational commitment; construction professionals; job performance; job satisfaction; work–family conflict

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/4/1443>

Shift Work

Shift workers at risk for metabolic syndrome

Problems with sleep are becoming more common and have been linked to chronic disease. This review article presents a perspective on the connection between circadian discordance, hormonal imbalance, and the development of metabolic syndrome in shift workers, along with potential means to address these issues.

Kulkarni et al. 2020.

The Journal of the American Osteopathic Association, vol. 120, no. 2.

Keywords: Sleep disorders; chronic disease; burden; metabolic syndrome

Evidence Level: 6A

Link: <https://jaoa.org/article.aspx?articleid=2760100>

Shift work and prostate cancer: an updated systematic review and meta-analysis

The International Agency of Research in Cancer (IARC) has recently confirmed shift work as a type 2A carcinogen. The results presented in published epidemiological studies regarding prostate cancer are inconsistent and the association remains controversial. The aims of this study were: (a) to investigate the possible association between shift work and prostate cancer incidence, identifying possible sources of heterogeneity; and (b) to analyse the potential effect of publication bias. A search for cohort and case-

control studies published from January 1980 to November 2019 was conducted. The quality of the articles was assessed using the Newcastle-Ottawa Scale. Pooled OR were calculated using random-effects models. Heterogeneity was evaluated using Cochran's Q test and data were stratified by potential sources of heterogeneity. Publication bias was analysed. Eighteen studies were included. No association was found between rotating/night-shift work and prostate cancer, pooled OR 1.07 (95%CI 0.99 to 1.15), $I^2 = 45.7\%$, $p = 0.016$. Heterogeneity was eliminated when only cohort studies (pooled OR 1.03; 95%CI 0.96 to 1.10; $I^2 = 18.9\%$, $p = 0.264$) or high-quality studies (pooled OR 0.99; 95%CI 0.89 to 1.08; $I^2 = 0.0\%$, $p = 0.571$) were considered. A publication bias was detected. An association between shift work and prostate cancer cannot be confirmed with the available current data. Future analytical studies assessing more objective homogeneous exposure variables still seem necessary.

Rivera-Izquierdo et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no.4.

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Keywords: Circadian disruption; heterogeneity analysis; night work; occupational health; prostate cancer; rotating shift work

Evidence Level: 1A

Link: <https://www.mdpi.com/1660-4601/17/4/1345>

Management and Leadership

Ethical leadership as the reliever of frontline service employees' emotional exhaustion: A moderated mediation model

Based on the conservation of resources theory, this study aims to create new knowledge on the antecedents of emotional exhaustion. We explore the internal mechanism and boundary conditions of the impact of ethical leadership on emotional exhaustion, using data gathered from 460 frontline service employees at an airport in China. Employees completed questionnaires regarding ethical leadership, emotional exhaustion, organizational embeddedness, job satisfaction, and demographic variables. After controlling for the effects of demographic variables and company tenure, ethical leadership was found to have a negative impact on emotional exhaustion ($\beta = -0.128$, $p < 0.01$), and to be positively related to organizational embeddedness ($\beta = 0.518$, $p < 0.01$). After adding in the mediating variable (organizational embeddedness), the effect of ethical leadership on emotional exhaustion was no longer significant ($\beta = 0.012$, ns), while organizational embeddedness emerged as significantly related to emotional exhaustion ($\beta = -0.269$, $p < 0.01$), implying that the effect of ethical leadership on emotional exhaustion was completely mediated by organizational embeddedness. Simultaneously, the results suggested that job satisfaction could strengthen the mediating effect of organizational embeddedness on emotional exhaustion (the difference in the mediating effect between the groups with respective high and low job satisfaction was -0.096 , $p < 0.05$). This study proposed and validated a moderated mediation model, the implications of which are that ethical leadership is an effective way to alleviate frontline service employees' emotional exhaustion.

Zhou et al. 2020.

International Journal of Environmental Research and Public Health, vol.17, no.3.

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Keywords: Conservation of resources theory; emotional exhaustion; ethical leadership; job satisfaction; organizational embeddedness

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/3/976>

Adapting to the Future of Work

Work Environment

The short- and long-term impacts of hurricane Irma on Florida agricultural leaders as early emergency responders: The importance of workplace stability

The impacts of hurricane-related disasters in agricultural communities include extensive losses of fields, orchards, and livestock, the recovery of which could span many years. Agricultural Extension Agents (EAs) try to manage and mitigate these losses, while simultaneously overseeing emergency shelter operations. These non-professional emergency responders face numerous potential stressors, the outcomes of which are minimally known. This study examined the short- and long-term medical and behavioral outcome of 36 University of Florida Agricultural Extension Agents within two months and one year after Hurricane Irma, Florida, USA, taking into consideration personal/home and work-related hurricane impacts. Regression analyses indicated that combined home and work hurricane impacts were associated with greater anxiety, depression, and medical symptoms controlling for age and number of prior hurricane experiences within two months of landfall. One year later, depression symptoms increased as well as the use of negative disengagement coping strategies for which stability of the work environment was protective. The findings suggest that advanced training in emergency response, organization and time management skills, time off and temporary replacement for personally impacted EAs, and workplace stability, including enhanced continuity of operations plans, represent critical elements of health prevention and early intervention for this occupational group.

Grattan et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 3

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Keywords: Hurricane Impact; agricultural extension workers; disasters; hurricanes; non-professional first responders; post-disaster behavioral health; workplace stability

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/3/1050>

Aging Workforce

Psychosocial working characteristics before retirement and depressive symptoms across the retirement transition: A longitudinal latent class analysis.

Objectives: Retirement is a major life transition. However, previous evidence on its mental health effects has been inconclusive. Whether retirement is desirable or not may depend on pre-retirement work characteristics. We investigated trajectories of depressive symptoms across retirement and how a number of psychosocial working characteristics influenced these trajectories. **Methods:** We included 1735 respondents from the Swedish Longitudinal Occupational Survey of Health (SLOSH), retiring during 2008-2016 (mean retirement age 66 years). They had completed biennial questionnaires reporting job demands, decision authority, workplace social support, efforts, rewards, procedural justice and depressive symptoms. We applied group-based trajectory modelling to model trajectories of depressive symptoms across retirement. Multinomial logistic regression analyses estimated the associations between -psychosocial working characteristics and depressive symptom trajectories. **Results:** We identified five depression trajectories. In four of them, depressive symptoms decreased slightly around retirement. In one, the symptom level was initially high, then decreased markedly across retirement. Perceptions of job demands, job strain, workplace social support, rewards, effort-reward imbalance and procedural justice were associated with the trajectories, while perceptions of decision authority and work efforts were only partly related to the trajectories. **Conclusions:** We observed a rather positive development of depressive symptoms across retirement in a sample of Swedish retirees. For a small group with poor psychosocial working characteristics, symptoms clearly decreased, which may indicate that a relief from poor working characteristics is associated with an improvement for some retirees. However, for other retirees poor working characteristics were associated with persistent symptoms, suggesting a long-term effect of these work stressors.

Ahlin et al. 2020.

Scandinavian Journal of Work and Environmental Health.

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Keywords: Depression; effort–reward imbalance; job control; job demand; job strain; longitudinal study; mental health; older worker; SLOSH; stress; Swedish Longitudinal Occupational Survey of Health; work stress.

Evidence Level: 4B

Link: https://www.sjweh.fi/show_abstract.php?abstract_id=3889

Physical performances show conflicting associations in aged manual workers

Ageing is associated with a decrease in physical performance implying that aged manual workers may be unable to match the physical requirements of their jobs. In this cross-sectional study, 96 male manual workers aged 51-72 years were recruited. Outcomes included handgrip strength (HGS), fat-free mass (FFM), fat percentage, cardiorespiratory fitness (VO₂max), forced vital capacity (FVC), forced expiratory volume after 1 s (FEV₁), spinal flexibility, sit-to-stand test performance and static balance. Covariates included height, smoking habits, leisure-time physical activity and systemic inflammation from blood samples. Outcomes were also compared with general populations. Age was negatively related to FFM and FEV₁, whereas static balance (velocity of displacement) was positively associated with age. Greater HGS, but poorer [VO₂max and FEV₁/FEV ratio were found compared with general populations. Age was negatively related with physical performances although a large part of the variance in performance could be explained by factors other than age such as smoking and systemic inflammation. The manual workers had greater muscle strength but had poorer cardiorespiratory fitness and lung function when compared with general populations. Specific health interventions targeting specifically cardiorespiratory fitness, lung function, and balance may be needed to maintain physical performances among manual workers.

Norheim et al. 2020.

Scientific Reports, vol. 10, no. 1.

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Keywords: Physical performance; aging; manual workers; physical requirements

Evidence Level: 4A

Link: <https://www.nature.com/articles/s41598-020-59050-y>

The impact of longstanding illness and common mental disorder on competing employment exits routes in older working age: A longitudinal data-linkage study in Sweden

Objectives: Comorbidity is prevalent in older working ages and might affect employment exits. This study aimed to 1) assess the associations between comorbidity and different employment exit routes, and 2) examine such associations by gender. **Methods:** We used data from employed adults aged 50-62 in the Stockholm Public Health Survey 2002 and 2006, linked to longitudinal administrative income records (N = 10,416). The morbidity measure combined Limiting Longstanding Illness and Common Mental Disorder-captured by the General Health Questionnaire-12 (≥4)-into a categorical variable: 1) No Limiting Longstanding Illness, no Common Mental Disorder, 2) Limiting Longstanding Illness only, 3) Common Mental Disorder only, and 4) comorbid Limiting Longstanding Illness+Common Mental Disorder. Employment status was followed up until 2010, treating early retirement, disability pension and unemployment as employment exits. Competing risk regression analysed the associations between morbidity and employment exit routes, stratifying by gender. **Results:** Compared to No Limiting Longstanding Illness, no Common Mental Disorder, comorbid Limiting Longstanding Illness+Common Mental Disorder was associated with early retirement in men (subdistribution hazard ratio = 1.73, 95% confidence intervals: 1.08-2.76), but not in women. For men and women, strong associations for disability pension were observed with Limiting Longstanding Illness only (subdistribution hazard ratio = 11.43, 95% confidence intervals: 9.40-13.89) and Limiting Longstanding Illness+Common Mental Disorder (subdistribution hazard ratio = 14.25, 95% confidence intervals: 10.91-18.61), and to a lesser extent Common Mental Disorder only (subdistribution hazard ratio = 2.00, 95% confidence intervals: 1.31-3.05). Women were more likely to exit through disability pension than men (subdistribution hazard ratio = 1.96, 95% confidence intervals: 1.60-2.39). Common Mental Disorder only was the only morbidity category associated with unemployment (subdistribution hazard ratio = 1.70, 95% confidence intervals: 1.36-2.15).

Conclusions: Strong associations were observed between specific morbidity categories with different employment exit routes, which differed by gender. Initiatives to extend working lives should consider older workers' varied health needs to prevent inequalities in older age.

Harber-Aschan et al. 2020.

PLoS One, vol. 15, no. 2.

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Keywords: Longstanding illness; mental disorders; competing employment; older working age

Evidence Level: 4B

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0229221>

Guiding and Supporting Mental Health and Wellbeing

Mental Health

Post-traumatic stress reactions and doctor-certified sick leave after a workplace terrorist attack: Norwegian cohort study.

Objective: To explore the association between the psychosocial work environment and the risk of sick leave among governmental employees with symptom-defined post-traumatic stress disorder (PTSD) after a workplace bomb attack. **Design:** A prospective study on employees who met the symptom criteria for PTSD. Questionnaire data on the psychosocial work environment 10 months after the terrorist attack was linked to registry data on doctor-certified sick leave in the period 12-22 months after the attack. **Setting:** The bombing of the government ministries in Oslo, Norway, 22 July 2011. **Participants:** The study sample consists of 94 Norwegian governmental employees, all with symptom-defined PTSD from the Norwegian version of the PTSD checklist (Post-traumatic Stress Disorder Checklist-Specific) measured 10 months after the attack. **Results:** After adjustment for sex and severity of PTSD symptoms, predictability at work reduced the odds of sick leave (adjusted OR=0.62, 95% CI 0.40 to 0.98). Sense of control over decisions at work was associated with fewer absence days for employees with sick leave (adjusted rate ratio=0.61, 95% CI 0.38 to 0.98). **Conclusions:** Employees with PTSD after workplace terrorism would benefit from control over their workplace conditions and increased predictability to reduce the risk of sick leave. The findings suggest that the work environment can facilitate employees' work ability after stressful events, independent of severity of PTSD symptoms.

Dale et al. 2020.

BMJ Open, vol. 10, no. 2.

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Keywords: PTSD; psychosocial work environment; sick leave; work place terror

Evidence Level: 4A

Link: <https://bmjopen.bmj.com/content/10/2/e032693.long>

Does emotional labor increase the risk of suicidal ideation among firefighters?

Purpose: To investigate whether emotional labor is associated with suicidal ideation in Korean firefighters.

Methods: Data were obtained from the Firefighter Research: Enhancement of Safety & Health (FRESH) Study, which was designed to investigate the effects of job characteristics on mental and physical health among Korean firefighters. A total of 18101 firefighters were chosen from a nationwide sample. The Korean Emotional Labor Scale (K-ELS) was used to evaluate exposure to emotional labor, which consisted of five sub-factors: emotional demand and regulation, overload and conflict in customer service, emotional disharmony and hurt, organizational surveillance and monitoring, and lack of a supportive and protective system in the organization. **Results:** Firefighters who were in the risk group were more likely to experience suicidal ideation than those in the normal group for each of the five sub-scales of emotional labor. The estimated mean values for suicidal ideation in the risk group were significantly higher than those in the normal group: 1.667 (95% CI: 1.344-2.069) for emotional demand and regulation, 1.590 (95% CI: 1.243-2.033) for overload and conflict in customer service, 2.409 (95% CI: 1.954-2.969) for emotional disharmony and hurt, 2.214 (95% CI: 1.832-2.676) for organizational surveillance and monitoring, and 1.665 (95% CI: 1.387-1.999) for lack of a supportive and protective system in the organization. **Conclusion:** These results

suggest that experience and exposure to chronic and excessive emotional labor might play a crucial role in the development of suicidal ideation among firefighters.

Hyun et al. 2020.

Yonsei Medical Journal, vol. 61, no. 2.

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

Keywords: Emotional labor; firefighter; suicidal ideation

Evidence Level: 4B

Link: <https://www.eymj.org/DOIx.php?id=10.3349/ymj.2020.61.2.179>

Mental health effects of long work hours, night and weekend work, and short rest periods

Although the prior literature has examined the relationship between work schedule characteristics and worker mental health, establishing the causal effect of work schedule characteristics is challenging because of endogeneity issues. This paper investigates how various work schedule characteristics affect workers' mental health using employee surveys and actual working hours recorded over seventeen months in a Japanese manufacturing company. Our sample includes 1334 white-collar workers and 786 blue-collar workers observed from 2015 to 2016. Our major findings are as follows: long working hours cause the mental health of white-collar workers to deteriorate even after controlling for individual fixed effects. Furthermore, working on weekends is associated with mental ill health-the negative effect of an hour increase in weekend work is one and a half to two times larger than that of weekday overtime work for white-collar workers. On the other hand, short rest periods are not associated with mental health for them. Our results indicate that taking a relatively long rest period on weekends is more important for keeping white-collar workers healthy than ensuring a sufficient daily rest period. Regarding blue-collar workers, our analysis reveals that working after midnight is associated with mental ill health, whereas short rest periods are not associated with their mental health. This suggests that the strain of night work is a more important determinant of mental health for blue-collar workers. The differences in the relationship between work schedule characteristics and workers' mental health for white-collar and blue-collar workers can be explained in terms of different work styles, different expectations, and different degrees of selection. We conclude that working for long hours or irregular hours deteriorates the mental health of workers but its impact is likely to differ significantly across job types.

Sato et al. 2020.

Social Science & Medicine, vol. 246

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Keywords: Healthy worker effect; Japan; mental health; nightwork; short rest period; weekend work; working hours

Evidence Level: 4B

Link: <https://www.sciencedirect.com/science/article/pii/S0277953619307695?via%3Dihub>

Mediating role of occupational stress and job satisfaction on the relationship between neuroticism and quality of life among Chinese civil servants: a structural equation model.

Background: Knowledge on the quality of life (QOL) of civil servants is limited. Therefore, the aims of this study were to investigate the QOL of civil servants, and examine whether occupational stress and job satisfaction mediated the association between neuroticism and QOL in civil servants from Shandong, China.

Methods: The cross-sectional study included 559 civil servants aged 27 to 60 years from Shandong province in China. Participants completed questionnaires assessing neuroticism, occupational stress, job satisfaction, and QOL. Structural equation modeling (SEM) was conducted to examine the hypothetical model. **Results:** Among the civil servants, the average score for QOL was 75.49 ± 14.73 . The SEM analysis showed a good fit of the data to the hypothesized model. Neuroticism, occupational stress, and job satisfaction explained 38% of the variance of QOL. Neuroticism was positively correlated with occupational stress and negatively correlated with job satisfaction and QOL. A strong direct effect (-0.386 , $P < 0.01$) and moderate indirect effect (-0.133 , $P < 0.01$) of neuroticism on QOL mediated by occupational stress and job satisfaction were observed. In addition, a direct effect (-0.197 , $P < 0.01$) and an indirect effect (-0.044 , $P < 0.01$) of occupational stress on QOL mediated by job satisfaction were also observed. **Conclusions:** Occupational

stress and job satisfaction partly mediated the relationship between neuroticism and QOL among Chinese civil servants. Thus, selecting individuals with a low level of neuroticism as civil servants, reducing occupational stress, and increasing job satisfaction may be important measures to improve their QOL.

Kong et al. 2020.

Health and Quality of Life Outcomes, vol. 18, no. 1.

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Keywords: Civil servants; job satisfaction; mediating effect; neuroticism; occupational stress; quality of life

Evidence Level: 4B

Link: <https://hqlo.biomedcentral.com/articles/10.1186/s12955-020-01295-2>

Bullying and Harassment

Job demand, job control, and impaired mental health in the experience of workplace bullying behavior: A two-wave study.

Workplace bullying is an extreme social stressor at work leading to a severe deterioration of health amongst its targets. Research has revealed two important orders of factors that may trigger workplace bullying: Poor working conditions and individual factors such as impaired mental health that determine a personal psychological vulnerability to bullying. However, research has rarely investigated their role simultaneously. In response, we investigated whether the relationship between poor working conditions (i.e., high job demand) at time 1 (T1) and the experience of bullying at time 2 (T2) is strengthened by experiencing symptoms of impaired mental health at T1. We also tested whether job control-which contributes to better working conditions-at T1 moderates the relationship between job demand at T1 and bullying at T2. Participants (N = 235) were workers in the health sector. The time lag between T1 and T2 was one year. Cross-lagged path analysis revealed that the relationship between job demand at T1 and the experience of bullying behavior at T2 was strengthened by T1 impaired mental health. This suggests that considering both working conditions and individual factors together may be important for reaching a better understanding of the development of bullying.

Balducci et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4.

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Keywords: Emotional abuse in the workplace; workplace bullying; workplace harassment

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/4/1358>

Sustainable work performance: The roles of workplace violence and occupational stress

The purpose of this study is to analyze the relationships between workplace violence, occupational stress, and sustainable work performance. Multiple dimensions of workplace violence (harassment, mobbing, ostracism, and stalking) were used in this study. A questionnaire survey was used, composed of 48 items with a 5-point Likert scale (1, strongly disagree, to 5, strongly agree). Data were collected from 15 hospitals in the vicinity of Karachi, Lahore, and Islamabad, Pakistan. The target population of this study consisted of doctors, nurses, and paramedical staff. We distributed 500 questionnaires among the target population. In total, 345 usable questionnaires were returned, resulting in a response rate of 69%. Partial least squares structural equation modeling was used to test the direct and indirect effects. The results of this study highlight that in both direct and indirect relationships, workplace violence negatively influences sustainable work performance. The findings of this study are as follows: First, harassment reduces employee morale, which consistently lessens employees' work performance. Second, mobbing at the workplace reduces productivity, increases levels of stress, anxiety, depression, and irritability, and increases low work engagement, work absences, and work destruction. Third, ostracism at the workplace reduces motivation among workers and organizations, which reduces work efficiency. Work performance is undermined due to stalking at the workplace because it creates a bad image and brings toxicity among colleagues and peers. Fourth, occupational stress is considered a stigma among employees who are facing stress at the workplace. We can conclude that if employees are happy and healthy, they can be their most productive. So, organizations need to construct a culture where employees can be at their best and shine.

Rasool et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 3.

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Keywords: Occupational stress and sustainable work performance; workplace violence

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/17/3/912>

Workplace bullying and suicidal ideation: findings from an Australian longitudinal cohort study of mid-aged workers

Workplace bullying adversely affects mental health, yet little is known about the outcomes for suicidal ideation. The current study used Australian population-based data to investigate the association between workplace bullying and suicidal ideation. The sample included 1488 employed participants aged 52-58 from wave 4 of the Personality and Total Health (PATH) Through Life Study. Workplace bullying was measured in two ways: (a) a single item asked about experiences of bullying 'currently', 'previously in the current workplace' and 'in a past workplace', and (b) 15 items asked about bullying behaviours experienced in the past 6 months. Suicidal ideation was measured using items from the Psychiatric Symptom Frequency Scale (PSF) and the Patient Health Questionnaire-9 (PHQ-9). Psychosocial job quality, both current and prior, was adjusted for. Current and past experiences of workplace bullying were associated with increased risk of suicidal ideation. Current experiences were no longer associated after adjusting for concurrent indicators of psychosocial job stress, although a tendency for increased ideation remained. Reported prior experience of workplace bullying in a past workplace remained associated with higher odds of suicidal ideation after adjusting for prior psychosocial job stressors and excluding individuals with prior suicidal ideation. Being bullied at work is associated with increased risk of suicidal thoughts, although this occurs within the broader influence of other psychologically stressful employment conditions.

Leach et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4

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Keywords: Mobbing; suicidal ideation; suicide; workplace bullying

Evidence Level: 4a

Link: <https://www.mdpi.com/1660-4601/17/4/1448>

Psychosocial Issues – Risk Factors

Occupational stress and the risk of turnover: A large prospective cohort study of employees in Japan

Background: Although several studies have examined the association between occupational stress and turnover, these studies relied on cross-sectional designs, subjects' self-report, healthcare workforce, or small sample sizes. This study aimed to confirm whether occupational stress increases the risk of turnover in a large-scale prospective cohort study using actual turnover data from company records. **Methods:** The participants were 3892 male and 5765 female employees aged 20-49 years in a financial service company. We followed them from October 2012 until April 1, 2016 and used company records to identify employees who resigned. We identified employees with high and low stress using the Brief Job Stress Questionnaire. Hazard ratios for turnover in high-stress employees were estimated using Cox proportional hazards models, and population attributable risks were calculated separately for men and women. **Results:** During 11,475,862 person-days, 122 men and 760 women resigned. After adjustment for age, length of service, job type, and position, the hazard ratios (95% confidence intervals) for turnover in high-stress employees were 2.86 (1.74-4.68) for men and 1.52 (1.29-1.78) for women. The corresponding population attributable risks for high stress were 8.2% for men and 8.3% for women. The component scores, i.e., job stressors, psychological/physical stress response, workplace social support, and job strain (the combination of high job demands and low job control) were also significantly associated with turnover ($p < 0.05$). **Conclusions:** Occupational stress increases the risk of actual turnover. Measures to prevent occupational stress may be useful to prevent employee turnover.

Kachi et al. 2020.

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

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Keywords: Administrative data; occupational stress; turnover; workers

Evidence Level: 4B

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8289-5>

Effort-reward imbalance at work and tooth loss: a cross-sectional study from the J-SHINE project

Oral diseases produce enormous productivity loss. However, epidemiological evidence of work stress and tooth loss is scarce. The aim of this study was to examine the association of work stress, according to effort-reward imbalance (ERI), with tooth loss. We conducted a cross-sectional study using data obtained between 2010 and 2011 in Japan. This study included 1,195 employees aged 25-50 years old (response rate=32%). The dependent variable was self-reported tooth loss (having or not). The independent variable was a dichotomized ERI ratio (>1.4 and ≤1.4). Age, sex, sociodemographic variables, work-related factors, and health-related variables were adjusted. Psychological distress was used as a potential mediator. We also examined an additive interaction between support from supervisors and ERI. The median age was 37, and 48% were women. After adjusting for the covariates, ERI was still associated with tooth loss (prevalence ratio=1.20 [95% confidence interval=1.01, 1.42] from Poisson regression models with a robust error variance). Psychological distress partially explained the association, and support from supervisors significantly attenuated the association. In conclusion, high ERI ratio was still associated with an increased risk of tooth loss among working adults.

Sato et al. 2020.

Industrial Health, vol. 58, no. 1.

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Keywords: Dental health; Effort-reward imbalance; Observational study; Oral health; Working environment

Evidence Level: 4A

Link: https://www.jstage.jst.go.jp/article/indhealth/58/1/58_2018-0226/article

Does cognitive function predict changes in perception of stressful working conditions?

Cognitive health is a key resource for individuals to nurture their employability. We studied the longitudinal association of cognitive function with changes in stressful working conditions, testing a possible reversed causation. We used a sample of employees (N=1,355) participating in two surveys (2006 and 2011) within a German national representative study (GSOEP). Cognitive function was captured by perceptual speed (Symbol Digit Test) and word fluency (Animal Naming Test). Stressful working conditions were measured by the validated short version of the effort-reward imbalance questionnaire. Multivariate linear regression models assessed the impact of perceptual speed and verbal fluency in 2006 on changes in participants' perceptions of effort, reward, effort-reward ratio, and over-commitment between 2006 and 2011, adjusting for socio-demography, behaviours, physical and mental health at baseline. Neither perceptual speed nor verbal fluency was significantly related to changes in perceived working conditions. Our findings did not support the notion of reversed causation.

Li et al. 2020.

Industrial Health, vol. 58, no. 1.

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: Cognitive function; effort; longitudinal study; over-commitment; reversed causation; reward; work stress

Evidence Level: 4B

Link: https://www.jstage.jst.go.jp/article/indhealth/58/1/58_2019-0017/article

Cardiovascular reactivity to acute stress associated with sickness absence among Japanese men and women: A prospective study

Objectives: We aimed to investigate associations between cardiovascular reactivity to acute stress and sickness absence among Japanese male and female workers, in a prospective study. **Methods:** Among healthy employed Japanese workers who underwent mental health checks between 2006 and 2009, data of 111 participants were analyzed. Changes in blood pressure, pulse rate, peripheral blood flow (PBF), and

heart rate variability (HRV) (high frequency [HF] and low frequency [LF]) were calculated using differences between the two tasks, mirror drawing stress [MDS] and a maze task, and the postperiod value. Sickness absence through March 2010 was followed up by mail survey (average follow-up 2.3 years). Logistic regression analysis was used, adjusting for lifestyle factors. **Results:** Among 12 participants who took sickness absences, eight were owing to mental problems. Changes in the LF during the MDS and maze tasks and LF-to-HF ratio during the MDS task were positively associated with all sickness absences (odds ratio [OR], 95% confidence interval [CI]: 2.09, 1.03-4.22; 2.04, 1.09-3.82; and 3.10, 1.46-6.58, respectively). Changes in PBF during the MDS task were also associated with increased risk of sickness absence (OR, 95% CI: 2.53, 1.10-5.81). **Conclusion:** Cardiovascular reactivity to acute stress should be considered at workers' health checks.

Hirokawa et al. 2020.

Brain and Behavior.

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Keywords: Japanese workers; autonomic reactivity to stress; heart rate variability; mental problems; prospective study; sickness absence

Evidence Level: 4B

Link: <https://onlinelibrary.wiley.com/doi/full/10.1002/brb3.1541>

Enabling Healthy and Safe Workplaces

Health and Wellbeing

Occupational and individual determinants of work-life balance among office workers with flexible work arrangements.

Flexible work arrangements permitting workers to work anytime and anywhere are increasingly common. This flexibility can introduce both challenges and opportunities for the organisation, as well as for worker work-life balance (WLB). This cross-sectional study aimed to examine the extent to which occupational factors (organizational, leadership and psychosocial) and individual work-related behaviours (over-commitment, overtime work and boundary management) are associated with WLB, and whether these associations are modified by the perceived level of flexibility at work (i.e., control over when, where, and how to do the work). In total, 2960 full-time office workers with flexible work arrangements at the Swedish Transport Administration participated. Associations were determined using linear regression analyses with adjustment for covariates. The strongest negative associations with WLB were found for over-commitment, quantitative job demands, expectations of availability, and overtime work. Strongest positive associations were found for boundary management, information about organizing work, social support, and relation-oriented leadership. Perceived flexibility was positively associated with WLB, and interacted with several of the examined factors, buffering their negative associations with WLB. Results suggest that WLB can be promoted by organizational initiatives focusing on minimizing excessive job demands, increasing psychosocial resources, supporting boundary management, and enhancing perceived flexibility.

Bjarntoft et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4.

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Keywords: Autonomy; job demands; job resources; work control; work-life balance

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/17/4/1418>

Use of cigarettes and E-cigarettes and dual use among adult employees in the US workplace.

Introduction: Evidence-based interventions for tobacco control in the US workplace can reach a large audience. The purpose of our study was to explore the prevalence and determinants of type of tobacco use (ie, cigarettes only, e-cigarettes only, or dual use) among adult employees in the United States and to examine type of use by state. **Methods:** We used data from the 2017 Behavioral Risk Factor Surveillance System to examine the prevalence of cigarette use, e-cigarette use, dual use, and quit attempts. We used multinomial logistic regression to examine the relationships between sociodemographic characteristics and type of tobacco product used, and we estimated adjusted prevalence. **Results:** Approximately 17% of

respondents were current smokers, 5% were current e-cigarette users, and 2% were dual users. E-cigarette-only and dual use were generally highest among young (aged 18-24), male, and less-educated respondents and lower for respondents who identified as black, Asian/Native Hawaiian/Pacific Islander, or Hispanic than for white respondents. Cigarette-only and dual use were higher for respondents who did not have health care coverage. Prevalence by state of e-cigarette use only ranged from 1.2% (Vermont) to 3.9% (Arkansas), whereas the prevalence of dual use ranged from 0.6% (District of Columbia) to 4.0% (Oklahoma).

Conclusion: Prevalence of cigarette, e-cigarette, and dual use varied by sociodemographic characteristics and by state. These findings can support targeting of specific populations when designing and implementing evidence-based interventions for tobacco control in workplace settings.

Kava et al. 2020.

Preventing Chronic Disease, vol. 17, no. 16.

Keywords: Cigarettes; E-cigarettes; adult employees; prevalence; determinants

Evidence Level: 4A

Link: https://www.cdc.gov/pcd/issues/2020/19_0217.htm

An examination of the association between lifetime history of prostate and pancreatic cancer diagnosis and occupation in a population sample of Canadians

Background: Occupation was assessed as possible risk factors for prostate (PCa) and pancreatic cancer in a large Canadian worker cohort. **Methods:** The Canadian Census Health and Environment Cohort (CanCHEC) was derived from linking the 1991 Canadian Census Cohort to the Canadian Cancer Database (1969-2010), Canadian Mortality Database (1991-2011), and Tax Summary Files (1981-2011). From the total sample of 1,931,110 persons, we identified and derived two samples of 28,610 men and 3,220 men and women with a past history of PCa and pancreatic cancer diagnoses, respectively. Cox proportional hazards models were used to estimate hazards ratios and 95% confidence intervals for occupation. **Results:** In Canadian men aged 24-64 years, the highest elevated risks of PCa were observed for library clerks (HR = 2.36, 95% CI:1.12-4.97), medical radiation technologists (HR = 1.66, 95% CI:1.04-2.65), telecommunications and line cable workers (HR = 1.62, 95% CI: 1.22-3.16) and commissioned police officers (HR = 1.54, 95% CI: 1.10-2.16). The highest elevated risk for pancreatic cancer were observed for commissioned police officers (HR = 4.34, 95% CI: 1.85-10.21), photographic and film processors (HR = 3.97, 95% CI:1.69-9.34), railway and motor transport labourers (HR = 3.94, 95% CI: 1.67-9.29), and computer engineers (HR = 3.82, 95%CI: 1.52-9.61).

Conclusion: These findings emphasize the need for further study of job-related exposures and the potential influence of non-occupational factors such as screening practices.

Singh et al. 2020.

PLoS One vol. 15, no. 2.

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Keywords: Prostate cancer, pancreatic cancer, Canada, occupation

Evidence Level: 4A

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0227622>

Diet, physical activity, and emotional health: What works, what doesn't, and why we need integrated solutions for total worker health

Background: Current research advocates lifestyle factors to manage workers' health issues, such as obesity, metabolic syndrome, and type II diabetes mellitus, among other things (World Health Organization (WHO) Obesity: preventing and managing the global epidemic, 2000; World Health Organization (WHO) Obesity and overweight, 2016), though little is known about employees' lifestyle factors in high-stress, high turnover environments, such as in the long term care (LTC) sector. **Methods:** Drawing on qualitative single-case study in Ontario, Canada, this paper investigates an under-researched area consisting of the health practices of health care workers from high-stress, high turnover environments. In particular, it identifies LTC worker's mechanisms for maintaining physical, emotional, and social wellbeing. **Results:** The findings suggest that while particular mechanisms were prevalent, such as through diet and exercise, they were often conducted in group settings or tied to emotional health, suggesting important social and mental health contexts to these behaviors. Furthermore, there were financial barriers that prevented workers from participating in these activities and achieving health benefits, suggesting that structurally, social determinants of health (SDoH), such as income and income distribution, are contextually important.

Conclusions: Accordingly, given that workplace health promotion and protection must be addressed at the individual, organizational, and structural levels, this study advocates integrated, total worker health (TWH) initiatives that consider social determinants of health approaches, recognizing the wider socio-economic impacts of workers' health and wellbeing.

Syed. 2020.

BMC Public Health vol. 20, no. 1.

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Keywords: Immigrant health; public health; social determinants of health; total worker health; visible minorities

Evidence Level: 5A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8288-6>

Factors associated with health survey response among young employees: a register-based study using online, mailed and telephone interview data collection methods

Background: Declining response rates are a common challenge to epidemiological research. Response rates further are particularly low among young people. We thus aimed to identify factors associated with health survey response among young employees using different data collection methods. **Methods:** We included fully register-based data to identify key socioeconomic, workplace and health-related factors associated with response to a health survey collected via online and mailed questionnaires. Additionally, telephone interviews were conducted for those who had not responded via online or to the mailed survey. The survey data collection was done in autumn 2017 among young employees of the City of Helsinki, Finland (18-39 years, target population n = 11,459). **Results:** The overall response to the survey was 51.5% (n = 5898). The overall findings suggest that differences in the distributions of socioeconomic, workplace and health-related factors between respondents in the online or mailed surveys, or telephone interviews, are relatively minor. Telephone interview respondents were of lower socioeconomic position, which helped improve representativeness of the entire cohort. Despite the general broad representativeness of the data, some socioeconomic and health-related factors contributed to response. Thus, non-respondents were more often men, manual workers, from the lowest income quartile, had part-time jobs, and had more long sickness absence spells. In turn, job contract (permanent or temporary) and employment sector did not affect survey response. **Conclusions:** Despite a general representativeness of data of the target population, socioeconomically more disadvantaged and those with long sickness absence, are slightly overrepresented among non-respondents. This suggests that when studying the associations between social factors and health, the associations can be weaker than if complete data were available representing all socioeconomic groups.

Lallukka et al. 2020.

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

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Keywords: health-related factors; mail survey; online survey; participation; register linkages; response; socioeconomic factors; telephone interview; workplace; young employees

Evidence Level: 4B

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8241-8>

Drivers of healthy eating in a workplace in Nepal: a qualitative study

Objective: To explore the perceptions, enablers and barriers to employees' healthy eating in a hospital site.

Design: A qualitative study including focus group discussion and in-depth interview, data were analysed using thematic analysis method. Setting: The study was carried out among employees of Dhulikhel Hospital-Kathmandu University Hospital, located about 30 km east of Nepal's capital Kathmandu.

Participants: Focus group discussions were conducted among the 33 participants, who were divided into four groups: (a) support staff (drivers, cook, laundry, gardeners and ward boys), (b) hospital administrators and managers, (c) health personnel (doctors, nurses and assistants) who work 8-12 hours shifts and (d) health personnel who work during office hours. Nine in-depth interviews were conducted among six canteen operators and three managers. **Results:** The major factors for promoting healthy eating were identified as the availability of affordable healthy food options in the cafeterias, a commitment to such promotion by the cafeteria manager, operators, staff and hospital administration and the level of education

of the employees. The most commonly reported barriers for healthy eating were the unavailability of healthy options, including the lack of food supply from local market, the higher cost of healthy foods, individual food preferences and limited human resources in the cafeteria. **Conclusion:** The availability of affordable healthy foods, supply of healthy foods from the market, commitment from cafeteria managers, hospital administrators and health awareness among cafeteria operators may promote healthy eating among employees in a Nepali hospital setting.

Tamrakar et al. 2020.

BMJ Open, vol. 10, no. 2.

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Keywords: Barriers; diet; facilitators; qualitative study; workplace

Evidence Level: 5B

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7031076/>

Changes in the association between European workers' employment conditions and employee well-being in 2005, 2010 and 2015

The aim of this paper is to study whether there is a change in the association between employment conditions and European employees' well-being at three different time points (the years 2005, 2010 and 2015), characterized by different socio-economic contexts. We based our study on the European Working Conditions Survey. Logistic regressions were performed by adjusting for gender, age, level of education, seniority, occupation, establishment size, activity sector and economic activity. Adjusted odds ratios (OR_{adj}) and 95% confidence intervals (95% CI) are reported. In general, the association between employment conditions (type of employment contract, supervising, weekly working hours, long working hours, other paid jobs, working at weekends or doing shifts) and well-being indicators (anxiety, fatigue and dissatisfaction) seemed to continue being harmful, or had even changed for the worse since 2005. The paper briefly discusses the possible reasons for this situation and calls for future research on the relation between well-being and irregular type of contracts, self-employment, supervising others or hours worked per week. Some implications in public health policies are also discussed.

Marin-Garcia et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 3.

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Keywords: European workers; anxiety; dissatisfaction; employment conditions; fatigue; labor conditions; mental health; workforce; workplace wellness

Evidence Level: 4B

Link: <https://www.mdpi.com/1660-4601/17/3/1048>

Commuting time to work and behaviour-related health: a fixed-effect analysis

Objectives: Long commuting times are linked to poor health outcomes, but the evidence is mainly cross-sectional. We examined longitudinal within-individual associations between commuting time and behaviour-related health. **Methods:** Data were from the Swedish Longitudinal Occupational Survey of Health study. We selected workers who responded to a minimum of two surveys conducted every other year between 2008 and 2018. We included all study waves with self-reported commuting time (ie, the exposure, 1-5, 6-10, 11-15 or ≥ 15 hours/week), body mass index (based on weight and height), physical (in)activity, smoking, alcohol use and sleep problems (ie, the outcomes) (N individuals=20 376, N observations=46 169). We used conditional logistic regression for fixed effects analyses that controls for time-varying confounders by design. Analyses were stratified by working hours: normal (30-40 hours/week) or longer than normal (>40 hours/week) and adjusted for time dependent covariates: age, marital status, occupational position, presence of children, chronic disease, depressive symptoms, job strain and shift work. **Results:** Those working >40 hours/week had higher odds of physical inactivity (OR 1.25, 95% CI 1.03 to 1.51) and sleep problems (OR 1.16, 95% CI 1.00 to 1.35) when they were commuting >5 hours/week than when they were commuting 1-5 hours/week. Among women working normal hours, longer commuting time associated with lower odds of problem drinking. **Conclusions:** Our findings suggest that lengthy commuting time increases the risk of physical inactivity and sleep problems if individuals have longer than normal weekly working hours. Effects of work arrangements that decrease commuting time should be examined in relation to health behaviours.

Halonen et al. 2020.

Occupational and Environmental Medicine, vol. 77, no. 2.

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Keywords: Body mass index; commuting; physical activity; sleep problem; smoking

Evidence Level: 4B

Link: <https://oem.bmj.com/content/77/2/77.long>

Work-life balance: Weighing the importance of work-family and work-health balance.

To date, research directed at the work-life balance (WLB) has focused mainly on the work and family domains. However, the current labor force is heterogeneous, and workers may also value other nonworking domains besides the family. The aim of this study was to investigate the importance of other nonworking domains in the WLB with a particular focus on health. Moreover, the importance of the effects of the work-family balance (WFB) and the work-health balance (WHB) on job satisfaction was investigated. Finally, we explored how the effects of the WFB and the WHB on job satisfaction change according to worker characteristics (age, gender, parental status, and work ability). This study involved 318 workers who completed an online questionnaire. The importance of the nonworking domains was compared with a t-test. The effect of the WFB and the WHB on job satisfaction was investigated with multiple and moderated regression analyses. The results show that workers considered health as important as family in the WLB. The WHB explained more of the variance in job satisfaction than the WFB. Age, gender and parental status moderated the effect of the WFB on job satisfaction, and work ability moderated the effect of the WHB on job satisfaction. This study highlights the importance of the health domain in the WLB and stresses that it is crucial to consider the specificity of different groups of workers when considering the WLB.

Grangano et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 3.

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Keywords: Diversity in the workplace; interaction analysis; job satisfaction; multiple regression; work-family balance; work-health balance; work-life balance

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/3/907>

Work Health and Safety

Cancer incidence among Swedish firefighters: an extended follow-up of the NOCCA study.

Objectives: To evaluate cancer incidence among Swedish firefighters and analyze risk in relation to work duration as a proxy for cumulative exposure. **Methods:** This cohort study is based on the Swedish component of the Nordic Occupational Cancer (NOCCA) project. The cohort includes six million people who participated in one or more of the population censuses in 1960, 1970, 1980 and 1990. The census data were linked to the Swedish Cancer Registry for the 1961-2009 period, extending a previous NOCCA follow-up time by 4 years. We identified 8136 male firefighters. SIRs were calculated using cancer incidence rates in the national population as a reference. **Results:** We found a statistically significant excess of non-melanoma skin cancer (SIR = 1.48, 95% CI 1.20-1.80) but no positive relationship between risk and work duration. There was a small, yet statistically significant increased risk of prostate cancer among firefighters with service times of 30 years or more. The first follow-up period (1961-1975) showed an increased risk of stomach cancer relative to the reference group, while the last period (1991-2009) showed an increased risk of non-melanoma skin cancer. There was no excess risk for all cancer sites combined (SIR = 1.03, 95% CI 0.97-1.09). **Conclusions:** Our results do not support an overall risk of cancer among Swedish firefighters, but a possible risk of non-melanoma skin cancer exists. The previously noted excess of prostate cancer among Swedish firefighters in NOCCA was no longer statistically significant in this extended follow-up but was present among those with the longest service times.

Bigert et al. 2020.

International Archives of Occupational and Environmental Health, vol. 93, no. 2.

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Keywords: Cancer incidence; carcinogens; firefighters; occupational exposure; smoke

Evidence Level: 4B

Link: <https://link.springer.com/article/10.1007%2Fs00420-019-01472-x>

Incorporating worker awareness in the generation of hazard proximity warnings.

Proximity warning systems for construction sites do not consider whether workers are already aware of the hazard prior to issuing warnings. This can generate redundant and distracting alarms that interfere with worker ability to adopt timely and appropriate avoidance measures; and cause alarm fatigue, which instigates workers to habitually disable the system or ignore the alarms; thereby increasing the risk of injury. Thus, this paper integrates the field-of-view of workers as a proxy for hazard awareness to develop an improved hazard proximity warning system for construction sites. The research first developed a rule-based model for the warning generation, which was followed by a virtual experiment to evaluate the integration of worker field-of-view in alarm generation. Based on these findings, an improved hazard proximity warning system incorporating worker field-of-view was developed for field applications that utilizes wearable inertial measurement units and localization sensors. The system's effectiveness is illustrated through several case studies. This research provides a fresh perspective to the growing adoption of wearable sensors by incorporating the awareness of workers into the generation of hazard alarms. The proposed system is anticipated to reduce unnecessary and distracting alarms which can potentially lead to superior safety performance in construction.

Chan et al. 2020.

Sensors (Basel), vol. 20, no. 3.

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Keywords: Automated warnings; construction safety; hazard proximity; sensors; worker awareness

Evidence Level: 5A

Link: <https://www.mdpi.com/1424-8220/20/3/806>

Need for recovery in relation to effort from work and health in four occupations

Objective: To examine three levels of need for recovery (NFR) after work in relation to effort from work demands, demand compensatory strategies, effort-moderating or -reversing resources, and health including health behaviors. A further purpose was to examine occupational characteristics determining NFR. **Methods:** 5000 engineers, carpenters, nurses, and home care nurses were invited to participate. NFR k-means clusters were calculated from 1289 participants. The effect from three levels of NFR regarding demands, compensatory strategies, resources at work, health, and health behaviors was examined using analysis of variance (ANOVA) and post hoc analysis. Prevalence ratios (PRs) of suboptimal health for three levels of NFR were calculated using Poisson regression. Linear stepwise multiple regression predictors explaining NFR were examined also occupation wise. **Results:** NFR centroids at 5.8/33, 13.1/33, and 21.0/33 points were identified. ANOVA showed corresponding effects from NFR levels on work demands and compensatory strategies. The inversed proportion concerned levels of resources at work. Only the low NFR cluster negated regular health effects. The other two cluster groups also repeatedly worked while ill and presented PRs concerning health effects from 1.9 to 3.9 when compared to the low NFR group. Making good quality work, recovery opportunities, and thinking of work when off work were the most important predictors of NFR among 1289 participants with also occupation-wise interpretable profiles. **Conclusions:** Three levels of NFR meant corresponding levels of work demands, work-demand compensatory strategies, and unfavorable health behaviors. An inversed proportion of resources related to the same levels of NFR. Low NFR meant no regular health effects which could guide limit values regarding salutary NFR. Important predictors of NFR were resources making a good quality work, recovery opportunities, and reversely effort from rumination when off work. Occupation-wise predictors could guide interventions.

Wentz et al. 2020.

International Archives of Occupational and Environmental Health, vol. 93, no. 2.

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Keywords: Occupations; psychosocial work characteristics; recovery; rumination; stress; work-related fatigue

Evidence Level: 4A

Link: <https://link.springer.com/article/10.1007%2Fs00420-019-01476-7>

Risk Assessment

Dose-response relationship between physical workload and specific shoulder diseases-a systematic review with meta-analysis

Several epidemiological studies have found an association between shoulder-loaded work activities and specific shoulder diseases. No study has derived the dose-response relationship and resulting doubling dose, important for the recognition of occupational diseases. This systematic review is an update of the van der Molen et al. (2017) review. Based on its methodologies, we identified new studies published up to November 2018. The dose-response relationship between physical occupational demands (hands at/above shoulder level, repetitive movements, forceful work, hand-arm vibrations) and specific shoulder diseases (defined as ICD-10 M 75.1-5: rotator cuff syndrome, bicipital tendinitis, calcific tendinitis, impingement, and bursitis) was derived. No evidence for sex-specific differences in the dose-response relationship was found. If there were at least two studies with comparable exposures, a meta-analysis was carried out. The pooled analysis resulted in a 21% risk increase (95% CI 4-41%) per 1000 h of work with hands above shoulder level. A meta-analysis was not possible for other occupational burdens due to the low number of studies and differing exposure measurements; an estimate of the doubling dose was made based on the cohort study of Dalbøge et al. (2014). To conclude, the present systematic review with meta-analysis contributes to knowledge of the level of exposure at which specific shoulder diseases-particularly rotator cuff lesions-should be recognized as an occupational disease.

Seidler et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4.

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Keywords: Dose-response relationship; doubling dose; musculoskeletal diseases of the shoulder; occupational disease; physical workload; rotator cuff lesions

Evidence Level: 1A

Link: <https://www.mdpi.com/1660-4601/17/4/1243>

Chronic Health Issues

Facilitators, barriers and support needs for staying at work with a chronic condition: A focus group study

Background: Working with a chronic condition can be challenging. Providing support to workers with a chronic condition can help them to stay at work and prevent work-related problems. Workers with a chronic condition who successfully stay at work can provide valuable input for the development of effective supportive interventions to prevent exit from work and facilitate sustainable employment. The aim of this study is to explore the lived experiences of workers with a chronic condition and identify existing barriers, facilitators and possible support needs for staying at work. **Methods:** Four focus groups were conducted between August and December 2017 with workers with one or more chronic conditions (n = 30). Participants included employees and (partially) self-employed workers. All focus group data were transcribed verbatim and thematically analyzed. **Results:** Disclosure and expressing one's needs were considered important personal facilitators for staying at work. Environmental facilitators included receiving practical information on working with a chronic condition and social and employer support. Environmental barriers were identified in the work environment, the health care system and service provision, e.g., manager and co-worker's lack of knowledge about working with a chronic condition, a lack of focus on work in the course of treatment for a chronic condition, dissatisfaction with occupational physician support, and the absence of support for self-employed workers. Provided support should be available to all workers, and be proactive and tailored to the workers' specific support needs. **Conclusions:** A variety of facilitators, barriers and support needs were identified in various domains. By addressing environmental barriers (e.g., by integrating work in the course of treatment and creating supportive work environments), sustainable employment by workers with a chronic condition can be promoted.

Bosma et al. 2020.

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

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Keywords: Barriers and facilitators; chronic conditions; support; sustainable employment; work

Evidence Level: 5A

Link: <https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-020-8320-x>

Illness narratives and chronic patients' sustainable employability: the impact of positive work stories

The number of workers with a chronic disease is steadily growing in industrialized countries. To cope with and to give meaning to their illness, patients construct illness narratives, which are widely shared across patient societies, personal networks and the media. This study investigates the influence of these shared illness narratives on patient's working lives, by examining the impact of reading a positive work story versus negative work story on patients' sustainable employability. We expected that this relationship would be mediated by positive emotions and the extent to which the story enhanced awareness of desires future selves, and moderated by identification with story character. An online field experiment with 166 people with Inflammatory Bowel Disease in The Netherlands showed that while reading a positive story of a patient with the same condition significantly increased positive emotions, these emotions did not influence sustainable employability. However, reading a positive story was related to higher sustainable employability when patients became more aware of their desired possible future work selves. Finally, identification with the story character moderated the impact of story type on sustainable employability. This study showed that personal engagement with a positive work story of a fellow patient is related to higher sustainable employability. Findings can be helpful for health professionals to empower employees with a chronic disease.

Brokerhof et al. 2020.

PLoS One vol. 15, no. 2.

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Keywords: Chronic disease; illness; emotions

Evidence Level: 5B

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228581>

Should systemic sclerosis be recognised as an occupational disease in Switzerland?

Systemic sclerosis is a rare autoimmune disease characterised by a multifactorial aetiology involving a gene-environment interaction. Despite the growing epidemiological arguments for odds ratio (OR) data showing an association with occupational exposure, systemic sclerosis is not currently included in the list of recognised occupational diseases in Switzerland, unlike other northern European countries. Future recognition will be conditional on the demonstration of a strong association between the disease and occupational exposure in the scientific literature. The present articles main goal is to present five cases of systemic sclerosis investigated for possible occupational aetiologies during occupational pathology consultations at the Institute for Work and Health, in Lausanne. The occupational aetiologies of these cases are discussed against the background of a literature review of publications from the past 20 years in order to determine whether recognition as an occupational disease is possible within Switzerland's legal framework. Epidemiological studies of systemic sclerosis have identified strong associations with occupational factors such as exposure to silica and solvents, with ORs ≥ 2 , and weaker associations with epoxy resins and welding fumes. Other occupational exposures are also known to induce systemic sclerosis-like diseases, such as vinyl chloride disease and toxic oil syndrome. All five patients had been exposed to either silica, solvents, or both. Given their exposure and the data in the literature, four patients had their cases declared to their accident insurance companies and two of them were recognised as suffering from an occupational disease by the Swiss National Accident Insurance Fund. Our literature review enabled us to design a short questionnaire to help general practitioners and rheumatologists to identify those patients with systemic sclerosis who are likely to have their illness recognised as an occupational disease.

Schmid et al. 2020.

Swiss Medical Weekly, vol. 21.

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Keywords: Sclerosis; systemic sclerosis; autoimmune disease; Switzerland; occupational disease

Evidence Level: 6A

Link: <https://smw.ch/article/doi/smw.2020.20193>

Factors associated with alcohol use disorder: the role of depression, anxiety, stress, alexithymia and work fatigue- a population study in Lebanon

Background: International research showed that common mental disorders such as depression, anxiety, social anxiety, stress, alexithymia and having insecure attachment styles are risk factors for alcohol use disorder (AUD). Our objective was to study the factors associated with AUD in a sample of the Lebanese population. **Methods:** During the period lasting from November 2017 to March 2018, a sample of 789 Lebanese participants agreed to contribute to a cross-sectional study (53.23% males). Alcohol use disorder was assessed using the Alcohol Use Disorder Identification Test (AUDIT). **Results:** A high risk of AUD was associated with higher alexithymia (ORa = 1.030; CI 1.009-1.051), depression (ORa = 1.076; CI 1.050-1.103) and suicidal ideation (ORa = 1.253; CI 1.026-1.531) in a significant manner. In opposition, a higher number of kids (ORa = 0.863; CI 0.752-0.991), being a female (ORa = 0.460; CI 0.305-0.694) and higher emotional management (ORa = 0.962; CI 0.937-0.988) were significantly associated with lower AUD risk. A cluster analysis derived three mutually exclusive clusters. Cluster 1 formed 45.4% of the sample and assembled people with psychological difficulties (work fatigue and high stress, high emotional work fatigue and low emotional intelligence, low self-esteem, high social phobia, high alexithymia); Cluster 2 formed 34.4% of the sample and assembled people with high wellbeing (low suicidal ideation, low emotional work fatigue, depression and anxiety, high emotional intelligence, high self-esteem and low social phobia); whereas cluster 3 formed 20.2% of the sample and represented people with mental dysfunction (high anxiety and depression, high suicidal ideation, low self-esteem and high social phobia, low emotional intelligence, high emotional work fatigue). People with psychological difficulties (cluster 1) (Beta = 5.547; CI 4.430-6.663), and people in distress (cluster 3) (Beta = 7.455; CI 5.945-8.965) were associated with higher AUDIT scores than those with high wellbeing (cluster 2). **Conclusion:** AUD seems to be influenced by several factors among the Lebanese population, including alexithymia, stress, anxiety and work fatigue. Healthcare professionals should spread awareness to reduce the prevalence of these factors.

Obeid et al. 2020.

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

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Keywords: Alcohol use disorder; Alexithymia; anxiety; depression; self-esteem

Evidence Level: 5A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8345-1>

Occupational Exposure

Network between Cytokines, Cortisol and occupational stress in gas and oilfield workers.

To test whether gas and oil field work is accompanied by stress and altered immune function, the perception of workplace stress, levels of salivary cortisol, plasma levels, and mononuclear cell production of cytokines were examined in 80 healthy workers recruited among a population of operators on gas and oilfields. Specific questionnaires for determining the perception of anxiety, occupational stress, and subjective symptoms were administered. Salivary cortisol and cytokines plasma levels were evaluated by Elisa and to investigate immune function, both spontaneous and PHA- or LPS-induced expression and production of cytokines were assessed by qRT-PCR. Workers showed medium stress levels at work, with growth and increased motivation for work, and based on salivary cortisol concentrations, were divided into two groups of ≤ 10 ng/mL (n = 31) or > 10 ng/mL (n = 49). Statistically significant higher plasma levels of IL-6, while lower TNF α , were detected in workers with cortisol > 10 ng/mL. Also, BMI, DL, JD and Job strain were significantly higher in workers with cortisol > 10 ng/mL. Thus, even modest variations of cortisol might have a role in the modulation of immune response and worker's vulnerability to health imbalance. Thus, the evaluation of immune status, in addition to cortisol levels, could be useful to prevent illnesses; exacerbation of pre-existing conditions; morbidity; and consequent absences from work, with economic repercussions.

Reale et al. 2020.

International Journal of Molecular Sciences, vol. 21, no. 3.

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Keywords: Cortisol; cytokines; decision latitude (DL); job stress; oil and gas field worker; psychological demands

Evidence Level: 5A

Link: <https://www.mdpi.com/1422-0067/21/3/1118>

A probabilistic approach for economic evaluation of occupational health and safety interventions: A case study of silica exposure reduction interventions in the construction sector

Background: Construction workers are at a high risk of exposure to various types of hazardous substances such as crystalline silica. Though multiple studies indicate the evidence regarding the effectiveness of different silica exposure reduction interventions in the construction sector, the decisions for selecting a specific silica exposure reduction intervention are best informed by an economic evaluation. Economic evaluation of interventions is subjected to uncertainties in practice, mostly due to the lack of precise data on important variables. In this study, we aim to identify the most cost-beneficial silica exposure reduction intervention for the construction sector under uncertain situations. **Methods:** We apply a probabilistic modeling approach that covers a large number of variables relevant to the cost of lung cancer, as well as the costs of silica exposure reduction interventions. To estimate the societal lifetime cost of lung cancer, we use an incidence cost approach. To estimate the net benefit of each intervention, we compare the expected cost of lung cancer cases averted, with expected cost of implementation of the intervention in one calendar year. Sensitivity analysis is used to quantify how different variables affect interventions net benefit. **Results:** A positive net benefit is expected for all considered interventions. The highest number of lung cancer cases are averted by combined use of wet method, local exhaust ventilation and personal protective equipment, about 107 cases, with expected net benefit of \$45.9 million. Results also suggest that the level of exposure is an important determinant for the selection of the most cost-beneficial intervention. **Conclusions:** This study provides important insights for decision makers about silica exposure reduction interventions in the construction sector. It also provides an overview of the potential advantages of using probabilistic modeling approach to undertake economic evaluations, particularly when researchers are confronted with a large number of uncertain variables.

Mofidi et al. 2020.

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

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Keywords: Bayesian networks; cost-benefit analysis; lung cancer; net benefit; probabilistic modeling approach; uncertainty

Evidence Level: 5B

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8307-7>

Occupational exposure to dust produced when milling thermally modified wood

During production, thermally modified wood is processed using the same machining operations as unmodified wood. Machining wood is always accompanied with the creation of dust particles. The smaller they become, the more hazardous they are. Employees are exposed to a greater health hazard when machining thermally modified wood because a considerable amount of fine dust is produced under the same processing conditions than in the case of unmodified wood. The International Agency for Research on Cancer (IARC) states that wood dust causes cancer of the nasal cavity and paranasal sinuses and of the nasopharynx. Wood dust is also associated with toxic effects, irritation of the eyes, nose and throat, dermatitis, and respiratory system effects which include decreased lung capacity, chronic obstructive pulmonary disease, asthma and allergic reactions. In our research, granular composition of particles resulting from the process of longitudinal milling of heat-treated oak and spruce wood under variable conditions (i.e., the temperature of modification of 160, 180, 200 and 220 °C and feed rate of 6, 10 and 15 m.min⁻¹) are presented in the paper. Sieve analysis was used to determine the granular composition of particles. An increase in fine particle fraction when the temperature of modification rises was confirmed by the research. This can be due to the lower strength of thermally modified wood. Moreover, a different effect of the temperature modification on granularity due to the tree species was observed. In the case of oak wood, changes occurred at a temperature of 160 °C and in the case of spruce wood, changes occurred at the temperatures of 200 and 220 °C. At the temperatures of modification of 200 and 220 °C, the dust

fraction (i.e., that occurred in the mesh sieves, particles with the size ≤ 0.08 mm) ranged from 2.99% (oak wood, feed rate of 10 m.min⁻¹) to 8.07% (spruce wood, feed rate of 6 m.min⁻¹). Such particles might have a harmful effect on employee health in wood-processing facilities.

Ockajova et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 5.

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Keywords: Granularity; oak; occupational exposure; spruce; thermowood; wood dust

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/5/1478>

Biological monitoring of occupational exposure to dichloromethane by means of urinalysis for un-metabolized dichloromethane.

The objective of the study is to establish exposure-excretion relationship between dichloromethane (DCM) in air (DCM-A) and in urine (DCM-U) in workplace to confirm a previous report. Male workers in a screen-printing plant participated in the study. Time-weighted average DCM-A was measured by diffusive sampling followed by gas-chromatography (GC), and DCM in end-of-shift urine samples was by head-space GC. The data were subjected to regression and other statistical analyses. In practice, 30 sets of DCM-A and DCM-U values were available. The geometric mean DCM-A was 8.4 ppm and that of DCM-U (as observed) was 41.1 $\mu\text{g/l}$. The correlation coefficients (0.70-0.85) were statistically significant across the correction for urine density. Thus, the analysis for un-metabolized DCM in end-of-shift urine samples is applicable for biological monitoring of occupational exposure to DCM, in support of and in agreement with the previous report. In conclusion, biological monitoring of occupational DCM exposure is possible by use of analysis for un-metabolized DCM in end-of-shift urine.

Kawai et al. 2020.

Industrial Health, vol. 58, no. 1.

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Keywords: Biological monitoring; dichloromethane; exposure-excretion relationship; methylene chloride; occupational exposure

Evidence Level: 5B

Link: https://www.istage.jst.go.jp/article/indhealth/58/1/58_2018-0222/_article

Relationship between occupational dust exposure levels and mental health symptoms among Korean workers

Dust and fumes are complex mixtures of airborne gases and fine particles present in all environments inhabited by people. This study investigated the relationship between occupational dust exposure levels and mental health problems such as depression or anxiety, fatigue, and insomnia or sleep disturbance. We analyzed data from the third and fourth Korean Working Conditions Survey (KWCS) conducted by the Korea Occupational Safety and Health Agency in 2011 and 2014. We performed chi-square tests to compare the different baseline and occupational characteristics and mental health status according to occupational dust exposure levels. The odds ratio (OR) and 95% confidence intervals (95% CIs) for mental health symptoms (fatigue, depression or anxiety, and insomnia or sleep disturbance) were calculated using adjusted multiple logistic regression models. A total of 78,512 participants (43,979 in men, 34,533 in women) were included in this study. Among them, 6,013 (7.7%) and 2,625 (3.3%) reported "moderate" and "severe" dust exposure, respectively. Among those who answered "yes" to depression or anxiety, fatigue, insomnia or sleep disturbance, 50 (4.6%), 961 (4.8%), and 123 (5.9%), respectively, demonstrated "severe" occupational dust exposure. Compared to "low" levels of dust exposure, "moderate" and "severe" exposure increased the risk of depression and anxiety (OR = 1.09, 95%CI: 0.88-1.36; OR = 1.16, 95%CI: 0.87-1.58, per exposure respectively); however, this was not statistically significant. For fatigue, significance was observed for "moderate" 1.54 (1.46-1.64) and "severe" 1.65 (1.52-1.80) exposure levels. "Severe" levels increased the risk of insomnia or sleep disturbance (OR = 1.52, 95%CI: 1.25-1.85). These results suggest that the "dust annoyance" concept of mental health, which may be explained by a neurocognitive mechanism, is plausible. Occupational "dust annoyance" has been linked to workers' mental health status, particularly in

terms of fatigue and sleep disturbance; a dose-response relationship has been observed. Workers should be protected against dust to support their health and productivity.

Lee et al. 2020.

PLoS One, vol. 15, no. 2.

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Keywords: Occupational exposure; dust exposure; mental health; symptoms; Korean workers

Evidence Level: 4A

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228853>

The disease burden attributable to 18 occupational risks in China: an analysis for the global burden of disease study 2017

Background: China has more than 18% of the global population and over 770 million workers. However, the burden of disease attributable to occupational risks is unavailable in China. We aimed to estimate the burden of disease attributable to occupational exposures at provincial levels from 1990 to 2017. **Methods:** We estimated the summary exposure values (SEVs), deaths and disability-adjusted life years (DALYs) attributable to occupational risk factors in China from 1990 to 2017, based on Global Burden of Disease Study (GBD) 2017. There were 18 occupational risks, 22 related causes, and 35 risk-outcome pairs included in this study. Meanwhile, we compared age-standardized death rates attributable to occupational risk factors in provinces of China by socio-demographic index (SDI). **Results:** The SEVs of most occupational risks increased from 1990 to 2017. There were 323,833 (95% UI 283,780 - 369,061) deaths and 14,060,210 (12,022,974 - 16,125,763) DALYs attributable to total occupational risks in China, which were 27.9 and 22.1% of corresponding global levels, respectively. For attributable deaths, major risks came from occupational particulate matter, gases, and fumes (PGFs), and for the attributable DALYs, from occupational injuries. The attributable burden was higher in males than in females. Compared with high SDI provinces, low SDI provinces, especially Western China, had higher death rates attributable to total occupational risks, occupational PGFs, and occupational injuries. **Conclusion:** Occupational risks contribute to a huge disease burden in China. The attributable burden is higher in males, and in less developed provinces of Western China, reflecting differences in risk exposure, socioeconomic conditions, and type of jobs. Our study highlights the need for further research and focused policy interventions on the health of workers especially for less developed provinces in China to reduce occupational health losses effectively.

Li et al. 2020.

Environmental Health, vol. 19, no. 1.

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Keywords: Attributable burden; death; occupational risk; risk exposure

Evidence Level: 5B

Link: <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-020-00577-y>

Asbestosis and Mesothelioma

Estimation of occupational exposure to asbestos in Italy by the linkage of mesothelioma registry (ReNaM) and national insurance archives. Methodology and results.

The identification and monitoring of occupational cancer is an important aspect of occupational health protection. The Italian law on the protection of workers (D. Leg. 81/2008) includes different cancer monitoring systems for high and low etiologic fraction tumors. Record linkage between cancer registries and administrative data is a convenient procedure for occupational cancer monitoring. We aim to: (i) Create a list of industries with asbestos exposure and (ii) identify cancer cases who worked in these industries. The Italian National Mesothelioma Registry (ReNaM) includes information on occupational asbestos exposure of malignant mesothelioma (MM) cases. We developed using data from seven Italian regions a methodology for listing the industries with potential exposure to asbestos linking ReNaM to Italian National Social Security Institute (INPS) data. The methodology is iterative and adjusts for imprecision and inaccuracy in reporting firm names at interview. The list of asbestos exposing firms was applied to the list of cancer cases (all types associated or possibly associated with asbestos according to International Agency for Research on Cancer (IARC) monograph 100C) in two Italian regions for the

indication of possible asbestos exposure. Eighteen percent of the cancer cases showed at least one work period in firms potentially exposing to asbestos, 48% of which in regions different from where the cases lived at diagnosis. The methodology offers support for the preliminary screening of asbestos exposing firms in the occupational history of cancer cases.

Airoidi et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 3.

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Keywords: Asbestos; gastrointestinal cancer; larynx cancer; lung cancer; mesothelioma; occupational cancer; ovarian cancer; record linkage

Evidence Level: 5B

Link: <https://www.mdpi.com/1660-4601/17/3/1020>

Sedentary Practices

The ability to benefit from an intervention to encourage use of treadmill workstations: Experiences of office workers with overweight or obesity

One way to increase physical activity in offices is to install treadmill workstations, where office workers can walk on a treadmill while performing their normal tasks. However, the experiences of people using these treadmill workstations over a long period of time is not known. In this 13-month study, we explored the experiences of office workers with treadmill workstations available in their offices. After completing a larger randomized controlled trial with 80 office workers ages 40 to 67 years with overweight or obesity, we interviewed 20 participants from the intervention group, using a semi-structured interview guide. Data were analyzed using a grounded theory approach with constant comparison of emerging codes, subcategories, and categories, followed by connecting the categories to create a core category. The core category is described as the "Ability to benefit." Although all participants had a rather high motivational level and pre-existing knowledge about the health benefits of increasing physical activity at work, they had different capacities for benefiting from the intervention. The categories are described as ideal types: the Convinced, the Competitive, the Responsible, and the Vacillating. These ideal types do not represent any single participant but suggest generalized abstractions of experiences and strategies emerging from the coding of the interviews. One participant could easily have more than one ideal type. Because of differences in ideal type strategies and paths used throughout the course of the study, participants had different abilities to benefit from the intervention. Knowledge regarding the ideal types may be applied to facilitate the use of the treadmill workstations. Because different ideal types might require different prompts for behavior change, tailored intervention strategies directed towards specific ideal types could be necessary.

Bergman et al. 2020.

PLoS One, vol. 15, no. 1.

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Keywords: Obesity; overweight; office workers; treadmill workstations

Evidence Level: 5A

Link: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228194>

A cost and cost-benefit analysis of the Stand More AT Work (SMaRT Work) Intervention

This study conducted a cost and cost-benefit analysis of the Stand More AT (SMaRT) Work workplace intervention, designed to reduce sitting time. The study was a cluster two-armed randomised controlled trial involving 37 office clusters (146 desk-based workers) in a National Health Service Trust. The intervention group received a height-adjustable workstation with supporting behaviour change strategies. The control group continued with usual practice. Self-report absenteeism, presenteeism and work productivity were assessed at baseline, 3, 6 and 12 months; and organisational sickness absence records 12 months prior to, and 12 months of the intervention. Mean per employee costs associated with SMaRT Work were calculated. Absenteeism, presenteeism and work productivity were estimated, and employer-recorded absence data and employee wage-banding were used to provide a human-capital-based estimate of costs to the organisation. The return-on-investment (ROI) and incremental cost-eficacy ratios (ICER)

were calculated. Intervention cost was £692.40 per employee. Cost-benefit estimates show a net saving of £1770.32 (95%CI £-354.40, £3895.04) per employee as a result of productivity increase. There were no significant differences in absence data compared to the control group. SMArT Work provides supporting evidence for policy-makers and employers on the cost benefits of reducing sitting time at work.

Munir et al. 2020.

International Journal of Environmental Research and Public Health, vol. 17, no. 4.

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Keywords: Cost-benefit analysis; presenteeism; sick leave; sickness absence; sit-stand; sitting; standing; workplace health promotion

Evidence Level: 2A

Link: <https://www.mdpi.com/1660-4601/17/4/1214>

Association of exposures to seated postures with immediate increases in back pain: A systematic review of studies with objectively measured sitting time

Objective: The purpose of this study was to conduct a systematic review of studies to determine whether sitting time measured objectively (by laboratory controlled time trial, direct observation, or wearable sensor) is associated with the immediate increase in low back pain (LBP) (determined by pain scale rating) in people >18 years of age. **Methods:** Four databases (PubMed, EMBASE, SPORTDiscus, and Cumulative Index to Nursing and Allied Health Literature) were searched from inception to September 1, 2018. Randomized controlled trials and cohort and cross-sectional studies, where objectively measured sitting time was temporally matched with a measure of LBP in adults, were included. Studies without a control session conducted on a separate day were excluded. Screening, full-text review, data extraction, and risk of bias assessment (Quality In Prognosis Studies) of included papers were performed independently by 2 reviewers, with a third available to resolve disagreements. **Results:** In total, 609 articles were identified, 361 titles/abstracts were screened, 75 full-text articles were assessed for eligibility, and 10 met the inclusion criteria. All but 1 reported sitting time to be associated with an immediate increase in LBP. Six of these reported clinically relevant pain levels (n = 330). Half of the included studies were rated as having a low risk of bias and the remaining were rated as having a moderate risk of bias. **Conclusion:** Prolonged sitting increases immediate reporting of LBP in adults; however, no conclusion between sitting and clinical episodes of LBP can be made. Based upon these findings, we recommend that future prospective studies should match objectively measured sitting with temporally related pain measurements to determine whether prolonged sitting can trigger a clinical episode of LBP.

Carvalho et al. 2020.

Journal of Manipulative and Physiological Therapeutics.

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Keywords: Accelerometry; actigraphy; low back pain; occupational diseases; pain measurement; risk factors; sedentary behavior; sitting position; time factors

Evidence Level: 1A

Link: [https://www.jmptonline.org/article/S0161-4754\(19\)30432-4/fulltext](https://www.jmptonline.org/article/S0161-4754(19)30432-4/fulltext)

Office-based physical activity: mapping a social ecological model approach against COM-B

Background: There are growing concerns over the health impacts of occupational sedentary behaviour on office-based workers and increasing workplace recognition of the need to increase physical activity at work. Social ecological models provide a holistic framework for increasing opportunities for physical activity at work. In this paper we propose a social ecological model of office-based physical activity and map it against the Capability Motivation Opportunity (COM-B) framework to highlight the mechanisms of behaviour change that can increase levels of physical activity of office-based workers. **Discussion:** The paper proposes a social ecological model of physical activity associated with office-based settings. The model considers opportunities for both incidental and discretionary activities, as well as macro and micro factors on both socio-cultural and physical dimensions. The COM-B framework for characterising behaviour change interventions is used to highlight the underlying mechanisms of behaviour change inherent in the model. The broad framework provided by social ecological models is important for understanding physical activity in office-based settings because of the non-discretionary nature of sedentary behaviour of office-based

work. It is important for interventions not to rely on individual motivation for behaviour change alone but to incorporate changes to the broader social ecological and physical context to build capability and create opportunities for more sustainable change.

van Kasteren et al. 2020.

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

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Keywords: COM-B; office work; physical activity; sedentary behaviour; social ecological model

Evidence Level: 6A

Link: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-8280-1>

Musculoskeletal Health

Education as a strategy for managing occupational-related musculoskeletal pain: a scoping review.

Background: Musculoskeletal (MSK) pain is the primary contributor to disability worldwide. There is a growing consensus that MSK pain is a recurrent multifactorial condition underpinned by health and lifestyle factors. Studies suggest that education on work-related pain and individualised advice could be essential and effective for managing persistent MSK pain. **Objective:** The objective of this scoping review was to map the existing educational resources for work-related MSK (WRMSK) pain, and the effects of implementing educational strategies in the workplace on managing WRMSK pain. **Methods:** This scoping review assessed original studies that implemented and assessed education as a strategy to manage WMSK pain. Literature search strategies were developed using thesaurus headings (ie, MeSH and CINAHL headings) and free-text search including words related to MSK in an occupational setting. The search was carried out in PubMed, CINAHL, Cochrane Library and Web of Science in the period 12-14 February 2019. **Results:** A total of 19 peer-reviewed articles were included and the study design, aim and outcomes were summarised. Of the 19 peer-reviewed articles, 10 randomised controlled trial (RCT) studies assessed the influence of education on work-related MSK pain. Many studies provided a limited description of the education material and assessed/used different methods of delivery. A majority of studies concluded education positively influences work-related MSK pain. Further, some studies reported additive effects of physical activity or ergonomic adjustments. **Conclusions:** There is a gap in knowledge regarding the best content and delivery of education of material in the workplace. Although beneficial outcomes were reported, more RCT studies are required to determine the effects of education material as compared with other interventions, such as exercise or behavioural therapy.

Palsson et al. 2020.

BMJ Open, vol. 10, no. 2.

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Keywords: Education; pain management; work-related musculoskeletal pain

Evidence Level: 6A

Link: <https://bmjopen.bmj.com/content/10/2/e032668.long>

Wearable device to monitor back movements using an inductive textile sensor

Low back pain (LBP) is the most common work-related musculoskeletal disorder among healthcare workers and is directly related to long hours of working in twisted/bent postures or with awkward trunk movements. It has already been established that providing relevant feedback helps individuals to maintain better body posture during the activities of daily living. With the goal of preventing LBP through objective monitoring of back posture, this paper proposes a wireless, comfortable, and compact textile-based wearable platform to track trunk movements when the user bends forward. The smart garment developed for this purpose was prototyped with an inductive sensor formed by sewing a copper wire into an elastic fabric in a zigzag pattern. The results of an extensive simulation study showed that this unique design increases the inductance value of the sensor, and, consequently, improves its resolution. Furthermore, experimental evaluation on a healthy participant confirmed that the proposed wearable system with the suggested sensor design can easily detect forward bending movements. The evaluation scenario was then extended to also include twisting and lateral bending of the trunk, and it was observed that the proposed design can successfully discriminate such movements from forward bending of the trunk. Results of the

magnetic interference test showed that, most notably, moving a cellphone towards the unworn prototype affects sensor readings, however, manipulating a cellphone, when wearing the prototype, did not affect the capability of the sensor in detecting forward bends. The proposed platform is a promising step toward developing wearable systems to monitor back posture in order to prevent or treat LBP.

Patino et al. 2020.

Sensors, vol. 20, no. 3.

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Keywords: E-textiles; inductance; low back pain; monitoring; nurses; smart garment; textile sensors; trunk posture; wearable device

Evidence Level: 5B

Link: <https://www.mdpi.com/1424-8220/20/3/905>