



# Emerging Evidence Alert February 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 January 2020 only.

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## Occupational violence increases risk of mental health problems, poor performance and toxic work cultures

Employees in high-risk roles face increased exposure to work-related violence and threats. Drawing on the insights of human services employees working in special schools, psychiatric wards, eldercare, and prisons and probation, Danish researchers Andersen and colleagues (2019), examined the role of personality and coping styles, attitudes, supervisor behaviours and prevention training. Employees high on the introversion and extroversion scales were found to be at increased risk for work-related threats, however this decreased if supervisor violence prevention behaviour was high. A key finding was prevention strategies relied on involvement from both employees and supervisors to be effective.

Doctors, nurse and paramedical staff were also surveyed as part of a Chinese study by Rasool and colleagues (2020). This study focused on the relationship between workplace violence, occupational stress and sustainable work performance. Researchers found that workplace violence negatively influences sustainable work performance in both direct and indirect relationships. Harassment, mobbing, ostracism, stalking and occupational stress reduce productivity and performance; increase levels of stress, anxiety and depression; and contribute to a toxic working environment. The researchers recommend that employees are the most productive in workplaces that foster a positive workplace culture.

In this edition of the Emerging Evidence Alert, a recent systematic review from researchers in Scandinavia found that employees who are exposed to work-related violence or threats are at increased risk of mental health disorders and mental ill-health symptoms. From 14 cross-sectional and 10 cohort studies, it was identified that exposure to work-related violence or threats increase the risk of depression and anxiety symptoms, burnout and psychological distress. Increased risk of sleep disturbances and disorders were also reported. The review highlighted the challenges in the reporting of occupational violence. For example, a vulnerability to mental health disorders increases susceptibility, whereas preference for low-risk roles reduces exposure to and impact of occupational violence.

These studies highlight the need for employers to work with their teams to develop workplace strategies to ensure there is effective violence prevention for employees in both low-risk and high-risk work environments. This will contribute to positive workplace cultures that support employee mental health and wellbeing, sustainable work performance and productivity.

## Comcare hosts Occupational Violence Community of Practice

Employers across the Comcare scheme came together to discuss workplace strategies to prevent occupational violence, which accounts for 15 per cent of mental stress claims according to data from Safe Work Australia.

Monitoring for any changes in threats or a breakdown in prevention strategies for workplace violence and customer violence, as well as risk reduction and mitigation, were all on the agenda along with presentations from WorkSafe Victoria and iCare that provided an overview of their research, learnings, and management resources.

A networking session where employers shared their own experiences and discussed better practice management strategies was a major highlight. Comcare will continue to seek feedback from employers to provide future networking and information sharing sessions to ensure important conversations about occupational violence and its prevention continues across the Scheme.

### For more information about Occupational Violence:

**Safe Work Australia website:** Managing the risk of [work-related violence](#)

**Comcare website:** Preventing and managing [customer aggression](#)

## 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

### Presenteeism and Absenteeism

#### **Sick leave absence and the relationship between intra-generational social mobility and mortality: Health selection in Sweden**

**Background:** Poor health could influence how individuals are sorted into occupational classes. Health selection has therefore been considered a potential modifier to the mortality class gradient through differences in social mobility. Direct health selection, in particular, may operate in the short-term as poor health may lead to reduced work hours or achievement, downward social mobility, unemployment or restricted upward mobility, and death. In this study, the relationship between social mobility and mortality (all-cause, cancer-related, cardiovascular disease-related (CVD), and suicide) is explored when the relationship is adjusted for poor health. **Methods:** Using Swedish register data (1996-2012) and discrete time event-history analysis, odds ratios and average marginal effects (AME) of social mobility and unemployment on mortality are observed before and after accounting for sickness absence in the previous year. **Results:** After adjusting for sickness absence, all-cause mortality remained lower for men after upward mobility in comparison to not being mobile (OR 0.82, AME -0.0003, CI - 0.0003 to - 0.0002). Similarly, upward mobility continued to be associated with lower cancer-related mortality for men (OR 0.85, AME -0.00008, CI - 0.00002 to - 0.0002), CVD-related mortality for men (OR 0.76, AME -0.0001, CI - 0.00006 to - 0.0002) and suicide for women (OR 0.67, AME -0.00002, CI - 0.00002 to - 0.00003). The relationship between unemployment and mortality also persisted across most causes of death for both men and women after controlling for previous sickness absence. In contrast, adjusting for sickness absence renders the relationship between downward mobility and cancer-related mortality not statistically different from the non-mobile. **Conclusions:** Health selection plays a role in how downward mobility is linked to cancer related deaths. It additionally accounts for a portion of why upward mobility is associated with lower mortality. That health selection plays a role in how social mobility and mortality are related may be unexpected in a context with strong job protection. Job protection does not, however, equalize opportunities for upward mobility, which may be limited for those who have been ill. Because intra-generational upward mobility and mortality remained related after adjusting for sickness absence, other important mechanisms such as indirect selection or social causation should be explored.

**Billingsley et al. 2020.**

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

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**Keywords:** Sick leave; absence; occupational classes; mobility; mortality

**Evidence Level:** 4B

**Link:** <https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-019-8103-4>

#### **The contribution of alcohol use, other lifestyle factors and working conditions to socioeconomic differences in sickness absence**

This study explored the relationship between alcohol use, smoking, physical activity, body mass index, physical and psychosocial working conditions, socioeconomic status and sickness absence. The study found that physical working conditions were the key aspect that explained the socioeconomic differences in long-term sickness absence, and psychosocial working conditions have greater impact on short-term sickness absence among men.

**Landberg et al. 2020.**

**European Addiction Research, vol. 26, no. 1.**

**Keywords:** Lifestyle factors; Alcohol use; Sickness absence; Socioeconomic differences; Working conditions.

**Evidence Level:** 4A

**Link:** <https://www.karger.com/Article/FullText/504437>

## Workers' compensation

### Occupational injuries and workers' compensation management strategies

An occupational injury describes any type of injury or illness that occurs to a patient as related to their specific occupational demands or requirements. Occupational injuries or illnesses represent a substantial percentage of emergency department visits as well as primary care and subspecialty clinical practices. The most common organs involved are the hands, eyes, spine, head, lungs, skeleton, and skin. Occupational injuries result from physical, biological, chemical, or psychosocial hazards such as noise, temperature, insect or animal bites, aerosols, blood-borne pathogens, hazardous chemicals, radiation, and occupational burnout. While prevention methods are available, many injuries still occur due to poor ergonomics, manual handling of heavy loads, misuse of equipment, general hazards, and inadequate safety training. Healthcare providers should strive to maintain awareness regarding the overall financial burden of the direct and indirect costs attributed to the long-term and permanent disability, as well as the pertinent role of the workers' compensation system to facilitate the flow and efficiency of healthcare provided to these workers to mitigate associated negative downstream effects.

**Varacallo et al. 2020.**

**StatPearls.**

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**Keywords:** Occupational injuries; workers compensations; management strategies; injury; illness

**Evidence Level:** 6B

**Link:** <https://www.ncbi.nlm.nih.gov/books/NBK470372/>

## Disability

### Development and evaluation of a strength-based method to promote employment of work-disability benefit recipients with multiple problems: a feasibility study

**Background:** For people with disabilities, chances to find or keep work are negatively affected by multiple problems like lower education, poverty and poor health. Furthermore, although active labour market policies proved to be effective for unemployed in general, success rates are poor for persons who are unemployed due to multiple problems. The present study aims to describe the development of a method as well as professional training to teach its application, and to assess the feasibility of method and training. The Strength-based method (CARm) aims to promote employment of work-disability benefit recipients with multiple problems. **Methods:** The main principles of the Strength model were redesigned for better applicability in a population of work-disability beneficiaries, resulting in the CARm method. As part of the CARm method, a training module for Labour Experts (LEs) was developed. To assess the new designed method and training, a one-group, pre-post design was used. Data were collected from eight participating LEs, five female and 3 male, aged between 41 and 55 years and having 2-17 years working experience. We used self-report questionnaires and a semi-structured discussion meeting after the training sessions with the LEs. **Results:** Eight labour experts (LEs) from the Dutch Social Security Institute participated in the study. Most LEs felt an improvement in their ability to ascertain developmental needs, opportunities and threats in the client's situation. Three months after the training, LEs almost unanimously agreed on the statements 'I expect to use the CARm method more frequently in the future' and 'I use the CARm method in daily practice whenever possible'. The overall rating for the training on a scale from 1 to 10 was 7.6 (range 7-9). The overall satisfaction with the trainers was good. **Conclusions:** The CARm method and training was found to be a feasible approach to facilitate LEs working at the UWV reintegration service to support clients with multiple problems. Sufficient managerial support for participating LEs is a key factor for successful implementation of CARm. Results show that CARm is worth testing for efficacy in a future trial.

**Brongers et al. 2020.**

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

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**Keywords:** Disability benefits; Multiple problems; Return to work; Strength; Training program.

**Evidence Level:** 5B

**Link:** <https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-020-8157-3>

## Building Employer Capability

### Job Design

#### **Road ambulances: working conditions of paramedics - pilot studies**

**Objectives:** The article presents the results of selected pilot studies conducted in medical ambulances. Their aim was to determine the working conditions and identify troublesome factors accompanying the performance of basic medical procedures by rescue teams. **Material and methods:** The study of working conditions was carried out in Mercedes-Benz ambulances, type S and P. Fifty-one paramedics of the Emergency Medical Rescue Service in Siedlce took part in the research. The questionnaire expert survey method and the direct observation method were used. **Results:** As a result of the applied research methods, knowledge was gained on the irregularities and difficulties that occur at the workplace of a paramedic, i.e., in an ambulance, including the lack of access to essential elements of medical equipment and their different location inside the vehicle, and the diversity of solutions for the spatial structure of ambulances, which all cause difficulties at work. Research has shown that paramedics take, on average, 33 min to familiarize themselves with the location of equipment in an ambulance other than the one in which they are usually on duty. There was no correlation between the lifeguard's length of service and the time necessary for getting acquainted with the equipment, which was studied using Pearson's correlation coefficient. In the study, rescuers also pointed to musculoskeletal ailments, mainly spinal pains resulting from taking forced positions during medical activities in an ambulance. **Conclusions:** The results obtained constitute the basis for the author's methodology of complex research aimed at defining the ergonomic recommendations necessary in the modification process of the operated medical fleet. The next step will be to formulate uniform guidelines for the construction of medical compartments of ambulances, the application of which will lead to the unification of their spatial structure regardless of the vehicle brand. Int **Beczowska et al. 2020.**

**Journal of Occupational Medicine and Environmental Health, vol. 33, no. 1.**

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**Keywords:** Ambulances; ergonomic; musculoskeletal discomfort; occupational hazard; paramedics; questionnaire survey

**Evidence Level:** 5A

**Link:** <http://ijomeh.eu/Road-Ambulances-Working-Conditions-of-Paramedics-Pilot-Studies,113341,0,2.html>

#### **Who reported having a high-strain job, low-strain job, active job and passive job? The WIRUS Screening study**

**Objective:** The Job Demands and Control model classifies job types as active, passive, low-strain or high-strain, based on a combination of job demands and control. While studies have shown high-strain jobs to have adverse consequences for health and work participation, prognostic factors for the four job types have been less explored. The aim of this study was to assess the associations between sociodemographic factors and job descriptors and being in high-strain, low-strain, active and passive jobs. **Methods:** The WIRUS Screening study targeted Norwegian employees in private and public enterprises. In this study, associations with job types among 4,487 employees were investigated with binary logistic regression analyses, adjusting for sociodemographic and job-related variables. **Results:** In fully adjusted models, high-strain job was associated with female gender; lower education; shift work; and doing work outside the workplace. Low-strain job was associated with opposite scores on the same variables, and with lower job position. Active job was associated with lower age; female gender; higher levels of education; higher job position level; shift work; and not doing work outside the workplace. Passive job was associated with opposite scores on the same variables. **Conclusions:** The study corroborates the role gender and education have for experiencing the job, and expands on existing knowledge on the role of job position and irregular working hours and spaces. By identifying factors associated with job types, the prevention of health problems and work disability may become be more targeted.

**Bonsaken et al. 2020.**

**PLoS One, vol. 14, no. 12.**

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**Keywords:** Job strain; active job; passive job; WIRUS screening study; job demands

**Evidence Level:** 4A

**Link:** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0227336>

### **Flexible employment policies, temporal control and health promoting practices: A qualitative study in two Australian worksites**

For four decades, theories of job demand-control have proposed that higher occupational status groups have lower health risks due to the stress accompanying jobs featuring high demands but high control. This research examines whether Flexible Work Arrangements (FWAs) can improve the health prospects of a range of workers by giving greater control over work time arrangements. Our setting is Australia, where FWAs were introduced in 2009. In line with these early studies alongside studies of work-life balance, we expected to observe that workers with access to control over daily work times could better control the activities outside of work that influence chronic disease. Using a practice sociology approach, we compared the accounts of twenty-eight workers in blue- and white-collar industries with differing degrees of work time flexibility. The findings do not contradict early theories describing occupational differences of job demand-control dynamics and their relationship to health risks. However, this study suggests that a) time demands and strains have increased for a broad sweep of workers since the 1980s, b) the greater control of higher occupational status groups has been eroded by the high performance movement, which has attracted less scrutiny than FWAs, and c) more workers are forced to adapt their daily lives, including their approach to health, to accommodate their job demands. Job insecurity further impedes preventative health practices adoption. What might appear to be worker-controlled flexibility can-under the pressures of job insecurity and performance expectations without time limits-transform into health-eroding unpredictability. The answer however is not greater flexibility in the absence of limits on the well-documented precursors of work stress: long hours, job insecurity and intensity-related exhaustion. While there have been welcome developments in job demand-control-health conceptualizations, they typically ignore the out-of-work temporal demands that workers face and which compound on-the-job demands. Redesign of the temporalities of working life within worksites need to be accompanied by society-level policies which address caring responsibilities, gender equality as well as broad labour market conditions.

**Dixon et al. 2020.**

**PLoS One, vol. 14, no. 12.**

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**Keywords:** Flexible employment policies; temporal control; health promoting practices; Australian worksite

**Evidence Level:** 5A

**Link:** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0224542>

## **Shift Work**

### **Night shift work - A risk factor for breast cancer**

Shift work is considered a risk factor for some health problems. This study aimed to determine whether night shift work is a significant factor for breast cancer risk. The case-control study was conducted from 2015-2019 in the Łódź region. The case group included 494 women diagnosed with malignant breast cancer; the control group included 515 healthy women. The research tool was an anonymous questionnaire. In the case group, the percentage of women working shift work was 51.9%, whereas in the control group, it was 34.1% (OR = 2.08 (95% CI: 1.61; 2.69)). A more insightful examination of shift work showed that only night work has a significant impact on breast cancer (OR = 2.61 (95% CI: 1.94; 3.53)). Even after considering the effect of other possible cancer factors (like high BMI, smoking, early menstruation, late menopause, pregnancy history, age, place of living, education), the odds of developing cancer were twice as high in the group of shift workers (OR = 2.20 (95% CI: 1.57; 3.08)). Considering a significantly higher risk of cancer among people working at night and a high percentage of such employees in Poland, the government should consider special action in the prophylactic treatment of cancers.

**Szkiela et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Breast cancer; occupational choice; public health; shift work; value of life.

**Evidence Level:** 5A

**Link:** <https://www.mdpi.com/1660-4601/17/2/659>

### **Relationship between shift type and voluntary exercise training in South Korean firefighters**

**Background:** According to the National Fire Agency, 69% of South Korean firefighters prefer the three-circuit system. Since the three-circuit system involves working for 24 h consecutively, it could reduce work performance of firefighters and their participation in exercise training (ET) and fitness levels could be affected by shift type. The present study examined the impact of shift type on ET and identified the interaction effect between shift type and city size on ET among South Korean firefighters. **Methods:** A series of logistic regression models were used to analyze the data collected from incumbent outside workers among Korean firefighters (N = 5196) in 2017. **Results:** Firefighters under the three-circuit system participated in ET less frequently than did those under the 21-circuit system, and the difference was greater in large cities than in small towns. This could be because of the greater opportunity to participate in leisure activities in large cities, or because participating in ET is easier for firefighters in small towns, who tend to be less busy than those in large cities. **Conclusions:** The three-circuit system is not feasible in the present situation in South Korea. Therefore, an environment suitable for the three-circuit system should be established.

**Park et al. 2020.**

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

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**Keywords:** Exercise training; firefighter; shift work.

**Evidence Level:** 5B

**Link:** <https://www.mdpi.com/1660-4601/17/3/728>

### **Insomnia symptoms and mood disturbances in shift workers with different chronotypes and working schedules**

**Background and purpose:** Shift workers frequently suffer from insomnia and mood disturbances, but little is known about the relationships of these conditions with the chronotypes and different working schedules of shift workers. We hypothesized that different shift-work schedules are associated with different severities of sleep and mood disturbances, and that the individual chronotype plays a role in sleep disturbances in shift workers. **Methods:** This study enrolled 276 participants, comprising 77 nurses working in a three-shift schedule (3S, 27.9%), 60 firefighters working in a 24-h-every-other-day shift schedule (EOD, 21.7%), and 139 day workers (DW, 50.4%). All of the participants completed the following questionnaires to assess their sleep disturbances, mood, and chronotype: Insomnia Severity Index (ISI), Epworth Sleepiness Scale, Hospital Anxiety and Depression Scale, and Morningness-Eveningness Questionnaire. **Results:** ISI questionnaires were worse in both shift workers compare to DW, 35.1% of 3S, 23% of EOD had clinically significant insomnia (ISI score >14). Depressive mood and anxiety symptom were significantly worse in 3S compare to EOD. The sleep disturbance by ISI score had significant correlations with depressive mood and anxiety symptoms for both EOD and 3S (EOD: rho=0.57, rho=0.57, 3S: rho=0.37, rho=0.33 respectively). Chronotype type in shift workers had no significant correlation with sleep disturbance, depressive mood, nor anxiety symptom. However, after adjustment, the eveningness chronotype have relationship to the depressive mood in shift workers. **Conclusions:** Sleep disturbances are more frequent in shift workers than DW. Depressive mood and anxiety symptoms were frequently reported in 3S, then EOD. Different shift schedules cab be a determinant of depressive mood and anxiety symptom.

**Choi et al. 2020.**

**Journal of Clinical Neurology, vol. 16, no. 1.**

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**Keywords:** Insomnia; mood; worker

**Evidence Level:** 4A

**Link:** <https://thejcn.com/DOIx.php?id=10.3988/jcn.2020.16.1.108>



### **Night-time shift work and related stress responses: A study on security guards**

**Background:** Work-related stress can induce a break in homeostasis by placing demands on the body that are met by the activation of two different systems, the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system. Night-shift work alters the body's exposure to the natural light-dark schedule and disrupts circadian (daily) rhythms. The greatest effect of night-shift work is the disruption of circadian rhythms. The impact that these disruptions may have on the pathogenesis of many diseases, including cancer, is unknown. This study aims to discover the relationship among three different job activities of security guards and their stress-related responses by evaluating salivary cortisol levels and blood pressure.

**Methods:** Ninety security guards, including night-time workers and night-time and daily-shift workers, were recruited for this study. Each security guard provided two saliva samples before and after three scheduled time points: (i) at 22:00, (ii) at 06:30, and (iii) at 14:00. **Results:** The results of the study showed a significant alteration in cortisol levels. Night-time shift cortisol levels significantly increased before and after the work shifts. A physiological prevalence of the vagal tone on the cardiocirculatory activity was found during night-shift work. **Conclusions:** This study indicates that cortisol levels and blood pressure are sensitive markers of biological responses to severe work stress. Shift-change consequences may occur at the end of the night shift when there is a significant increase in the cortisol level and a significant variation in cardiovascular parameters.

**Cannizzaro et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** HPA axis activation; anxiety-like behavior; occupational stress; work-related stress

**Evidence Level:** 5A

**Link:** <https://www.mdpi.com/1660-4601/17/2/562>

### **Management and Leadership**

#### **Linking transformational leadership, patient safety culture and work engagement in home care services**

**Aim:** To assess the relationship between transformational leadership, job demands, job resources, patient safety culture and work engagement in home care services. **Design:** Cross-sectional survey.

**Methods:** Healthcare professionals in Norwegian home care services participated in the study ( $N = 139$ ). Multiple regression analyses with patient safety culture and work engagement as outcomes and transformational leadership, job demands, job resources as predictors were conducted. **Results:** The transformational leadership model explained 35.7% of the variance in patient safety culture. Adding job demands and resources and work engagement to the model increased the explained variance to 53.5%. The job resource "skill utilization" was the strongest predictor of work engagement. The full model with all predictor variables explained 28.2% of work engagement. **Conclusion:** Transformational leadership has a significant impact on patient safety culture and work engagement in home care services. Employees' perceptions of job demands, available resources and engagement also affect patient safety culture.

**Ree et al. 2020.**

**Nursing Open, vol. 7, no. 1.**

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**Keywords:** Job demands; job resources; patient safety culture; transformational leadership; work engagement.

**Evidence Level:** 4A

**Link:** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6917935/>

#### **Transformational leadership, career adaptability, and work behaviors: The moderating role of task variety**

Career adaptability is a set of individual resources that benefit one's sustainable development in their lifelong careers, especially in today's turbulent environment. However, how to foster employees' career adaptability through managerial strategies and eventually contribute to organizations remains to be studied. Guided by the career construction theory, we posit a moderated mediation model that transformational leadership (TFL) could strengthen employees' career adaptability and further foster their

task performance and organization-directed citizenship behavior (OCBO), with task variety moderating the mediation effect. We conducted a three-wave survey with 558 supervisor-employee dyads to test the overall model. The results validated that career adaptability mediated the links between TFL and task performance as well as OCBO. Furthermore, the mediation effect was stronger for employees who had higher levels of task variety. In short, our study offers the groundwork to understand that employees' career adaptability can be activated by transformational leaders and is self-regulatory to benefit work behaviors in the task variety context. It enlightens organizations to cultivate employees' career adaptability in the way of TFL and job design, with the objective of promoting the sustainable development for both the employees and the organizations.

**Lan et al. 2020.**

**Frontiers of Psychology, vol. 10.**

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**Keywords:** Career adaptability; organizational citizenship behavior; task performance; task variety; transformational leadership.

**Evidence Level:** 5B

**Link:** <https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02922/full>

### **How leadership behaviors influence the effects of job predictability and perceived employability on employee mental health - a multilevel, prospective study**

**Objectives:** This study aimed to elucidate the potential moderating effect of fair-, empowering-, and supportive-leadership behaviors on the relationship between job predictability, future employability, and subsequent clinically relevant mental distress. **Method:** The study had a full panel, prospective design, utilizing online, self-administered questionnaire data collected at two time points, two years apart. Fair-, empowering-, and supportive-leadership behaviors, job predictability and future employability were measured by the General Nordic Questionnaire for Psychological and Social Factors at Work (QPS Nordic). Mental health was measured using the 10-item Hopkins Symptom Checklist (HSCL-10), with cut-off set to >1.85 to identify clinically relevant cases. As data were nested within work units, a multilevel analytic approach was chosen. **Results:** Individual-level direct effects: (i) higher levels of job predictability [odds ratio (OR) 0.83, 95% confidence interval (CI) 0.70-0.98], (ii) future employability (OR 0.83, 95% CI 0.74-0.93), (iii) fair- (OR 0.78, 95% CI 0.68-0.91), empowering- (OR 0.77, 95% CI 0.67-0.87), and supportive- (OR 0.71, 95% CI 0.61-0.81) leadership behavior, and (iv) the combination "quality of leadership" (OR 0.69, 95% CI 0.59-0.81) were significantly associated with a lower risk of reporting subsequent mental distress. Work-unit level direct effects: higher work-unit levels of fair- (OR 0.52, 95% CI 0.34-0.80) and empowering- (OR 0.61, 95% CI 0.40-0.94) leadership behaviors and quality of leadership (OR 0.54, 95% CI 0.34-0.87) were significantly associated with a lowered risk of subsequent mental distress. Cross-level interactions: No cross-level interaction effects were shown. **Conclusions:** Leadership behaviors did not moderate the effects of job predictability and future employability on mental health. However, employees embedded within work-units characterized by fair, empowering and supportive leadership behaviors had a lower risk of subsequent mental distress.

**Flovik et al. 2020.**

**Scandinavian Journal of Work and Environmental Health.**

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**Keywords:** Leadership; behaviours; job predictability; employability; mental health

**Evidence Level:** 4B

**Link:** [https://www.sjweh.fi/show\\_abstract.php?abstract\\_id=3880](https://www.sjweh.fi/show_abstract.php?abstract_id=3880)

### **Fatigue in ferry shipping employees: The role of work-family conflict and supervisor support**

**Background:** Fatigue is a concern in ferry shipping as it has a negative impact on crew members health and plays a major role in marine incidents and accidents. Research within land-based occupational settings has found that work-family conflict is an important risk factor for fatigue and that support from leaders constitutes a possible resource with the potential to buffer a negative impact from work-family conflict. Though, the working conditions of ferry shipping are likely to interfere with employee's family life those two factors have received little attention in research on seafarers' health. Therefore, the aim of this study was to investigate the direct associations between work-family conflict as well as leaders' support with

fatigue in employees of the Danish ferry shipping industry. Further, the study aimed at testing whether support could buffer potential detrimental associations between work-family conflict and fatigue.

**Methods:** The study design was cross-sectional, and 193 respondents answered to a self-administered questionnaire. Fatigue was measured with the Swedish Occupational Fatigue Inventory. Perceived work-family conflict and perceived supervisor support were assessed with two subscales from the Copenhagen Psychosocial Questionnaire. The association of potential risk factors with fatigue was determined using hierarchical multiple linear regression analyses. **Results:** After controlling for confounding, work-family conflict was found to be positively associated with four of the five subdimensions of fatigue; lack of energy, physical discomfort, lack of motivation and sleepiness, while more support from supervisors was related to less lack of energy, physical exhaustion and lack of motivation. Further, supervisor support was found to moderate the effect from work-family conflict on the physical subdimensions of fatigue. **Conclusion:** Although restricted by its cross-sectional design and a limited sample, this study provides support for the independent relevance of work family conflict and support from nearest superior for employee fatigue in ferry shipping. Further, there was evidence for a moderating role of such support on the negative impact of work-family conflict on the physical aspects of fatigue. Shipping companies may consider commencing initiatives which reduce conflicts between family life and work obligations, and that leader support may be a relevant component in such initiatives.

**Dohrmann et al. 2020.**

**BMC Public Health, vol. 19, no. 1.**

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**Keywords:** Fatigue; Ferry shipping employees; work family conflict; supervisor support

**Evidence Level:** 4B

**Link:** <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7954-z>

## Work Ability

### **Too-much-of-a-good-thing effect of external resource investment - A study on the moderating effect of psychological capital on the contribution of social support to work engagement**

Built on the job demands-resources model (JD-R) and self-determination theory, the present research proposed that the relationship between work resources (social support) and employees' work engagement takes on an inverted U-shaped curve, and presents a model of the moderation of personal resources (psychological capital) on the relationship. The hypotheses were tested by hierarchical regression analysis and path analysis with 535 surveys collected in 19 enterprises. The findings demonstrated an inverted U-shaped curve relationship between enterprises' social support and employees' work engagement and further suggested that the predicting effect of social support on work engagement is influenced by employees' psychological capital, that is to say, the transformation from social support to work engagement bears higher efficiency in employees with high psychological capital than in those with low psychological capital. However, psychological capital fails to display a moderating effect on the curve relationship between social support and work engagement. The present study, casting doubt on the assumption that enterprise supply must meet the needs of employees, argued that the effectiveness of enterprises' resource support is influenced by the individual needs of employees.

**Xi et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Job demands-resources model; psychological capital; self-determination theory; social support; work engagement.

**Evidence Level:** 5B

**Link:** <https://www.mdpi.com/1660-4601/17/2/437>

## Adapting to the Future of Work

### Technology

#### **Experience of stress assessed by text messages and its association with objective workload-A longitudinal study**

Exploring stress trajectories in detail and over a long time may give valuable information in terms of both understanding and practice. We followed a group of primary health care employees in a randomized controlled trial. The objective was to describe their experience of stress, explore the intra-individual variability and examine the association between the experience of stress and the objective workload. Weekly text messages with a single item stress question were distributed in two time series: 12 weeks at the beginning of the trial and 26 weeks after the 6-month follow up. Aggregated objective data about workload were collected from their administration office and related to stress levels. There was a seasonal variation, with higher stress during the fall than in spring and summer. The analysis comparing high and low stress subgroups showed that the stress trajectory of a high-stress subgroup was different from that of a low-stress subgroup. Individuals with high exhaustion scores had higher odds of belonging to a subgroup of individuals with high intra-individual variability in stress experience. The objective workload was measured in two ways and was strongly associated with the stress experience. We found that the lower the productivity, the higher the feeling of stress.

**Arapovic-Johansson et al. 2020.**

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

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**Keywords:** Intra-individual variability; new technology; objective data; work stress; workload.

**Evidence Level:** 4A

**Link:** <https://www.mdpi.com/1660-4601/17/3/680>

#### **Work-related Internet use as a threat to work-life balance - a comparison between the emerging on-line professions and traditional office work**

**Objectives:** In the present study, the authors focused on the comparison of work characteristics related to the possibility of striking the right work- nonwork balance, as well as satisfaction with the actual work-life balance (WLB), negative work-to-home conflict and the quality of life related to social relationships, between a new group of on-line workers (social media or e-marketing specialists, search engine optimization or search engine marketing specialists, e-public relations experts etc.) and traditional office workers. **Material and methods:** The authors conducted a questionnaire study covering 189 on-line workers (whose work required permanent presence on-line) and 200 office workers (using the Internet mainly to communicate with other departments and to search for information). **Results:** The results showed that the on-line workers reported a significantly lower satisfaction with WLB and a higher negative work-home interaction. The authors found no differences as regards the social quality of life between the studied groups. **Conclusions:** These findings confirm that technology advancement opens a new chapter in organizational psychology and occupational health, especially in the context of the emerging on-line occupations.

**Jacukowicz et al. 2020.**

**International Journal of Occupational Medicine and Environmental Health, vol. 33, no. 1.**

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**Keywords:** Office work; on-line work; overtime work; quality of life; work-home interaction; work-life balance.

**Evidence Level:** 4A

**Link:** <http://ijomeh.eu/WORK-RELATED-INTERNET-USE-AS-A-THREAT-TO-WORK-LIFE-BALANCE-COMPARISON-BETWEEN-THE,112115,0,2.html>

## Guiding and Supporting Mental Health and Wellbeing

### Mental Health

#### **How does positive work-related stress affect the degree of innovation development?**

Many studies sustain that work-related stress exerts pervasive consequences on the employees' levels of performance, productivity, and wellbeing. However, it remains unclear whether certain levels of stress might lead to positive outcomes regarding employees' innovativeness. Hence, this paper examines how the five dimensions of work-related stress impact on the employees' levels of innovation performance. To this aim, this study focused on a sample of 1487 employees from six Italian companies. To test the research hypotheses under assessment, we relied on the use of the partial least squares (PLS) technique. Our results reveal that, in summary, the stressors job autonomy, job demands, and role ambiguity exert a positive and significant impact on the employees' levels of innovativeness. However, this study failed to find evidence that the supervisors' support-innovation and colleagues' support-innovation links are not statistically significant.

**Albort-Morant et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Innovation; partial least squares; work-related stress

**Evidence Level:** 5B

**Link:** <https://www.mdpi.com/1660-4601/17/2/520>

#### **Work addiction, obsessive-compulsive personality disorder, burn-out, and global burden of disease: implications from the ICD-11**

Occupational stress and high workload are being increasingly recognized as significant contributors to the diseases and disorders constituting major components of the global burden of disease. A more detailed definition of burn-out was recently included by the World Health Organization (WHO) in the eleventh revision of the International Classification of Diseases (ICD-11) which reflects a growing acknowledgment of the role of professional work in mental health. One of the symptoms of obsessive-compulsive personality disorder/anankastic personality disorder (OCPD/APD) is an undue preoccupation with productivity to the exclusion of pleasure and interpersonal relationships. This compulsive overworking is closely related to the concept of work addiction, and OCPD/APD was suggested to be its major risk factor. OCPD/APD is the most prevalent personality disorder and one that appears to produce the highest direct and indirect medical costs. At the same time, it is vastly understudied. In recent years, it has been repeatedly emphasized that it requires consistent conceptualization and clarification of its overlapping with similar conditions. Even though the limited existing studies suggest its strong relationship with burn-out and depression among employed individuals, there has been no systematic effort to investigate its role in the consequences of occupational stress and high workload. This paper identifies several substantial gaps in the current understanding of the relationships between work addiction, OCPD/APD, burn-out, and the global burden of disease within the context of the WHO's plan of developing evidence-based guidelines on mental wellbeing in the workplace.

**Atroszko et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** World Health Organization; burn-out; global burden of disease; mental health; obsessive-compulsive personality disorder; perfectionism; work addiction; workaholism

**Evidence Level:** 6A

**Link:** <https://www.mdpi.com/1660-4601/17/2/660>

#### **Work-related exposure to violence or threats and risk of mental disorders and symptoms: a systematic review and meta-analysis**

**Objective:** This review aimed to examine systematically the epidemiological evidence linking work-related exposure to violence and threats thereof with risk of mental disorders and mental ill-health symptoms.

**Methods:** We searched PubMed, EMBASE, PsycINFO and Web of Science to identify original studies that

provide quantitative risk estimates. The evidence was weighted according to completeness of reporting, potential common method bias, and bias due to differential selection and drop out, selective reporting, and misclassification of exposure and outcome. **Results:** We identified 14 cross-sectional and 10 cohort studies with eligible risk estimates, of which 4 examined depressive disorder and reported an elevated risk among the exposed [pooled relative risk (RR) 1.42, 95% confidence interval (CI) 1.31-1.54, I<sup>2</sup>=0%]. The occurrence of depressive and anxiety symptoms, burnout and psychological distress was examined in 17 studies (pooled RR 2.33, 95% CI 3.17, I<sup>2</sup>=42%), and 3 studies examined risk of sleep disturbance (pooled RR 1.22, 95% CI 1.09-1.37, I<sup>2</sup>=0%). In most studies, common method bias and confounding could not be ruled out with confidence and strong heterogeneity in most outcome definitions invalidate the strict interpretation of most pooled risk estimates. **Conclusion:** The reviewed studies consistently indicate associations between workplace violence and mental health problems. However, due to methodological limitations the causal associations (if any) may be stronger or weaker than the ones reported in this study. Prospective studies with independent and validated reporting of exposure and outcome and repeated follow-up with relevant intervals are highly warranted.

**Rudkjoebring et al. 2020.**

**Scandinavian Journal of Work and Environmental Health.**

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**Keywords:** Work-related exposure; violence; threats; mental disorders

**Evidence Level:** 1A

**Link:** [https://www.sjweh.fi/show\\_abstract.php?abstract\\_id=3877](https://www.sjweh.fi/show_abstract.php?abstract_id=3877)

### **Social jetlag is associated with an increased likelihood of having depressive symptoms among the Japanese working population: the Furukawa Nutrition and Health Study**

**Study objectives:** Social jetlag, a mismatch between biological and social timing, has been reported to be associated with depressive symptoms among general population. However, evidence on this association is lacking among non-shift workers, who are under pressure to adapt themselves to a work schedule. We investigated the cross-sectional association of social jetlag with depressive symptoms among Japanese non-shift workers. **Methods:** This study included 1,404 employees, aged 18-78 years, who completed a study questionnaire at a periodic health checkup. Social jetlag was calculated as the absolute value of the difference in the midpoint of sleep times between weekdays and weekends. Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale. Multivariable logistic regression was used to estimate the odds ratio (OR) with adjustments for potential confounders including diet and chronotype. **Results:** Of the study participants, 63.5%, 28.4%, and 8.1% had less than 1 hour, 1 to less than 2 hours, and at least 2 hours of social jetlag, respectively. Greater social jetlag was significantly associated with an increased likelihood of having depressive symptoms. The multivariable-adjusted OR (95% confidence interval) were 1.30 (0.95 to 1.78) and 2.14 (1.26-3.62) for 1 to less than 2 hour and at least 2 hours compared to less than 1 hour of social jetlag. The association between social jetlag and depressive symptoms appeared to be linear, according to restricted cubic spline regression. **Conclusion:** Results suggest that greater social jetlag is associated with an increased likelihood of having depressive symptoms among non-shift workers.

**Islam et al. 2020.**

**Sleep, vol. 43, no. 1.**

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**Keywords:** Japanese; cross-sectional study; depressive symptoms; non-shift worker; social jetlag.

**Evidence Level:** 4B

**Link:** <https://academic.oup.com/sleep/article/43/1/zsz204/5573922>

## **Bullying and Harassment**

### **Prevalence of workplace physical violence against health care professionals by patients and visitors: A systematic review and meta-analysis**

Workplace physical violence against health care professionals perpetrated by patients and visitors has been a persistent problem worldwide. Prevalence estimates varied vastly across studies and there was a lack of

quantitative syntheses of prevalence studies. This review aimed to quantify pooled one-year prevalence estimates at the global and regional levels. A systematic literature search was performed in the databases of PubMed, PsycINFO, Web of Science, and Embase between 1 January 2000 and 8 October 2018. Studies providing information about one-year prevalence of self-reported workplace physical violence against health care professionals perpetrated by patients or visitors were included. Heterogeneity between studies was evaluated using Cochran's chi-squared test (Cochran's Q) and I<sup>2</sup> values. Subgroup analysis and meta-regression were used to explore heterogeneity. A total of 65 eligible studies reported one-year prevalence estimates for 61,800 health care professionals from 30 countries. The pooled one-year prevalence of workplace physical violence against health care professionals perpetrated by patients or visitors was 19.33% (95% confidence interval (CI): 16.49%-22.53%) and the overall heterogeneity was high across studies. We noted geographic and staff categories variations for prevalence estimates through subgroup analysis. The meta-regression showed that sample size, type of health care setting, and quality score were significant moderators for heterogeneity. One in five health care professionals experienced workplace physical violence perpetrated by patients or visitors worldwide annually. Practical intervention was needed to ensure safety of health care professionals.

**Li et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 1.**

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**Keywords:** Health care professionals; meta-analysis; physical violence; workplace violence.

**Evidence Level:** 1A

**Link:** <https://www.mdpi.com/1660-4601/17/1/299>

### **Psychosocial Issues – Risk Factors**

#### **Firefighters' occupational stress and its correlations with cardiorespiratory fitness, arterial stiffness, heart rate variability, and sleep quality**

This study investigated the correlations between firefighters' occupational stress and cardiorespiratory fitness, arterial stiffness, heart rate variability, and sleep quality. We examined 705 male firefighters aged 40-50 years in Seoul City, Korea from November 2016-December 2017. The Occupational stress scale was used to evaluate occupational stress; an exercise stress test was administered to measure participants' maximal oxygen uptake (VO<sub>2</sub>max); brachial-ankle pulse wave velocity was used to measure firefighters' arterial stiffness; their autonomic nervous system activities were analyzed to determine heart rate variability (HRR); and the Pittsburgh Sleep Quality Index was used to assess their sleep quality. We divided the sample population into tertile groups per their occupational stress scores; i.e., low-stress group (n = 233), medium-stress group (n = 237), and high-stress group (n = 235). They were compared per each indicator and correlations were examined. There was a significant difference in VO<sub>2</sub>max (p < .01), and arterial stiffness (p < .001) according to occupational stress levels. Occupational stress was significantly correlated with cardiorespiratory fitness (r = -.820, p < .05), arterial stiffness (r = .085, p < .05), and sleep quality (r = .276, p < .001), but not HRR. In conclusion, Firefighters' occupational stress is a key factor behind their elevated risk of cardiovascular diseases; therefore, we recommend programs aimed at reducing their occupational stress and preventing cardiovascular diseases.

**Yook et al. 2020.**

**PLoS One, vol. 14, no. 12.**

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**Keywords:** Firefighters; occupational stress; cardiovascular fitness; arterial stiffness, heart rate variability, and sleep quality

**Evidence Level:** 4A

**Link:** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0226739>

#### **Associations of temperament and character with coping strategies among office workers**

**Objective:** Coping can be defined as the reactions to harm or distress individuals take to reduce stress. This study aimed to determine how an individual's temperament and character is correlated with the person's main coping method. **Methods:** The Korean version of the Ways of Coping Questionnaire and Temperament and Character Inventory-Revised-Short Version were used to evaluate the coping strategies

and temperament and character of 1,035 people. Four hierarchical linear regression analyses with the scores of each coping strategy subscale as a dependent variable were performed. **Results:** High persistence, cooperativeness, self-transcendence, and low harm avoidance were associated with using a problem-focused coping strategy. Being female, high novelty seeking, reward dependence, and self-transcendence were associated with using a support seeking coping strategy. High novelty seeking, self-transcendence, and low self-directedness were associated with using emotion-focused coping strategy. Being female, high novelty seeking, persistence, cooperativeness, and self-transcendence were associated with using a hopeful-thinking coping strategy. **Conclusion:** Our results show that there may be specific personality features guiding what kind of coping strategy an individual might use in a given situation.

**Hwang et al. 2020.**

**Psychiatry Investigations, vol. 17, no. 1.**

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**Keywords:** Character; coping strategy; personality; stress; temperament.

**Evidence Level:** 4B

**Link:** <https://www.psychiatryinvestigation.org/journal/view.php?doi=10.30773/pi.2019.0084>

## Burnout

### **Association between occupational burnout and heart rate variability: A pilot study in a high-tech company in Taiwan**

Work stress and burnout have become important issues. Changes in work patterns frequently, long working hours, and too much pressure among workers in high-tech companies may result in the chronic fatigue symptoms and increase the risk of cardiovascular diseases, even leading to sudden death. Changes of heart rate variability (HRV) can be treated as a warning from the autonomic nervous systems and as a long-term monitoring method for chronic disease, for example, cardiovascular diseases and sudden death. The purpose of this study was to explore the association between occupational burnout and HRV. Proportional stratified convenient sampling was performed and in total, 120 individuals participated in this study. Questionnaires and the "occupational burnout inventory" were used to collect biographical and burnout information. A novel wrist physiological monitor was used to measure autonomic nervous system-related data, including HRV, low-frequency (LF) %, high-frequency (HF) %, and LF/HF ratio. Descriptive statistics and logistic regressions were computed using SPSS 17.0 (Chinese version, IBM Corp., New York, NY). The results show that participants who were 20 to 25 years old, work overtime because of onerous personal tasks, had a medical history, and recently felt unwell have higher "personal burnout." "Participants with a graduate degree, with onerous tasks, who were indirect staff, and with a regular-hour job tended to overcommit to their work." Significant associations were found among medical history, recently feeling unwell, and "work-related burnout." There was a positive association between HRV and job seniority. LF%, HF%, and LF/HF ratio were significantly correlated with job category. "Work overcommitment" was related to LF/HF ratio among men. Some items in "personal burnout" and "work overcommitment" were also associated with HRV among women. The findings suggest that the measurement of HRV can be applied in occupational settings to assess burnout. It not only allows administrators to quickly select the colleagues who need health care, but also provides timely and appropriate care, thereby promoting the health of the worker.

**Lo et al. 2020.**

**Medicine, vol. 99, no. 2.**

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

**Keywords:** Burnout; occupation; heart rate; work stress; working patterns; working hours

**Evidence Level:** 4B

**Link:** [https://journals.lww.com/md-journal/FullText/2020/01100/Association\\_between\\_occupational\\_burnout\\_and\\_heart.36.aspx](https://journals.lww.com/md-journal/FullText/2020/01100/Association_between_occupational_burnout_and_heart.36.aspx)



## **Work hours and difficulty in leaving work on time in relation to work-to-family conflict and burnout among female workers in Taiwan**

The present study explores the relations between work hours and the difficulty in leaving work on time to both work-to-family conflict (WFC) and burnout among female workers in Taiwan. A cross-sectional research design and questionnaire were employed to obtain the research data. In total, 738 full-time female workers took part in the study. The results of regression analyses showed that when age, marital status, economic status, occupation, parental status, and housework responsibilities were controlled, more work hours were positively associated with WFC and burnout. When the difficulty in leaving work on time was also considered in the analysis, long working hours were still significantly associated with burnout; however, the significant relation with WFC disappeared. It is surmised that if female employees work overtime voluntarily, the perception of WFC diminishes; nevertheless, the adverse effect of long working hours on health remains unabated. This study concludes that female employees who work overtime on a voluntary basis are at risk of health problems, which should be a focus of concern.

**Huang et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Burnout; leaving work on time; women; work hours; work-to-family conflict.

**Evidence Level:** 4B

**Link:** <https://www.mdpi.com/1660-4601/17/2/605>

## **Enabling Healthy and Safe Workplaces**

### **Health and Wellbeing**

#### **Job stress and emotional exhaustion at work in Spanish workers: Does unhealthy work affect the decision to drive?**

**Objectives:** The purpose of this study was to assess the relationships among the following elements: unhealthy work indicators (job stress and emotional exhaustion at work), the decision to drive (or not), and driving crashes suffered by Spanish workers. **Methods:** For this cross-sectional study, a full sample of 1,200 Spanish drivers (44% women and 56% men) was used, their mean age being 42.8 years. They answered a questionnaire divided into three sections: demographic and driving-related data; burnout, job stress, and life stress; and self-reported road behaviors and driving safety indicators. **Results:** Overall, 41.6% of drivers reported emotional exhaustion at work. Furthermore, 80.2% of the participants showing substantial signs of job stress or exhaustion had experienced one or more important stressful life events during the previous year. Job stress was associated with the number of driving crashes suffered along the last 3 years. Also, and especially in situations where drivers admit not feeling well enough to drive, job stress and emotional exhaustion seem to be independent from the decision to drive, and from perceiving these variables as potential impairers of driving performance. **Conclusions:** First of all, this study showed a high prevalence of job stress and emotional exhaustion symptoms experienced at work by Spanish workers. Moreover, significant relationships were found among self-rated driving performance, workplace stress and burnout indicators, which suggests that job stress and emotional exhaustion levels may, indeed, impair driving performance, but they do not influence the decision to drive or not. In other words, even when they are significantly affected by job stress or emotional exhaustion at work, most Spanish drivers still drive.

**Alonso et al. 2020.**

**PLoS One, vol. 15, no. 1.**

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**Keywords:** Job stress; emotional exhaustion; Spanish workers; unhealthy work indicators

**Evidence Level:** 4B

**Link:** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0227328>

## **Efficacy of a self-help web-based recovery training in improving sleep in workers: Randomized controlled trial in the general working population**

**Background:** Sleep complaints are among the most prevalent health concerns, especially among workers, which may lead to adverse effects on health and work. Internet-delivered cognitive behavioral therapy for insomnia (iCBT-I) offers the opportunity to deliver effective solutions on a large scale. The efficacy of iCBT-I for clinical samples has been demonstrated in recent meta-analyses, and there is evidence that iCBT-I is effective in the working population with severe sleep complaints. However, to date, there is limited evidence from randomized controlled trials that iCBT-I could also be an effective tool for universal prevention among the general working population regardless of symptom severity. Although increasing evidence suggests that negatively toned cognitive activity may be a key factor for the development and maintenance of insomnia, little is known about how iCBT-I improves sleep by reducing presleep cognitive activity. **Objective:** This study aimed to examine the efficacy of a self-help internet-delivered recovery training, based on principles of iCBT-I tailored to the work-life domain, among the general working population. General and work-related cognitive activities were investigated as potential mediators of the intervention's effect. **Methods:** A sample of 177 workers were randomized to receive either the iCBT-I (n=88) or controls (n=89). The intervention is a Web-based training consisting of six 1-week modules. As the training was self-help, participants received nothing but technical support via email. Web-based self-report assessments were scheduled at baseline, at 8 weeks, and at 6 months following randomization. The primary outcome was insomnia severity. Secondary outcomes included measures of mental health and work-related health and cognitive activity. In an exploratory analysis, general and work-related cognitive activities, measured as worry and work-related rumination, were investigated as mediators. **Results:** Analysis of the linear mixed effects model showed that, relative to controls, participants who received iCBT-I reported significantly lower insomnia severity scores at postintervention (between-group mean difference -4.36; 95% CI -5.59 to -3.03; Cohen d=0.97) and at 6-month follow-up (between-group difference: -3.64; 95% CI -4.89 to -2.39; Cohen d=0.86). The overall test of group-by-time interaction was significant ( $P<.001$ ). Significant differences, with small-to-large effect sizes, were also detected for cognitive activity and for mental and work-related health, but not for absenteeism. Mediation analysis demonstrated that work-related rumination (indirect effect:  $a_1b_1=-0.80$ ;  $SE=0.34$ ; 95% boot CI -1.59 to -0.25) and worry (indirect effect:  $a_2b_2=-0.37$ ;  $SE=0.19$ ; 95% boot CI -0.85 to -0.09) mediate the intervention's effect on sleep. **Conclusions:** A self-help Web-based recovery training, grounded in the principles of iCBT-I, can be effective in the general working population, both short and long term. Work-related rumination may be a particularly crucial mediator of the intervention's effect, suggesting that tailoring interventions to the workplace, including components to reduce the work-related cognitive activity, might be important when designing recovery interventions for workers.

**Hebrendt et al. 2020.**

**Journal of Medical Internet Research, vol. 22, no. 1.**

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**Keywords:** Web-based, cognitive behavioral therapy; e-mental-health; insomnia; mediators; occupational health

**Evidence Level:** 2A

**Link:** <https://www.jmir.org/2020/1/e13346/>

## **Tai Chi and workplace wellness for health care workers: A systematic review**

Several studies show the positive effects of new non-medical therapies known as complementary and alternative medicines (CAMs). In this context, the discipline of tai chi is obtaining a wider consensus because of its many beneficial effects both on the human body and mind. The aim of this study was to perform a systematic review of the scientific literature concerning the relationship between tai chi practice and wellness of health care workers (HCW) in their professional setting. The research was performed in September 2019, investigating the databases Cinahl, Scopus, Web of Science, and PubMed. Full-text articles, written in English language and published after 1995, were taken into account. No restrictions regarding the study design were applied. A quality assessment was developed using AMSTAR, Jadad, Newcastle-Ottawa Scale, INSA, and CASE REPORT scale. Six papers were finally included: Three clinical trials, one observational study, one systematic review, and one case report. The methodological quality of the included studies was judged as medium level. In conclusion, this systematic review suggests the

potential impact of interventions such as tai chi as tools for reducing work-related stress among healthcare professionals. Further research will be needed in order to gain robust evidence of its efficacy.

**Cocchiara et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 1.**

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**Keywords:** Health professional; nursing; stress; tai chi; workplace wellbeing; workplace wellness.

**Evidence Level:** 1A

**Link:** <https://www.mdpi.com/1660-4601/17/1/343>

### **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 behaviours. 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 et al. 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>

### **Wellbuilt for wellbeing: Controlling relative humidity in the workplace matters for our health**

This study offers a new perspective on the role of relative humidity in strategies to improve the health and wellbeing of office workers. A lack of studies of sufficient participant size and diversity relating relative humidity (RH) to measured health outcomes has been a driving factor in relaxing thermal comfort standards for RH and removing a lower limit for dry air. We examined the association between RH and objectively measured stress responses, physical activity (PA), and sleep quality. A diverse group of office workers (n = 134) from four well-functioning federal buildings wore chest-mounted heart rate variability monitors for three consecutive days, while at the same time, RH and temperature (T) were measured in their workplaces. Those who spent the majority of their time at the office in conditions of 30%-60% RH experienced 25% less stress at the office than those who spent the majority of their time in drier conditions. Further, a correlational study of our stress response suggests optimal values for RH may exist within an even narrower range around 45%. Finally, we found an indirect effect of objectively measured poorer sleep quality, mediated by stress responses, for those outside this range.

**Razjouyan et al. 2020.**

**Indoor Air, vol. 30, no. 1.**

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**Keywords:** Health; office workers; relative humidity; sleep quality; stress responses; wearable sensors.

**Evidence Level:** 5A

Link: <https://onlinelibrary.wiley.com/doi/full/10.1111/ina.12618>

## Risk Assessment

### **Comprehensive evaluation system of occupational hazard prevention and control in iron and steel enterprises based on a modified delphi technique**

The study designs a comprehensive evaluation system for the prevention and control of occupational hazards, calculates its weight coefficient, and provides a potential strategic and effective tool for the scientific evaluation of occupational hazards in the iron and steel enterprises. The system was established through induction and analysis of relevant literature, personal interview, theoretical analysis, Delphi expert consultation, and special group discussions. Using an improved analytical hierarchy process fuzzy comprehensive evaluation model and on the basis of the improved Delphi expert investigation, the weight of the operability comprehensive evaluation index system is constructed. A three-level index system is established on the basis of harmful factors of occupational activities, health status of employees, protection facilities of occupational hazards, occupational health management, and so on. The index system structure is 4-20-95, and the weight coefficients of the four dimensions are 0.2516, 0.2428, 0.2550, and 0.2506. The recovery rate of the questionnaire was 82.5%, 100.0%, and 100.0%. The effective rates were 75.0%, 100.0%, and 100.0%. Conversely, the expert authority coefficients of the four dimensions are 0.875, 0.769, 0.832 and 0.800. Results show that the consistency factors of the four dimensions are statistically significant. Cronbach's  $\alpha$  coefficient, standardized Cronbach's  $\alpha$  coefficient, and split-half reliability of the comprehensive evaluation index system are 0.959, 0.950, and 0.810, respectively. After factor analysis, four common factors were extracted on the basis of expert opinions, and the cumulative variance was 63.1%. The comprehensive evaluation system for the prevention and control of occupational hazards in the iron and steel enterprises proposed by the study is relatively complete and reasonable.

**Song et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Delphi method; analytic hierarchy process; fuzzy comprehensive evaluation model; iron and steel enterprises; occupational hazards; system.

**Evidence Level:** 6B

Link: <https://www.mdpi.com/1660-4601/17/2/667>

## Chronic Health Issues

### **Prevalence and risk factors of occupational skin disease in Korean workers from the 2014 Korean working conditions survey**

**Purpose:** Occupational skin disease (OSD) is a commonly known occupational disease. However, epidemiological data about this condition in Korea are limited. We aimed to estimate the prevalence and risk factors of OSD using nationally representative data. **Materials and methods:** We used data from the large-scale, cross-sectional, nationwide 4th Korean Working Conditions Survey conducted in 2014. OSD was defined as skin diseases caused or aggravated by working environments as indicated in a self-reported questionnaire. Factors affecting the occurrences of OSD were investigated using logistic regression analysis. **Results:** The prevalence rates of OSD were 1.35% in all workers and 62.2% in workers with skin diseases. The workers with OSD were older, had lower educational levels, and had longer working times per week than those without OSD ( $p < 0.001$ ). Furthermore, OSDs occurred more frequently in self-employed workers ( $p = 0.002$ ), those with small-sized businesses ( $p = 0.008$ ), those with longer working durations ( $p < 0.001$ ), and manual and service workers ( $p < 0.001$ ). Although the workers with OSD had greater exposure to various hazardous factors, logistic multivariate analysis showed that high temperatures and skin contact with chemical products were significantly correlated (odds ratios: 2.096 and 2.326, respectively). High prevalence rates of OSD were observed in membership organizations/repair/other personal services (3.2%), agriculture/forestry/fishing (2.7%), manufacturing (2.0%), and construction (1.6%) industries. Additionally, depression/anxiety problems were significantly more prevalent in workers with OSD than in those without ( $p < 0.001$ ). **Conclusion:** This is the first study to present large-scale epidemiological data on

OSD prevalence in Korean workers. Our results highlight modifiable factors contributing to the development of OSDs.

**Park et al. 2020.**

**Yonsei Medical Journal, vol. 61, no. 1.**

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**Keywords:** Occupational skin disease; epidemiology; occupational dermatitis.

**Evidence Level:** 4B

**Link:** <https://www.eymj.org/DOIx.php?id=10.3349/ymj.2020.61.1.64>

### **Environmental tobacco smoke (ETS) and hyperlipidemia modified by perceived work stress**

**Background:** Accumulating evidence has shown that exposure to environmental tobacco smoke (ETS) is associated with cardiovascular diseases (CVDs) However, few studies have assessed both exposure to ETS and high-perceived work stress on hyperlipidemia. The aim of the present study is to assess the interaction effect of ETS exposure and high-perceived work stress on the risk of hyperlipidemia. **Methods:** A total of 11,875 middle-aged civil servants from 647 registered institutions employed by the Taiwan government were randomly selected using multistage stratified cluster sampling based on proportional probabilistic sampling. Each participant anonymously and independently filled out a web-based questionnaire and informed consent. **Results:** The prevalence of hyperlipidemia in middle-aged civil servants diagnosed by physicians was 11.5% for men and 6.1% for women. Hyperlipidemia was significantly associated with smoking, alcohol consumption, betel nut chewing, weight gain and perceived work stress. In both the obesity and smoking groups, there were consistent interaction effects of ETS exposure and perceived work stress on hyperlipidemia for middle-aged civil servants. Non-obese and non-smoking groups were more at risk for hyperlipidemia from exposure to both ETS and high-perceived work stress. **Conclusion:** There is an interaction effect of ETS exposure and high-perceived work stress on hyperlipidemia, regardless of obesity and smoking. It is crucial to immediately reduce ETS exposure and stressful work by enforcing smoke-free policies and reducing pressure for civil servants.

**Lin et al. 2020.**

**PLoS One, vol. 15, no. 1.**

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**Keywords:** Tabaco smoke; work; hyperlipidemia; work stress

**Evidence Level:** 2B

**Link:** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0227348>

## **Occupational Exposure**

### **Occupational determinants of Leptospirosis among urban service workers**

This study was carried out to determine the risk factors of leptospirosis infection among local urban service workers in Sabah. This is a cross-sectional study involving 394 workers in Kota Kinabalu City, Sabah, conducted from February to March 2017. Information on demography, occupational exposures and environmental factors was obtained by a modified validated questionnaire. Polymerase Chain Reaction (PCR) was used to determine the prevalence of positive leptospirae. The overall figure for positive leptospirae was 9.4% (95% CI: 6.8-12.8). Urban sweepers and lorry drivers made up the highest proportion of positive leptospirae respondents, contributing 15.5% and 9.4%, respectively. The significant risk factors for positive leptospirae were older age (p-value = 0.001), higher monthly salary (p-value = 0.039), longer duration of employment (p-value = 0.011) and working as an urban sweeper (p-value = 0.021). Leptospirae was prevalent among healthy urban service workers and relates to their working activities.

**Atil et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Leptospirosis; occupational determinants; urban services; workers

**Evidence Level:** 4B

**Link:** <https://www.mdpi.com/1660-4601/17/2/427>

### **New opportunities to mitigate the burden of disease caused by traffic related air pollution: Antioxidant-rich diets and supplements**

Air pollution is associated with premature mortality and a wide spectrum of diseases. Traffic-related air pollution (TRAP) is one of the most concerning sources of air pollution for human exposure and health. Until TRAP levels can be significantly reduced on a global scale, there is a need for effective shorter-term strategies to prevent the adverse health effects of TRAP. A growing number of studies suggest that increasing antioxidant intake, through diet or supplementation, may reduce this burden of disease. In this paper, we conducted a non-systematic literature review to assess the available evidence on antioxidant-rich diets and antioxidant supplements as a strategy to mitigate adverse health effects of TRAP in human subjects. We identified 11 studies that fit our inclusion criteria; 3 of which investigated antioxidant-rich diets and 8 of which investigated antioxidant supplements. Overall, we found consistent evidence that dietary intake of antioxidants from adherence to the Mediterranean diet and increased fruit and vegetable consumption is effective in mitigating adverse health effects associated with TRAP. In contrast, antioxidant supplements, including fish oil, olive oil, and vitamin C and E supplements, presented conflicting evidence. Further research is needed to determine why antioxidant supplementation has limited efficacy and whether this relates to effective dose, supplement formulation, timing of administration, or population being studied. There is also a need to better ascertain if susceptible populations, such as children, the elderly, asthmatics and occupational workers consistently exposed to TRAP, should be recommended to increase their antioxidant intake to reduce their burden of disease. Policymakers should consider increasing populations' antioxidant intake, through antioxidant-rich diets, as a relatively cheap and easy preventive measure to lower the burden of disease associated with TRAP.

**Barthelemy et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Mediterranean diet; antioxidant supplement; antioxidant-rich diet; health effects; inflammation; oxidative stress; reduce burden of disease; traffic-related air pollution

**Evidence Level:** 6A

**Link:** <https://www.mdpi.com/1660-4601/17/2/630>

### **Towards a risk evaluation of workers' exposure to handborne and airborne microbial species as exemplified with waste collection workers**

Bioaerosol exposure is associated with health problems. The aim of this study is to evaluate whether it is possible to assess the risks posed by waste collection workers' exposure through identification and characterization of bacterial and fungal species, to which the workers are exposed. Using MALDI-TOF MS, microorganisms in waste collection workers' exposure through air, hand, and contact with the steering wheel were identified. Fungi found in high concentrations from the workers' exposure were characterized for the total inflammatory potential (TIP), cytotoxicity, and biofilm-forming capacity. In total, 180 different bacterial and 37 different fungal species in the workers' exposure samples were identified. Some of them belong to Risk Group 2, e.g. *Escherichia coli*, *Klebsiella oxytoca*, *Staphylococcus aureus*, and *Aspergillus fumigatus*, some have been associated with occupational health problems e.g. *Penicillium citrinum* and *P. glabrum* and some are described as emerging pathogens e.g. *Aureobasidium pullulans*. The TIP of fungal species was dose-dependent. High TIP values were found for *Penicillium italicum*, *P. brevicompactum*, *P. citrinum*, and *P. glabrum*. Several species were cytotoxic, e.g. *A. niger* and *P. expansum*, while some, e.g. *P. chrysogenum*, did not affect the cell viability. Based on waste workers' average inhalation rate, they inhaled up to  $2.3 \times 10^4$  cfu of *A. niger*,  $7.4 \times 10^4$  cfu of *P. expansum*, and  $4.0 \times 10^6$  cfu of *P. italicum* per work day. Some species e.g. *A. niger* and *P. citrinum* were able to form biofilm. In conclusion, the workers were exposed to several species of microorganisms of which some to varying degrees can be evaluated concerning risk. Thus, some microorganisms belong to Risk Group 2, and some are described as causing agents of occupational health problems, emerging pathogens, or intrinsically antibiotic resistant. For some other species very little is known. The TIP, cytotoxicity, and ability to form biofilm of the dominating fungi support and expand previous findings. These parameters depended on the species and the dose, thus highlighting the importance of species identification and exposure level in the risk assessment of exposure.

**Madsen et al. 2020.**

**Environmental Research, vol. 183.**

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**Keywords:** Bacterial species; Biofilm; Environmental fungal species; HL-60 cells; Inflammation; MALDI-TOF.

**Evidence Level:** 5B

**Link:** <https://www.sciencedirect.com/science/article/pii/S0013935120300694?via%3Dihub>

### **Cohort profile: Firefighter research on the enhancement of safety and health (FRESH), a prospective cohort study on Korean firefighters**

Firefighters have a high risk of developing cardiovascular and mental disorders due to their physical and chemical environments. However, in Korea, few studies have been conducted on environmental risk of firefighters. The Firefighter Research on the Enhancement of Safety and Health (FRESH) study aimed to discover the risk factors for cardiovascular disease and mental disorders among firefighters. Former and current firefighters were recruited from three university hospitals. A total of 1022 participants completed baseline health examinations from 2016 to 2017. All participants were scheduled for follow-ups every 2 years. Baseline health survey, laboratory testing of blood and urine samples, blood heavy metal concentration, urine polycyclic aromatic hydrocarbons (PAHs) metabolites, stress-related hormone test, natural killer cell activity, as well as physical and mental health examinations that focused on cardiovascular and mental disorders, were conducted. In addition, 3 Tesla (3T) brain magnetic resonance imaging (MRI) and neuropsychological tests were also performed to investigate structural and functional changes in the brains of 352 firefighters aged >40 years or new hires with less than 1 year of service.

**Kim et al. 2020.**

**Yonsei Medical Journal, vol. 61, no. 1.**

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**Keywords:** Firefighters; Republic of Korea; cardiovascular diseases; cohort studies; magnetic resonance imaging; mental disorders.

**Evidence Level:** 4B

**Link:** <https://www.eymj.org/DOIx.php?id=10.3349/ymj.2020.61.1.103>

### **Workplace emissions and exposures during semiconductor nanowire production, post-production, and maintenance work**

**Background:** Nanowires are a high-aspect-ratio material of increasing interest for a wide range of applications. A new and promising method to produce nanowires is by aerotaxy, where the wires are grown in a continuous stream of gas. The aerotaxy method can grow nanowires much faster than by more conventional methods. Nanowires have important properties in common with asbestos fibres, which indicate that there can be potential health effects if exposure occurs. No conclusive exposure (or emission) data from aerotaxy-production of nanowires has so far been published. **Methods:** Different work tasks during semiconductor nanowire production, post-production, and maintenance were studied. A combination of direct-reading instruments for number concentration (0.007-20  $\mu\text{m}$ ) and filter sampling was used to assess the emissions (a couple of centimetre from the emission sources), the exposure in the personal breathing zone (max 30 cm from nose-mouth), and the concentrations in the background zone (at least 3 m from any emission source). The filters were analyzed for metal dust composition and number concentration of nanowires. Various surfaces were sampled for nanowire contamination. **Results:** The particle concentrations in the emission zone (measured with direct-reading instruments) were elevated during cleaning of arc discharge, manual reactor cleaning, exchange of nanowire outflow filters, and sonication of substrates with nanowires. In the case of cleaning of the arc discharge and manual reactor cleaning, the emissions affected the concentrations in the personal breathing zone and were high enough to also affect the concentrations in the background. Filter analysis with electron microscopy could confirm the presence of nanowires in some of the air samples. **Conclusions:** Our results show that a major part of the potential for exposure occurs not during the actual manufacturing, but during the cleaning and maintenance procedures. The exposures and emissions were evaluated pre- and post-upscaling the production and showed that some work tasks (e.g. exchange of nanowire outflow filters and sonication of substrates with nanowires) increased the emissions post-upscaling.

**Isaxon et al. 2020.**

**Annals of Work Exposure and Health, vol. 64, no. 1.**

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**Keywords:** Direct-reading instruments; electron microscopy; metal analysis; occupational exposure; upscaling.

**Evidence Level:** 5B

**Link:** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6935015/>

## Sedentary Practices

### "Why would you want to stand?" an account of the lived experience of employees taking part in a workplace sit-stand desk intervention

**Background:** Sit-stand desk interventions have the potential to reduce workplace sedentary behaviour and improve employee health. However, the extent of sit-stand desk use varies between employees and in different organisational contexts. Framed by organisational cultural theory and product design theory, this study examined employees' lived experience of taking part in a workplace sit-stand desk intervention, to understand the processes influencing feasibility and acceptability. **Methods:** Participant observations and qualitative interviews were conducted with 15 employees from two office-based workplaces in the UK, as part of a process evaluation that ran alongside a pilot RCT of a workplace sit-stand desk intervention. Observational field notes and transcripts were analysed using thematic analysis. **Results:** Three themes related to the experience of using a sit-stand desk at work were generated: employees' relationship with their sit-stand desk; aspirations and outcomes related to employee health and productivity; and cultural norms and interpersonal relationships. The perceived usability of the desk varied depending on how employees interacted with the desk within their personal and organisational context. Employees reported that the perceived influence of the desk on their productivity levels shaped use of the desk; those who perceived that standing increased energy and alertness tended to stand more often. Sit-stand desks were voiced as being more acceptable than intervention strategies that involve leaving the desk, as productivity was conflated with being at the desk. **Conclusions:** The findings indicate a range of organisational, social-cultural and individual-level factors that shape the feasibility and acceptability of sit-stand desk use, and suggest strategies for improving employees' experiences of using a sit-stand desk at work, which might positively influence sedentary behaviour reduction and health.

**Hall et al. 2020.**

**BMC Public Health, vol. 19, no. 1.**

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**Keywords:** Multi-component intervention; Organisational culture; Physical activity; Product design; Qualitative; Sedentary behaviour; Sitting; Standing; UK; Workplace health.

**Evidence Level:** 5A

**Link:** <https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-019-8038-9>

### Cardiorespiratory fitness and device-measured sedentary behaviour are associated with sickness absence in office workers

Physical activity reduces the risk of several noncommunicable diseases, and a number of studies have found self-reported physical activity to be associated with sickness absence. The aim of this study was to examine if cardiorespiratory fitness, device-measured physical activity, and sedentary behaviour were associated with sickness absence among office workers. Participants were recruited from two Swedish companies. Data on sickness absence (frequency and duration) and covariates were collected via questionnaires. Physical activity pattern was assessed using ActiGraph and activPAL, and fitness was estimated from submaximal cycle ergometry. The sample consisted of 159 office workers (67% women, aged  $43 \pm 8$  years). Higher cardiorespiratory fitness was significantly associated with a lower odds ratio (OR) for both sickness absence duration (OR = 0.92, 95% confidence interval (CI) 0.87-0.96) and frequency (OR = 0.93, 95% CI 0.90-0.97). Sedentary time was positively associated with higher odds of sickness absence frequency (OR = 1.03, 95% CI 0.99-1.08). No associations were found for physical activity at any intensity level and sickness absence. Higher sickness absence was found among office workers with low



cardiorespiratory fitness and more daily time spent sedentary. In contrast to reports using self-reported physical activity, device-measured physical activity was not associated with sickness absence.

**Drake et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Cardiorespiratory fitness; office workers; physical activity; sedentary behaviour; sickness absence.

**Evidence Level:** 4B

**Link:** <https://www.mdpi.com/1660-4601/17/2/628>

### **A scoping review of digital tools to reduce sedentary behavior or increase physical activity in knowledge workers**

**Background:** There is increasing interest in the role that technology can play in improving the vitality of knowledge workers. A promising and widely adopted strategy to attain this goal is to reduce sedentary behavior (SB) and increase physical activity (PA). In this paper, we review the state-of-the-art SB and PA interventions using technology in the office environment. By scoping the existing landscape, we identified current gaps and underexplored possibilities. We discuss opportunities for future development and research on SB and PA interventions using technology. **Methods:** A systematic search was conducted in the Association for Computing Machinery digital library, the interdisciplinary library Scopus, and the Institute of Electrical and Electronics Engineers Xplore Digital Library to locate peer-reviewed scientific articles detailing SB and PA technology interventions in office environments between 2009 and 2019. **Results:** The initial search identified 1130 articles, of which 45 studies were included in the analysis. Our scoping review focused on the technologies supporting the interventions, which were coded using a grounded approach. **Conclusion:** Our findings showed that current SB and PA interventions using technology provide limited possibilities for physically active ways of working as opposed to the common strategy of prompting breaks. Interventions are also often offered as additional systems or services, rather than integrated into existing office infrastructures. With this work, we have mapped different types of interventions and provide an increased understanding of the opportunities for future multidisciplinary development and research of technologies to address sedentary behavior and physical activity in the office context.

**Damen et al. 2020.**

**International Journal of Environmental Research and Public Health, vol. 17, no. 2.**

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**Keywords:** Knowledge workers; physical activity; scoping review; sedentary behavior; technological interventions; workplace.

**Evidence Level:** 6A

**Link:** <https://www.mdpi.com/1660-4601/17/2/499>

## **Physical Activity**

### **Workers' physical activity data contribute to estimating maximal oxygen consumption: a questionnaire study to concurrently assess workers' sedentary behavior and cardiorespiratory fitness**

**Background:** Sedentary behavior (SB) and cardiorespiratory fitness (CRF) are important issues in occupational health. Developing a questionnaire to concurrently assess workers' SB and CRF could fundamentally improve epidemiological research. The Worker's Living Activity-time Questionnaire (WLAQ) was developed previously to assess workers' sitting time. WLAQ can be modified to evaluate workers' CRF if additional physical activity (PA) data such as PA frequency, duration, and intensity are collected. **Methods:** A total of 198 working adults (93 women and 105 men; age, 30-60 years) completed anthropometric measurements, a treadmill exercise test for measuring maximal oxygen consumption (VO<sub>2</sub>max), and modified WLAQ (m-WLAQ, which included questions about PA data additional to the original questions). Multiple regression analyses were performed to develop prediction equations for VO<sub>2</sub>max. The generated models were cross-validated using the predicted residual error sum of squares method. Among the participants, the data of 97 participants who completed m-WLAQ twice after a 1-week interval were used to calculate intraclass correlation coefficient (ICC) for the test-retest reliability analyses. **Results:** Age ( $r = -$

0.29), sex ( $r = 0.48$ ), body mass index (BMI,  $r = -0.20$ ), total sitting time ( $r = -0.15$ ), and PA score (total points for PA data,  $r = 0.47$ ) were significantly correlated with VO<sub>2</sub>max. The models that included age, sex, and BMI accounted for 43% of the variance in measured VO<sub>2</sub>max [standard error of the estimate (SEE) = 5.04 ml·kg<sup>-1</sup>·min<sup>-1</sup>]. These percentages increased to 59% when the PA score was included in the models (SEE = 4.29 ml·kg<sup>-1</sup>·min<sup>-1</sup>). Cross-validation analyses demonstrated good stability of the VO<sub>2</sub>max prediction models, while systematic underestimation and overestimation of VO<sub>2</sub>max were observed in individuals with high and low fitness, respectively. The ICC of the PA score was 0.87 (0.82-0.91), indicating excellent reliability. **Conclusions:** The PA score obtained using m-WLAQ, rather than sitting time, correlated well with measured VO<sub>2</sub>max. The equation model that included the PA score as well as age, sex, and BMI had a favorable validity for estimating VO<sub>2</sub>max. Thus, m-WLAQ can be a useful questionnaire to concurrently assess workers' SB and CRF, which makes it a reasonable resource for future epidemiological surveys on occupational health.

**Matsuo et al. 2020.**

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

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**Keywords:** Occupational health; Physical fitness; Reliability; Sitting time; Validity.

**Evidence Level:** 5B

**Link:** <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-8067-4>

### **Access to showers and change rooms at work associated with active commuting among older workers: Findings from a national population survey**

Workers ability to access showers and change rooms in the workplace is associated with active commuting on younger workers. This study explored the relationship between access to these facilities and active commuting to work in older workers. Workers aged over 50 years were more likely to cycle to work if facilities were available

**Biswas et al. 2020.**

**Journal of Applied Gerontology, vol. 39, no. 2.**

**Keywords:** Cycling; physical activity; transport; workplace

**Evidence Level:** 4A

**Link:** [https://journals.sagepub.com/doi/full/10.1177/0733464818755313?url\\_ver=Z39.88-2003&rfr\\_id=ori%3Arid%3Aacrossref.org&rfr\\_dat=cr\\_pub++0pubmed](https://journals.sagepub.com/doi/full/10.1177/0733464818755313?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Aacrossref.org&rfr_dat=cr_pub++0pubmed)

### **Psychosocial profiles of physical activity fluctuation in office employees: A latent profile analysis**

**Objectives:** Fluctuation is a common but neglected phenomenon of physical activity (PA) behavior. This study aimed to explore the psychosocial profiles of PA fluctuation in office employees, and to examine the association of latent profiles with demographics and PA level. **Method:** 434 Chinese office employees who were identified as PA fluctuators (M = 32.4 years, SD = 6.9, 55.5% female) completed a cross-sectional online survey covering demographics, PA behavior, and six psychosocial indicators (self-efficacy, planning, action control, affective attitude, social support, and perceived barriers). Latent profile analysis was used to determine PA fluctuators' psychosocial profiles. Associated factors of profile membership were identified with multinomial logistic regression. **Results:** The two-profile model (uncommitted vs. moderately committed) was selected as the best solution. The moderately committed group (n = 346, 79.7%) possessed a more active mindset by reporting significantly higher scores of self-efficacy ( $t = 9.42$   $p < .001$ ), planning ( $t = 16.33$   $p < .001$ ), action control ( $t = 14.55$   $p < .001$ ), affective attitude ( $t = 13.33$   $p < .001$ ), and social support ( $t = 11.50$   $p < .001$ ) compared with the uncommitted group (n = 88, 20.3%). Results from a multinomial logistic regression showed that the moderately committed profile was associated with normal weight status (OR = 2.00,  $p < .05$ ), having a medium managerial position (OR = 2.54,  $p < .01$ ), and high level of moderate to vigorous PA behavior (OR = 4.85,  $p < .001$ ). **Conclusions:** These findings demonstrate the variability of PA fluctuators' mindsets. Future tailored interventions are recommended to promote PA behavior for this population based on the categorization from the present study.

**Duan et al. 2020.**

**PLoS One, vol. 15, no. 1.**

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**Keywords:** Physical activity; office employees; psychosocial profiles

**Evidence Level:** 4A

**Link:** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0227182>

### **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:** Treadmill workstation; office workers; overweight; obesity

**Evidence Level:** 5A

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

## **Musculoskeletal Health**

### **A description of musculoskeletal injuries in a Canadian police service**

**Objectives:** Police officers run a risk of injury that is higher than in most other occupations. This study aims to quantify injury prevalence and identify common musculoskeletal injuries (MSIs) among police officers, using injury data from a municipal police service in Alberta, Canada. **Material and methods:** This is a descriptive study based on a secondary data analysis of the MSIs reported to the police service over a 41-month period; January 1, 2013 - June 2, 2016. Data from 1325 active police officers were examined, and injury prevalence was reported according to sex, injury diagnosis, the body part injured, and the work area. **Results:** The prevalence of strains and sprains was very high, at 89.2%. The back and shoulder were most frequently affected. Overall, injury proportions did not differ significantly across work areas. The injury risk was age-related but no significant differences in injuries between sexes were identified. **Conclusions:** Minor injuries such as strains and sprains occur frequently in the police occupation. Future research should focus on specific risk factors for MSIs in police officers in order to aid prevention.

**Lentz et al. 2020.**

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**Keywords:** Injury; musculoskeletal; occupation; police; prevalence; sprains and strains.

**Evidence Level:** 5B

**Link:** <http://ijomeh.eu/A-description-of-musculoskeletal-injuries-in-a-Canadian-police-service,112275,0,2.html>

