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Chung-Cheng Lu & Jyun-Kai Liang. *Exploring factors that influence the cardiovascular health of bus drivers for the improvement of transit safety.* Pages: 1263-1272.

The causes of traffic accidents include sudden cardiovascular disease events of drivers that go undetected in routine physical examinations of their health. While increased attention has been paid to proactive driver management by the frequent monitoring of drivers' mental and physical condition to avoid such events, very few studies have examined the deeper risk factors that influence the cardiovascular health of bus drivers represented by workload and scheduling. To fill this knowledge gap, this study adopts a data mining approach to exploring the factors influencing the cardiovascular health of intercity bus drivers using their daily cardiovascular measurement data along with their schedules and routine physical examination results. Ten influencing factors were identified, including medical history, late-night habits and afternoon and evening driving schedules. The present findings will be useful for preventing accidents where cardiovascular disease is involved, which in turn will help improve transit safety.

- **Keywords:** public transport, transit safety, transit driver management, accident prevention

Clara Rodríguez-Gude, Cláudia Maria Sousa, Yaiza Taboada-Iglesias & Margarita Pino-Juste. *Musculoskeletal pain in musicians: does playing more than one instrument have more effect?* Pages 1273-1278.

Objectives. Repeated instrumental practice represents a risk factor for the appearance of playing-related musculoskeletal disorders (PRMDs). This study aimed to compare the prevalence and characteristics of PRMDs based on location, pain characteristics and number of hours of instrumental practice, in musicians who play one or more musical instruments. *Methods.* An observational study was conducted with music university students in Spain using a questionnaire. *Results:* A total of 178 musicians (41%) played a second instrument. Musicians who played only one instrument had a slightly lower mean number of pain sites (M 3.25, SD 1.93; M 3.44, SD 2.27). On the contrary, pain intensity (M 2.72, SD 2.03; M 2.23, SD 1.78 points), pain interference on mood, quality of life and instrumental practice (M 3.04, SD 2.29; M 2.80, SD 2.24 points) as well as the number of hours devoted to instrumental practice (M 21.18, SD 10.47; M 20.03, SD 12.54 h/week) is slightly higher in musicians playing a

single instrument. *Conclusions.* Pain intensity is the only variable of those analysed that presents statistically significant differences when comparing musicians who play a single instrument with those who play a second instrument, being higher in mono-instrumental musicians.

- **Keywords:** musician, musculoskeletal pain, mono-instrumental, multi-instrumental, playing-related musculoskeletal disorders

Mohammed Said Obeidat, Lubna Omar Sarhan & Tarek Q. Qasim. *The influence of human resource management practices on occupational health and safety in the manufacturing industry.* Pages: 1279-1293.

This study provides an overview of the influence of applying two human resource management (HRM) practices on workers' occupational health and safety (OHS). These practices are selection and recruitment, and development and training. Furthermore, this study highlights the observed activities to define hazards, processes and OHS measures in the manufacturing industries. It also assesses the importance of workers' knowledge and awareness of OHS programs. A structured questionnaire was administered to those working in the manufacturing sector in several countries. The responses were analyzed statistically. The results showed that the demographic variables had a significant impact on workers' knowledge and awareness of OHS programs. In addition, HRM practices played a major role in OHS. Therefore, it is recommended to top management to highly consider OHS practices by integrating them into the workplace, starting from worker selection, all the way to production, operations and management, by establishing a strong HRM system.

- **Keywords:** Cronbach's human health and safety, Jordan, manufacturing sector, statistical analysis

Okrasa Małgorzata, Cheberyachko Serhii, Radchuk Dmytro, Deryugin Oleg & Sharovatova Olena. *Evaluation of properties of elastomeric head straps of filtering facepiece respirators.* Pages: 1294-1300.

Frequent donning and doffing of filtering facepiece respirators (FFRs) can reduce their effectiveness due to the residual deformation of their elastic head straps. This study investigates the loss of elasticity of head straps during repeated use. Five elastomeric tapes were tested as FFR head straps, and their tensile strength was measured using a DU-100 dynamometer after repeated donning and doffing cycles. After eight consecutive uses, the protection factor drops significantly, requiring strap length adjustments to guarantee the specified level of user protection. The maximum tensile force of the elastomeric head straps causes residual elongation, which remains consistent after eight cycles. The study also establishes how strap elongation depends on the force and number of donning and doffing cycles. This knowledge is vital for designing better FFRs. Additionally, the research explores alternative materials for FFR construction to address strap elongation and its effects on performance and comfort.

- **Keywords:** respiratory protective equipment, filtering facepiece respirator, head straps, elastomeric tapes, elasticity

Dipayan Das & Ashish Kumar Singh. *Ergonomic design and evaluation of gemstone polishing workstation.* Pages: 1301-1318.

Objectives. Gemstone polishers suffer from musculoskeletal problems due to constrained working postures, substantially influenced by the poor design of conventional gemstone polishing workstations. The present study investigated the effects of three workstation adjustment parameters (illumination at workstation, polishing height, tool post position)

on postural angle, muscle activity and perceived postural discomfort in order to develop recommendations for new gemstone polishing workstations. *Methods.* Twelve professional gemstone polishers performed the polishing task on a prototype test-rig in 27 different test conditions. Taguchi's L₂₇ orthogonal array was employed to estimate the optimum setting for gemstone polishing workstation design. *Results.* Study variables had a significant influence on postural angles. Polishing height substantially influenced muscle activity and perceived discomfort in the shoulder and lower back region. Tool post position was found to be the determinant factor for forearm muscle activity and perceived discomfort in the wrist/forearm region. Based on the findings, illumination of 1500lux, polishing at 15cm above the elbow height and a 20° tool position was recommended. *Conclusions.* Our findings present an alternative approach to using Taguchi's design of experiment for workstation improvement, which has received very little attention in ergonomics studies. A confirmation test was conducted to validate the study recommendations.

- **Keywords:** gemstone polishing, handicrafts, Taguchi, signal-to-noise ratio, ergonomics, low-cost intervention, workstation design

Pingqing Liu, Yuanyuan Liu, Wenyue Hou, Yunyun Yuan & Bin Li. *How spiritual leadership affects team safety performance: the role of team reflexivity and work interdependence.* Pages: 1319-1327.

Objectives. Frequent occurrence of workplace accidents may be caused by a lack of attention by team members to safety behaviors on the spiritual level. It is very important to investigate the incentive mechanism of spirit factor on team safety performance. *Methods.* Based on social cognition theory and social interaction theory, this study analyzed matching data from 717 employees across 173 teams, and verified the mechanism underlying team-level spiritual leadership on team safety performance. *Results.* Spiritual leadership not only helped improved a team's safety performance, but also affected it through team reflexivity. Meanwhile, work interdependence positively moderated the positive relationship between team reflexivity and team safety performance, as well as the mediating role of team reflexivity. *Conclusions.* The findings expanded the research scope of leadership style-safety performance at the team level, and provided guidelines for managers to promote safety and healthy development of a team in practice.

- **Keywords:** spiritual leadership, team reflexivity, team safety performance, work interdependence

Siriporn Dankachatarn, Anongnard Boonpak, Nattakarn Worrasan, Busma Kama, Donrawee Waeyeng, Mujalin Intaramuean & Junjira Mahaboon. *Effects of safety interventions toward workers' behaviors using the theory of planned behavior in the rubber wood processing industry.* Pages: 1328-1334.

Objectives. Rubberwood manufacturing has a wide range of occupational safety hazards. Workers' safety behaviors are substandard. This quasi-experimental study aimed to determine the factors affecting safety behaviors using the theory of planned behavior (TPB) and compare the effects of safety intervention programs on workers' behaviors. *Methods.* The sample comprised workers from a rubberwood processing factory. Exploratory and confirmatory factor analyses were performed to validate the TPB constructs. The constructs were also analyzed before and after the interventions using structural equation modeling to confirm the observed variables. The interventions included conducting job safety analysis, establishing safety standard operation procedures and launching a behavioral promotion campaign. A *t* test was used to compare the constructs' intervention effects. *Results.* The structural equation model

adequately fit the data and confirmed that the constructs were aligned with the TPB. Most path coefficients were statistically significant after the interventions were implemented. 'Attitude' and 'perceived behavioral control' directly and significantly affected 'intention'. 'Intention' was an essential mediator to 'behaviors'. The improvement in workers' behaviors was evident. *Conclusions.* According to the TPB, safety program interventions helped enhance workers' behaviors. Hence, based on participatory approaches, sustainable safety interventions should be maintained for all levels of personnel in the organization.

- **Keywords:** theory of planned behavior, rubber wood, safety interventions

Liliana Cruz-Ausejo, Anthony Copez-Lonzoy, Ana Lucía Vilela-Estrada, Juan José Valverde, Melissa Bohórquez & Miguel Moscoso-Porras. *Can working at home be a hazard? Ergonomic factors associated with musculoskeletal disorders among teleworkers during the COVID-19 pandemic: a scoping review.* Pages: 1335-1344.

Objectives. The improvised and massive adoption of remote work in the context of COVID-19 has forced us to adapt homes as workspaces, which could promote development of musculoskeletal disorders (MSDs). This review explores the evidence for ergonomic factors associated with MSDs in teleworkers. *Methods.* A literature search was conducted in MEDLINE, Embase, Scopus, SciELO and EBSCO. We included observational studies published between March 2020 and October 2021 that included teleworking personnel due to the restrictions of the pandemic. *Results.* A total of 212 studies were identified, 14 were chosen for complete review. Associated factors were change of work modality (on-site work to telework), use of home environments as workspaces (areas not adapted for work and with low lighting), working furniture (non-ergonomic chairs and desks), use of electronic devices (tablets, cell phones and laptops), organizational factors (working hours, active breaks, sitting time) and individual factors (physical activity practice). *Conclusion.* Various ergonomic home factors and the characteristics of teleworking – mainly furniture, the environment of work and physical activity – are associated with MSDs. This evidence suggests that the norms and regulation of telework can consider the adaptation of workspace and conditions at home to prevent health problems in the medium and long term.

- **Keywords:** musculoskeletal disease, ergonomics, coronavirus, pandemics, physical activity, screen devices

Tiehua Chen, Wenyi Hu & Hongxia Li. *The effect of empowering leadership on miners' unsafe behavior: a cross-level chain mediation model.* Pages: 1345-1357.

Miners' unsafe behavior has always been a key issue in coal mine safety management. Numerous studies have shown that leadership is an important factor influencing miners' unsafe behavior. A cross-level structural model was constructed based on social cognitive theory, using psychological safety and safety climate as intermediary variables, to analyze the effect of empowering leadership on miners' unsafe behavior. Data were gathered from 272 coal miners on 59 working teams. Multilevel regression analysis and the Monte Carlo method were employed to analyze the influence of the empowering leadership on miners' unsafe behavior. The results showed that empowering leadership was negatively related to miners' unsafe behavior. Psychological safety and safety climate mediated the relationship between empowering leadership and miners' unsafe behavior, and also jointly mediated in the chain. These findings enrich existing research results on miners' unsafe behavior and provide a beneficial enlightenment to coal mine safety management.

- **Keywords:** empowering leadership, miners' unsafe behavior, psychological safety, safety climate

Yazan I. Abu Aisheh, Wesam Salah Alaloul, S. A. Alhammadi & Bassam A. Tayeh. *Safety management implementation drivers for construction projects: a structural equation modelling approach*. Pages: 1358-1367.

The construction industry is one of the hazardous fields due to its exceptional environment. Therefore, this work aimed to assess the essential drivers needed for employing safety management in the Palestinian construction industry. The drivers for safety management were recognized from earlier literature, where the questionnaires were dispersed to professionals from construction projects. The exploratory factor analysis (EFA) technique was then performed to contextually adjust the identified drivers. The results showed that safety management drivers could be categorized into three constructs: management, awareness and policy. In addition, partial least squares structural equation modelling (PLS-SEM) was performed to generate the safety management driver's model. The results indicated that management drivers were vital drivers for adopting safety management. The study's findings would act as a reference for construction stakeholders to decrease danger and enhance the construction project's success via implementing safety management drivers.

- **Keywords:** safety management, construction projects, partial least squares structural equation modelling, drivers, exploratory factor analysis

Sajjad Mohsenian, Bahram Kouhnavard, Mohammad Nami, Alireza Mehdizadeh, Mojgan Seif & Zahra Zamanian. *Effect of temperature reduction of the prefrontal area on accuracy of visual sustained attention*. Pages: 1368-1375.

Objectives. Detection of sensitive signs in many work environments with automated systems (aviation industry, flight safety tower, maritime industry, monitoring in the military industry, etc.) is essential and requires constant visual attention. Therefore, the aim of this study was to investigate the effect of forehead cooling on the accuracy of stable visual attention. *Methods.* This interventional study was performed on 34 male students. The sampling method was a randomized block design. Subjects were assessed by demographic questionnaire, Snellen chart, Spielberger state-trait anxiety inventory (STAI) and physiological and cognitive measurements. *Results.* Prefrontal cortex (PFC) cooling caused significant changes in sublingual temperature during four measurements in the intervention group. There were no significant changes in heart rate, diastolic blood pressure and saturation of peripheral oxygen (%SpO₂) between the two groups. The critical flicker frequency (CFF) as an indicator of cognitive fatigue showed that cognitive improvement after PFC cooling occurred following a reduction in cognitive fatigue. *Conclusions.* Considering the importance of choosing non-invasive methods to improve the operator's cognitive skills while performing cognitive tasks in the field of neuroergonomics, it can be concluded that PFC cooling is an effective and safe way to improve some cognitive skills such as visual attention.

- **Keywords:** visual attention, sustained attention, neuroergonomics, flicker fusion threshold, hemoencephalography

Yu Min, Qin Wenjing, Li Jizu, Yan Yong & Guo Yanyu. *Work-family conflict, work engagement and unsafe behavior among miners in China*. Pages: 1376-1382.

The present study aims to explore the relationship between work-family conflict and unsafe behavior among underground coal miners, testing the mediating role of work

engagement in this relationship. A cross-sectional survey was conducted in Shanxi Province, China from June to August 2020. A total of 580 front-line miners were recruited for this study. Structural equation modeling was used to explore the mechanisms of work–family conflict on unsafe behavior. Findings revealed that time-based conflict, strain-based conflict and behavior-based conflict were positively related to unsafe behavior, and work engagement mediated the relationships between work–family conflict and unsafe behavior. Managers should alleviate miners’ work–family conflict, providing effective organizational support to improve the miner's work engagement, and thus reduce their unsafe behavior.

- **Keywords:** work–family conflict, unsafe behavior, work engagement, mediating role

Hu Shi & Muhammad Aamir Nadeem. *Effects of safety leadership and safety management practices on safety participation through a casual-chain mediators approach in the Chinese construction industry. Pages: 1383-1394.*

Objectives. This article aims to prompt first-line workers to go beyond regular job roles and engage in more discretionary safety behavior–safety participation in the Chinese construction industry. The construction industry is a high-risk industry, and first-line workers are more likely to be exposed to workplace hazards. Once accidents happen, the negative consequences would come out. Therefore, employee voluntary safety behavior is focused on in this research. *Methods.* The present research framework examines the roles of safety leadership and safety management practices from the group and organizational perspectives in predicting the voluntary safety behavior (safety participation) of first-line workers in the Chinese construction industry through casual-chain mediators (safety climate and job satisfaction). In this study, partial least squares structural equation modeling (PLS-SEM) is adopted for data analysis and hypotheses testing. *Results.* After data analysis, the results show that safety leadership and safety management practices are significantly and positively associated with safety participation of first-line workers through safety climate and job satisfaction. Moreover, safety management practices have a more statistical effect on safety climate compared to safety leadership. *Conclusions.* These results provide some practical implications for facilitating the workers to conduct safety participation in the construction industry.

- **Keywords:** safety leadership, safety management practices, safety participation, safety climate, job satisfaction

Tianan Yang, Yuhang Jin, Xuan Jin & Jianwei Deng. *How organizational support can help employees mitigate the effects of distributive injustice: a hierarchical moderated mediation model. Pages: 1395-1401.*

Objectives. At present, the mechanism of distributive justice leading to presenteeism is still unclear. We aim to explore the relationship among distributive justice, organization-based self-esteem, presenteeism and organizational support among Chinese medical workers by building a moderated mediation model. *Methods.* We employed a cross-level research design that aggregated organizational support to the organizational level. Medical staff from 50 different hospitals in China were invited to participate in the survey, and 1122 valid data questionnaires were obtained. We used hierarchical linear modelling to test this cross-level moderated mediation model. *Results.* Our results suggest that, at the individual level, organization-based self-esteem partially mediates the distributive justice–presenteeism relationship, and at the individual level, organizational support moderates the relationship between distributive justice and organization-based self-esteem. *Conclusions.* Distributive justice enhances individuals’ organization-based self-

esteem, which is associated with a reduction in presenteeism, and underscores the importance of organizations shaping an organizational support climate.

- **Keywords:** distributive justice, presenteeism, organizational support, healthcare worker

Paola Ochoa Pacheco, David Coello-Montecel & Daniela M. Andrei. *Validation of the Spanish version of the Neal, Griffin and Hart safety behavior scale*. Pages: 1402-1415.

Objectives. The safety behavior scale (SBS), developed by Neal, Griffin and Hart, is one of the most widely used conceptualizations in the field of occupational safety. Previous studies have evaluated the psychometric properties of this scale in different populations. However, few validation studies have been conducted in the Latin American context. To fill these gaps in the literature, this study aimed to assess the validity, reliability and measurement invariance of this instrument in the context of the Latin American mining industry. *Methods.* Data were collected from 398 workers from Ecuadorian mining companies. The questionnaire was translated into Spanish following a back-translation process. The latent factorial structure of the SBS was explored by estimating a series of confirmatory factor analysis (CFA) and exploratory equation modeling (ESEM) models. *Results.* The analyses showed that the two correlated first-order factor CFA representation was the most appropriate model for the data. Measurement invariance by age, type of contract and firm size was also confirmed. *Conclusions.* The SBS is a valid and reliable measure of safety behavior. In addition, this study determined the applicability of this instrument in the Latin American context, which enhances opportunities for future research in the region.

- **Keywords:** safety behavior, safety compliance, safety participation, scale validation, measurement invariance

Yu Min, Li Jizu, Qin Wenjing, Guo Yanyu & Yan Yong. *Research on the influence of role stressors on unsafe behavior among construction workers in China*. Pages: 1416-1422.

Individuals' unsafe behavior is identified as one of the important reasons leading to construction industry accidents. The purpose of the present study is to explore the mechanism of role stressors' impact on unsafe behavior, the mediating role of psychological strain and the moderating role of empowering leadership among construction workers. The sample used for the analyses in this study includes 600 employees from 10 different construction companies in China. Bootstrap analysis was performed to explore the mediating role of psychology strain, and hierarchical linear regression analysis was performed to explore the moderating role of empowering leadership. The results showed that role stressors were positively related to unsafe behavior; psychology strain mediates the relationship between role stressors and unsafe behavior; and empowering leadership moderates the relationship between psychological strain and unsafe behavior. The findings indicate that empowering leadership can decrease unsafe behavior.

- **Keywords:** role stressors, psychological strain, unsafe behavior, empowering leadership

Mohammad Reza Taheri, Seyed Bagher Mortazavi, Hasan Asilian, Omran Ahmadi & Fatemeh Sogandi. *Investigating human error in Iran's copper mines using the CREAM based on human cognitive reliability analysis.* Pages: 1423-1428.

Objectives Human error has been recognized as one of the top causes of most accidents in mines. This study aimed to identify and assess cognitive errors among copper miners using the cognitive reliability and error analysis method (CREAM). *Methods.* This cross-sectional study was carried out in one of the copper mines in Iran. First, all tasks were analyzed by hierarchical task analysis (HTA). Then cognitive errors were assessed using the CREAM. *Results.* With respect to the basic CREAM results in the operational units, including extraction, crushing and processing, human error probability (HEP) was obtained as 0.056, 0.0315 and 0.0177, respectively. Based on the results of the extended CREAM, the types of errors identified for all tasks in the three operational units were mainly associated with execution (53.4%), observation (40%), interpretation (5%) and planning (1.6%). Also, the cognitive errors were related to execution, monitoring, observation, communication, diagnosis, recording and planning, respectively. *Conclusion.* The results showed that human error is very high in the operational units of the mine. Therefore, immediate actions are needed to improve safety performance in the mine units, which determine the role of various factors in human errors and can provide the possibility of implementing more effective interventions.

- **Keywords:** human error, cognitive reliability and error analysis method, miner, performance reliability

Cheng-Yu Tsai, Arnab Majumdar, Yija Wang, Wen-Hua Hsu, Jiunn-Horng Kang, Kang-Yun Lee, Chien-Hua Tseng, Yi-Chun Kuan, Hsin-Chien Lee, Cheng-Jung Wu, Robert Houghton, He-in Cheong, Iulia Manole, Yin-Tzu Lin, Lok-Yee Joyce Li & Wen-Te Liu. *Machine learning model for aberrant driving behaviour prediction using heart rate variability: a pilot study involving highway bus drivers.* Pages: 1429-1439.

Objectives. Current approaches via physiological features detecting aberrant driving behaviour (ADB), including speeding, abrupt steering, hard braking and aggressive acceleration, are developing. This study proposes using machine learning approaches incorporating heart rate variability (HRV) parameters to predict ADB occurrence. *Methods.* Naturalistic driving data of 10 highway bus drivers in Taiwan from their daily routes were collected for 4 consecutive days. Their driving behaviours and physiological data during a driving task were determined using a navigation mobile application and heart rate watch. Participants' self-reported data on sleep, driving-related experience, open-source data on weather and the traffic congestion level were obtained. Five machine learning models – logistic regression, random forest, naive Bayes, support vector machine and gated recurrent unit (GRU) – were employed to predict ADBs. *Results.* Most drivers with ADB had low sleep efficiency ($\leq 80\%$), with significantly higher scores in driver behaviour questionnaire subcategories of lapses and errors and in the Karolinska sleepiness scale than those without ADBs. Moreover, HRV parameters were significantly different between baseline and pre-ADB event measurements. GRU had the highest accuracy (81.16–84.22%). *Conclusions.* Sleep deficit may be related to the increased fatigue level and ADB occurrence predicted from HRV-based models among bus drivers.

- **Keywords:** aberrant driving behaviour, driver behaviour questionnaire, gated recurrent unit, heart rate variability, Karolinska sleepiness scale

Muhammad Imran Rashid, Muhammad Athar, Fahad Noor & Amjad Hussain. *Behavior-based safety program for process industries*. Pages: 1440-1450.

Objectives. This article describes the reduction of unsafe behaviors observed at a fertilizer complex by implementation of a behavior-based safety (BBS) program via a behavior observation form developed by a multidisciplinary team. *Methods.* Six observation categories, i.e., position of people, reaction of people, personal protective equipment (PPE), tools used, operating procedures and housekeeping, are used to monitor safe and unsafe behaviors for a period of 18 months. *Results.* Safe behaviors increased from 57 to 70% and unsafe behaviors reduced from 40 to 26%. Behaviors of employees working in various sections of fertilizer complex such as ammonia, urea, utility, bagging/shipping and workshop were also observed. Non-compliance with PPE, housekeeping and standard operating procedures was also monitored in individual sections. Non-operational areas including the administration block, housing colony, maintenance workshop, warehouse, fire station and electrical substation were also observed. Among these, the maximum unsafe behaviors are for the housing colony and minimum for the electrical substation. *Conclusion.* It has been concluded that working on the housing colony, administration block and fire station areas will address 74% unsafe behaviors of non-operational areas. For practical applications, worldwide industries can implement this BBS program to enhance BBS, thus reducing unsafe behaviors and increasing employee morale.

- **Keywords:** behavior-based safety, unsafe behaviors, operating procedures, personal protective equipment, housekeeping

Simona Margheritti, Alessia Negrini & Massimo Miglioretti. *Can psychological capital promote safety behaviours? A systematic review*. Pages: 1451-1459.

Objectives. Occupational health and safety (OHS) is a relevant issue for many systems and stakeholders. This systematic literature review aims to expand knowledge on this topic starting from the integrated safety model (ISM) and to evaluate the role of psychological capital (PsyCap) on safety behaviours (SBs) (i.e., safety performance and prevention of occupational accidents and injuries). *Methods.* A total of 2704 studies was initially identified in the Scopus, PsycINFO and Web of Science databases. After rigorous screening, 20 empirical studies were included. *Results.* The results showed the relevant contribution of PsyCap in promoting SBs as a direct antecedent, a mediator between organizational factors and SBs or a moderator between job demands and SBs. *Conclusion.* Findings indicate that when workers feel resourceful, they feel also more confident and engaged, and, in turn, more focused on safety issues. Moreover, the results sometimes turn out to be contradictory, showing the dark side of personal resources. Considering these results, a plan to monitor and develop PsyCap could be implemented to promote SBs and safety environment. Indeed, PsyCap can be an essential individual resource for behaving safely also by reducing job demands' perceptions and improving safety leadership.

- **Keywords:** occupational accidents, occupational injuries, psychological capital, safety performance, systematic review

Ali M. Aljaroudi, Amit Bhattacharya, Amanda Strauch, Tyler D. Quinn & W. Jon Williams. *Effect of cooling on static postural balance while wearing firefighter's protective clothing in a hot environment.* Pages: 1460-1466.

Objectives. Postural imbalance can result from hyperthermia-mediated muscular fatigue and is a major factor contributing to injuries from falling. The objective of this study was to investigate the effect of exercise-induced hyperthermia and the impact of cooling on postural balance while wearing firefighters' protective clothing (FPC) in a hot environment. *Methods.* A portable force platform measured postural balance characterized by postural sway patterns using center of pressure metrics. Twelve healthy, physically fit males were recruited to stand on the force platform once with eyes open and once with eyes closed before and after treadmill exercise inside an environmental chamber under hot and humid conditions (30 °C and 70% relative humidity) while wearing FPC. Subjects participated in two randomly assigned experimental phases: control and cooling intervention. *Results.* A significant increase in physiological responses and postural balance metrics was observed after exercising in the heat chamber while wearing FPC. Cooling resulted in a significant effect only on postural sway speed after exercise-induced hyperthermia. *Conclusions.* Hyperthermia can negatively alter postural balance metrics, which may lead to an increased likelihood of falling. The utilization of body cooling reduced the thermal strain but had limited impact on postural balance stability.

- **Keywords:** firefighters, personal protective equipment, postural balance, hyperthermia, heat stress, active cooling

Jorge Benzaquen, Beatrice Avolio & Juan Weston. *Biosecurity in the workplace and a QMS during the COVID-19 pandemic: a survey for Peruvian goods companies.* Pages: 1467-1476.

Objectives. This study analyzes the differences between goods companies with a Standard No. ISO 9001:2015 quality management system (QMS) and those without, in terms of implementation of biosecurity measures during the COVID-19 pandemic. The study shows whether having a QMS helped companies to implement the biosecurity measures required to continue operating during a pandemic. *Methods.* The sample was composed of 145 Peruvian goods companies. The empirical data were collected through a questionnaire sent to company presidents, general managers and department heads. The questionnaire focused on four biosecurity dimensions in the workplace: protocols, preventive actions, biosecurity processes and risk management. *Results.* The study found that companies with a QMS (Standard No. ISO 9001:2015) significantly differed from companies without in the implementation of three of the four biosecurity dimensions. *Conclusions.* This study is useful for academia and companies because it identifies the main differences between certified and non-certified companies, in terms of adoption of biosecurity measures. This study highlights the importance of a QMS to respond to hazardous situations like a global health crisis, but also provides useful information for the strategic decision-making process of companies.

- **Keywords:** quality management systems, Standard No. ISO 9001:2015, total quality management, biosecurity workplace, COVID-19, Peruvian goods companies

Yutao Kang, Xinyu Zhou, Weijiong Chen & Xin Li. *Investigating the relationship between eye movements and the situation awareness of forklift operators for accident prevention*. Pages: 1477-1485.

This study investigated differences in eye movement indicators among forklift operators with different situation awareness (SA) and the relationship between eye movement indicators and the SA of forklift operators to verify the effectiveness of eye movement tracking in assessing SA and the factors affecting operators' SA for improving forklift operation safety. An eye movement tracking system was used to collect eye movement data from 15 forklift operators while they performed a series of forklift tasks. The SA global assessment technique (SAGAT) was used to determine the SA score of each operator. The results indicated that the fixation duration percentage (FDP), fixation count percentage (FCP) and average fixation duration (AFD) all had a positive relationship with SA in the work-related area of interest (AOI). These findings support eye movement tracking as an effective technique to quantitatively evaluate forklift operators' SA and provide insights into how forklift operators' SA could be improved.

- **Keywords:** forklift operators, situation awareness, eye-tracking measures, human factors

Vijaya Bandyopadhyaya, Ranja Bandyopadhyaya & Santanu Barman. *Understanding key behavioral factors affecting road traffic citation and crash involvement of professional bus and passenger van drivers using a modified driver behavior questionnaire: an Indian perspective*. Pages: 1486-1503.

A customized 27-item driver behavior questionnaire (DBQ) for professional long-distance bus and passenger van drivers in Bihar, India was tested separately and the underlying factor structures identified. In total, 156 bus and 149 passenger van drivers were surveyed and their self-reported aberrations, measured using the DBQ, were recorded along with their self-reported traffic citation and crash involvement in the past 3 years. A 21-item seven-factor DBQ and a 19-item five-factor DBQ were obtained for bus and passenger van drivers respectively through exploratory and confirmatory factor analysis. Structural equation modeling was used to find relations between DBQ factors and drivers' number of crashes and traffic citations involvements. Only speed issues could significantly explain traffic citation involvement but no factor could significantly explain crash involvement for bus drivers. For passenger van drivers, only aggressive violations could explain traffic citation involvement while unmindfulness, aggressive violations and errors could explain crash involvement.

- **Keywords:** driver behavior questionnaire, road traffic crashes, factor analysis, structural equation modeling, professional drivers

Vesna Nikolić, Josip Taradi, Tamara Vukić & Ivana Pedović. *Occupational safety knowledge management in Slovenia, Croatia and Serbia*. Pages: 1504-151.

This article elaborates the characteristics of knowledge management in the context of occupational safety and presents the results of research based on the assumption that there is a link between knowledge management and occupational safety performance, and that knowledge management can help in improving occupational safety performance. The research involved 645 occupational safety experts from three Balkan countries (Slovenia, Croatia and Serbia). The results showed that the knowledge management in the organization is related to all of the observed aspects of occupational safety performance: number of work-related injuries within the organization; number of lost working days due to injuries; costs caused by work-related injuries and occupational

diseases; financial investments in occupational safety; assessment of the state of occupational safety. The practical implications of the article can be seen in the context of meeting the educational needs for continuous learning and improvement of knowledge/lifelong learning in the field of occupational safety.

- **Keywords:** knowledge management, occupational safety, Balkan countries

Milad Derakhshanjazari, Bahram Kouhnavard, Roohollah Bagherzadeh, Mohammad Reza Monazzam, Masoud Haghani & Zahra Zamanian. *Investigating the effect of workwear textile modification with nanometal-embedded PMMA polymer by a spray method on textile air permeability, bending stiffness and surface temperature induced by near-infrared.* Pages: 1515-1522.

Objectives. This study aimed to optimize modification of cotton–polyester textiles of workwear in terms of air permeability (AP), bending stiffness (BS) and near-infrared (NIR) reflectance using nanometal-embedded polymethyl methacrylate (PMMA) polymer by a spray method. *Methods.* This experimental study was carried out to modify cotton–polyester textiles using nanoparticles of aluminum oxide (Al₂O₃), tin oxide (SnO) and zinc oxide (ZnO) embedded in PMMA polymer with different weight percentages by a spray method under 215-psi pressure. The surface temperature of the textiles induced by the NIR spectrum and their comfort in terms of AP and BS were measured according to Standard No. ASTM D737 and BS 3356, respectively. *Results.* Cotton (65%)–polyester (35%) textiles can be modified with a PMMA-based aluminum and zinc nanoparticle composite with equal weight percentage using a pressurized spray method with good durability. Also, most NIR reflection is in the textile coated with aluminum and ZnO nanoparticle composite in the PMMA base. *Conclusions.* It is recommended that this composite be used in future studies to impregnate the clothing textile of outdoor workers in hot and arid regions by a spray method under pressure and its effects be investigated on reducing heat stress in these workers.

- **Keywords:** modified textile, nanoparticles, polymethyl methacrylate, near-infrared

Sidra Zaheer, Quratulain Amir, Hira Fatima Waseem, Komal Riaz, Nirmal Zehra, Shagufta Shakil & Masooma Shoaib. *Patterns of musculoskeletal disorders in health care providers and their association with ergonomic risks.* Pages: 1523-1531.

Objectives. Musculoskeletal disorders (MSDs) have a high prevalence among allied health care providers because of the demanding nature of their work and lack of practicing proper ergonomics. The aim of this study focused on patterns of work-related musculoskeletal disorders (WMSDs) affecting different health care providers working in a different unit of a tertiary care hospital. *Methods.* This cross-sectional study collected data from 2000 allied health care providers working at various departments of Civil Hospital and Dow University Hospital of Karachi (DUHS), via self-administered questionnaire, based on Occupational Safety and Health Administration (OSHA) guidelines. *Results.* Our findings revealed that 92.9% of individuals had MSDs as a result of poor ergonomics, with 93% reporting that the disease interferes with their normal job routine. *Conclusions.* Medical technologists are the most affected group among allied health care workers. Lack of knowledge and improper ergonomic culture results in such a high prevalence rate in allied health care workers in Pakistan.

- **Keywords:** musculoskeletal disorders, work-related musculoskeletal disorder, ergonomics, allied health care provider, upper and lower back pain

Jiaming Ni, Ping Xiao & Boyi Li. *Effects of firefighting gloves styles on manual performance.* Pages: 1532-1541.

This study analyzes structural characteristics of firefighting gloves from the perspective of style design, to investigate the impact of the fit of four types of selected firefighting gloves on firefighters' manual operation efficiency. Seventeen male college students participated in the ergonomic trial to compare manual work done with bare hands and while wearing gloves. The results showed that the participants' hand dexterity decreased after wearing firefighting gloves, but there were significant differences between different styles of gloves. As glove thickness increased, the time to complete manual work increased continuously. But the change in the participant's hand and finger length did not affect the tactile perception of gloves. The construction of fingers had an inverse significant effect on dexterity and grip performance. To enhance manual performance, it is recommended that hand length, finger length and finger girth be considered when designing firefighting gloves based on the motion characteristics of firefighting operations.

- **Keywords:** firefighting gloves, hand dimensions, fit, manual performance, hand function evaluation

Kaan Koçali. *The Effects of Daylight Saving Time (DST) Transition Cancellation on Work Accidents of Turkey.* Pages: 1542-1551.

Objectives. Turkey canceled the daylight saving time (DST) transition and started permanent clock application. Considering the effect of this new regulation on working hours, this study examines whether there is a relationship with the increase in the number of work accidents in shifts. *Methods.* Data on work accidents were obtained from the Republic of Turkey Social Security Institution (SSI), filed between 2011 and 2020. We estimate accident rates using Poisson regression and log-linear models as a function of a variety of date-based factors. *Results.* The results show that DST transition is effective (ineffective in terms of gender) on changes in the number of work accidents. With statistical analyses, the hourly distribution of work accidents was determined, indicating at which hour the most work accidents occurred, using the work accident frequency rate. The number of prevented work accidents was calculated as 286,793 for Turkey. *Conclusion.* The findings from these studies suggest that cancellation of the DST transition does not have a negative effect on the incidence of work accidents in Turkey; on the contrary, this practice also serves the purpose of preventing work accidents.

- **Keywords:** daylight saving time, work accident, work safety, Turkey

Marlena Sokół-Szawłowska. *Change in the form of work of psychologists after the outbreak of the COVID-19 pandemic in Poland, and the subjective mental state of this professional group.* Pages: 1552-1557.

Objectives. The first wave of the COVID-19 pandemic in Poland in spring 2020 forced psychologists to fight the psychological consequences, which were triggered by drastic life changes among the entire population. This group of professionals had an incredibly difficult role to play in society; the level of their overload in studies was even compared to doctors treating COVID-19. This article aims to analyze the situation of both personal and professional psychologists in the first wave of the pandemic. *Methods.* During the study, 341 psychologists were surveyed using the snowball method (hybrid access). Data were collected between 12 March and 3 May 2020. The study is part of a large project from all waves of the pandemic. *Results.* In total, 82.7% of psychologists experienced moderate to high-intensity stress, and 61.29% switched to a remote or hybrid mode of working with patients. Subjectively depressed mood occurred in 16.13%, reduced drive in 27.57% and dyssomnia in 18.77%. A total of 61.58% had concerns about their professional and/or financial future after the pandemic. *Conclusion.* The challenges

during, as well as after, the pandemic period require taking care of individual mental well-being for psychologists. This is a necessary condition for undertaking a committed job.

- **Keywords:** psychologist, professional situation, mental state, COVID-19 pandemic, global epidemics, work attitudes

Chen Lin & Yang Shunxin. *Research on a post-competency model of civil aviation flight cadets*. Pages: 1558-1571.

The initial evaluation index system of civil aviation flight cadets' competency was established using NVivo version 11.0 through qualitative analysis. The competency evaluation index system of civil aviation flight cadets was determined using questionnaire surveys and SPSS version 26.0, and includes four dimensions – core quality, ethical discipline, psychological quality and leadership – and another 23 indexes. The competency model was constructed using AMOS version 23.0 through factor analysis and a structural equation model, and the weight coefficient of each index at all levels was finally determined. The results showed that self-confidence and optimism, attention distribution and situational awareness are the three most important indicators affecting the competency of civil aviation flight cadets. Therefore, the model can provide references for the scientific evaluation of civil aviation flight cadets' competence and provide support for airlines and colleges to train flight cadets.

- **Keywords:** civil aviation, flight cadets, competency, grounded theory, structural equation model

Humayun Kabir, Navjot Bhullar, Md Shahidul Islam, Kim Usher, Md Ershadul Haque & Myfanwy Maple. *Prevalence and risk factors of physical and psychological health among readymade garment workers in Bangladesh*. Pages: 1572-1583.

Objective. Poor health outcomes of Bangladeshi readymade garment (RMG) workers tend to be associated with a variety of occupational factors. This study aimed to investigate the prevalence of, and risk factors associated with, the physical and psychological health outcomes of Bangladeshi RMG workers. *Methods.* Responses to a cross-sectional survey from a convenience sample of 411 adult Bangladeshi RMG workers (mean age = 26.24 years; *SD* 6.40 years; female = 80%) were analysed using bivariate and multivariate (logistic regression models) analyses. *Results.* More than half of the participants reported headaches (61.6%) and colds/flu (51.3%), followed by fever (37.2%), diarrhoea (32.8%), bodily pain (29.9%) and respiratory infections (20.9%). For psychological health, stress (69.1%), anxiety (66.2%) and boredom (64.5%) were most prevalent, followed by sleeplessness (51.3%), depression (48.2%) and fear (34.3%). RMG workers from the factories located in Chattogram (a peripheral region compared to Dhaka) reported poorer physical and psychological health outcomes than those working in factories in Dhaka (the capital city of Bangladesh). Overall, compared to males, female RMG workers were more likely to be vulnerable to both physical and psychological health outcomes. *Conclusion.* Improvement in workplace conditions and safety programmes is needed to safeguard the overall health outcomes of Bangladeshi RMG workers.

- **Keywords:** health vulnerabilities, physical health, psychological health, readymade garment workers, Bangladesh