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Journal articles marked with an asterisk indicate an IWH scientist or adjunct scientist is included in the list of authors.

Andersen LL, Vinstrup J, Thorsen SV, Pedersen J, Sundstrup E, and Rugulies R. Combined psychosocial work factors and risk of long-term sickness absence in the general working population: prospective cohort with register follow-up among 69 371 workers. *Scandinavian Journal of Work, Environment & Health*. 2022; 48(7):549-559.

<https://doi.org/10.5271/sjweh.4035> [open access]

Abstract: OBJECTIVE: This study aimed to investigate the importance of combined psychosocial work factors for the risk of long-term sickness absence (LTSA). METHODS: We followed 69 371 employees in the general working population (Work Environment and Health in Denmark study 2012-2018), without LTSA during the preceding year, for up to two years in the Danish Register for Evaluation of Marginalization. Using k-means cluster analyses and weighted Cox-regression controlling for age, gender, survey year, education, health-behaviors, and physical work demands, we determined the prospective association of 11 identified clusters - based on the combination of nine psychosocial work factors (recognition, quantitative demands, work pace, emotional demands, influence, justice, role clarity, role conflicts, and support from colleagues) - with the risk of LTSA. RESULTS: During 124 045 person-years of follow-up, 6197 employees developed LTSA (weighted 8.5%). Using the cluster with the most favorable psychosocial scores as reference, clusters scoring poorly on several combined psychosocial factors had increased risk of LTSA. The cluster scoring poor on all nine psychosocial factors exhibited the highest risk [hazard ratio (HR) 1.68, 95% confidence interval (CI) 1.45-1.94]. Scoring poorly on one or two psychosocial factors did not increase the risk of LTSA when combined with favorable scores on the other psychosocial

factors. Interaction analyses showed that gender, but not age and education, modified the association between cluster and LTSA. CONCLUSION: Scoring poorly on several combined psychosocial work factors plays an important role in the risk of LTSA. Scoring favorably on several psychosocial factors outweighed the potentially adverse effects of scoring poorly on one or two factors

Chin B, Rundell SD, Sears JM, Fulton-Kehoe D, Spector JT, and Franklin GM. Intensity of physical therapy services: association with work and health outcomes in injured workers with back pain in Washington State. American Journal of Industrial Medicine. 2022; [epub ahead of print].

<https://doi.org/10.1002/ajim.23440>

Abstract: BACKGROUND: Associations between the intensity of physical therapy (PT) treatments and health outcomes among individuals with back pain have been examined in the general population; however, few studies have explored these associations in injured workers. Our study objective was to examine whether intensity of PT treatments is positively associated with work and health outcomes in injured workers with back pain. METHODS: We conducted a secondary analysis of prospective data collected from the Washington State Workers' Compensation (WC) Disability Risk Identification Study Cohort (D-RISC). D-RISC combined survey results with WC data from the Washington State Department of Labor and Industries. Workers with a State Fund WC claim for back injuries between June 2002 and April 2004 and who received PT services within the first year of injury were eligible. Intensity of PT treatment was measured as the type and amount of PT services within 28 days from the first PT visit. Outcome measures included work disability and self-reported measures for working for pay, pain intensity, and functional status at 1-year follow-up. We conducted linear and logistic regression models to test associations. RESULTS: We identified 662 eligible workers. In adjusted models, although the intensity of PT treatment was not significantly associated with work disability at 1-year follow-up, it was associated with lower odds of working for pay, decreased pain intensity, and improved functional status. CONCLUSIONS: Our findings suggest that there may be small benefits from receiving active PT, manual therapy, and frequent PT treatments within 28 days of initiating PT care

Corbiere M, Mazaniello-Chezol M, Lecomte T, Guay S, and Panaccio A. Developing a collaborative and sustainable return to work program for employees with common mental disorders: a participatory research with public and private organizations. Disability and Rehabilitation. 2022; 44(18):5199-5211.

<https://doi.org/10.1080/09638288.2021.1931481>

Abstract: Purpose: To disentangle the key steps of the return to work (RTW) process and offer clearer recovery-focused and sustainable RTW for people on sick leave due to common mental disorders (CMDs). Methods: This participatory research involves two large Canadian organizations. In each organization, we established an advisory committee composed of RTW stakeholders. We collected information in semi-structured interviews from RTW stakeholders

(n = 26) with each member of the advisory committee in each organization, as well as with employees who had recently experienced CMDs. The interviews examined the RTW process for employees on sick leave due to CMDs as well as RTW stakeholders' perceptions of barriers and facilitators. A thematic approach was used to synthesize the data, following which, results were discussed with the two advisory committees to identify solutions considering key RTW steps. Results: Ten common key steps within the three RTW phases emerged from the semi-structured interviews with RTW stakeholders and discussions with the two advisory committees: 1) At the beginning of sickness absence and involvement of disability management team (phase 1), we found 3 steps (e.g., taking charge of the file), 2) during the involvement in treatment rehabilitation with health professionals and preparation of the RTW (phase 2), 4 steps (e.g., RTW preparation), and finally 3) the RTW and follow-up (phase 3) consists of 3 steps (e.g., gradual RTW). Conclusion: A participatory study involving RTW stakeholders helped identify 10 common key steps within three phases to support RTW sustainability of people with CMDs. Future research will need to address how RTW coordinators intervene in the RTW process of employees with CMDs within these steps. IMPLICATIONS FOR REHABILITATION Rehabilitation professionals will benefit from a detailed description of the RTW process (10 steps spread out over 3 RTW phases), allowing them to standardize it while adopting a personalized approach for the employee on sick leave. Rehabilitation professionals are informed of stakeholders' role and actions required in the RTW process; as such the communication between RTW stakeholders should be improved. RTW coordinators will be able to tailor more precisely their intervention, considering the detailed RTW process and RTW stakeholders' role and actions, and thus will become the pivot occupational health specialists for the RTW process.

Hirsch B, Lentge P, and Schnabel C. Uncovered workers in plants covered by collective bargaining: who are they and how do they fare? *British Journal of Industrial Relations*. 2022; 60(4):929-945.

<https://doi.org/10.1111/bjir.12679> [open access]

Abstract: In Germany, employers used to pay union members and non-members in a plant the same union wage in order to prevent workers from joining unions. Using recent administrative data, we investigate which workers in firms covered by collective bargaining agreements still individually benefit from these union agreements, which workers are not covered anymore and what this means for their wages. We show that about 9 per cent of workers in plants with collective agreements do not enjoy individual coverage (and thus the union wage) anymore. Econometric analyses with unconditional quantile regressions and firm-fixed-effects estimations demonstrate that not being individually covered by a collective agreement has serious wage implications for most workers. Low-wage non-union workers and those at low hierarchy levels particularly suffer since employers abstain from extending union wages to them in order to pay lower wages. This jeopardizes unions' goal of protecting all disadvantaged workers.

Kataria KK, Sharma M, Mohan Suri N, Kant S, and Luthra S. Analyzing musculoskeletal risk-severity among small scale casting workers using ergonomic assessment tools: a statistical approach. Work. 2022; 72(4):1429-1442.

<https://doi.org/10.3233/WOR-210867>

Abstract: Background: Work-related musculoskeletal disorders (WMSDs) are leading cause of injuries among economically backward workers employed under small scale metal casting units especially in developing countries. In India, most casting unit's falls under small and medium enterprises having inadequacy of advanced technological equipment's due to several economic constraints and rely intensively on manual labour. Foundry work is very much prone to WMSDs involving much physical interaction of workers with their jobs which includes several risk factors. Objective: The study objectives were to analyse the musculoskeletal risk prevalence among small scale casting workers using ergonomic assessment tools and statistical approach. Methods: In present study, WMSDs risk prevalence has been examined using Rapid Entire Body Assessment (REBA) and virtual ergonomics. Further, risk evaluations were analysed using Mann-Whitney U test and Taguchi L25 orthogonal array. Results: Results revealed manual handling task as being most vulnerable followed by the fettling section. Statistically significant differences were observed (p -value < 0.05) among all the work-sections except lift-lower task and molding section ($p = 0.361$; $p > 0.05$) for left side region; and lift-lower task and fettling section ($p = 0.230$; $p > 0.05$) for the right side region, where differences were not statistically significant. ANOVA results indicated that workstation height followed by population percentile and object weight were dominant factors significantly affecting the response parameter i.e. L4-L5 spine compression (p -value < 0.01); however workstation width (p -value > 0.05) had no significant effect. Conclusion: The present study may guide foundry industrialists in analysing the mismatch between the workers' job profile and redesigning existing workstation layouts in small scale foundries based on minimizing the WMSDs risk severity associated with the work tasks.

Lefrancois M and Trottier M. Work-family balance in the construction industry: why gender analysis matters to develop sustainable interventions. Ergonomics. 2022; 65(11):1525-1536.

<https://doi.org/10.1080/00140139.2021.2021281>

Abstract: Work-family balance (WFB) in the construction sector has rarely been studied. Hardship, atypical schedules and seasonal work create challenging conditions for parents in this male-dominated industry. Semi-structured interviews with workers (14 men, 6 women) and a survey of 789 on-site workers (85% men, 15% women) were conducted as part of a wider participatory action-research project involving governmental actors. Triangulation of the interview and survey data clarified the influence of quantitative and qualitative workload and of managerial support on work-family conflict. Results also show that male and female workers have differentiated experiences of WF issues and, consequently, develop different WF strategies while pursuing increased flexibility. The stereotyped conception of WF encourages social norms that have various impacts on mothers and fathers working in the industry. Recommendations for a cultural shift are proposed for employers in this industry,

marked by a labour shortage and low retention of female workers. Practitioner summary: This paper provides a gendered analysis of work-family issues among on-site workers in the construction industry. It aims to inform ergonomists and occupational health researchers about the potential of inflexible work designs to convey stereotypes that can impact the sustainability and equity of workplace interventions

Mazur LM, Adapa K, Meltzer-Brody S, and Karwowski W. Towards better understanding of workplace factors contributing to hospitalist burden and burnout prior to COVID-19 pandemic. *Applied Ergonomics*. 2023; 106:103884.

<https://doi.org/10.1016/j.apergo.2022.103884> [open access]

Abstract: BACKGROUND: Hospitalists are physicians trained in internal medicine and play a critical role in delivering care in in-patient settings. They work across and interact with a variety of sub-systems of the hospital, collaborate with various specialties, and spend their time exclusively in hospitals. Research shows that hospitalists report burnout rates above the national average for physicians and thus, it is important to understand the key factors contributing to hospitalists' burnout and identify key priorities for improving hospitalists' workplace. METHODS: Hospitalists at an academic medical center and a community hospital were recruited to complete a survey that included demographics, rating the extent to which socio-technical (S-T) factors contributed to burnout, and 22-item Maslach Burnout Inventory - Human Services Survey (MBI-HSS). Twelve contextual inquiries (CIs) involving shadowing hospitalists for 60 h were conducted varied by shift type, length of tenure, age, sex, and location. Using data from the survey and CIs, an affinity diagram was developed and presented during focus groups to 12 hospitalists to validate the model and prioritize improvement efforts. RESULTS: The overall survey participation rate was 68%. 76% of hospitalists reported elevated levels on at least one sub-component within the MBI. During CIs, key breakdowns were reported in relationships, communication, coordination of care, work processes in electronic healthcare records (EHR), and physical space. Using data from CIs, an affinity diagram was developed. Hospitalists voted the following as key priorities for targeted improvement: improve relationships with other care team members, improve communication systems and prevent interruptions and disruptions, facilitate coordination of care, improve workflows in EHR, and improve physical space. CONCLUSIONS: This mixed-method study utilizes participatory and data-driven approaches to provide evidence-based prioritization of key factors contributing to hospitalists' burnout. Healthcare systems may utilize this approach to identify workplace factors contributing to provider burnout and consider targeting the factors identified by providers to best optimize scarce resources

Monti C, Giammichele G, Antuono V, Loreti B, Tomei F, De Marco F, et al. Low-dose occupational exposure to nickel and thyroid hormones. *Journal of Occupational & Environmental Medicine*. 2022; 64(11):e667-e671.

<https://doi.org/10.1097/JOM.0000000000002660>

Abstract: INTRODUCTION: The aim of this study was to evaluate the effects of a low-dose exposure to nickel, as it is present in urban air, on thyroid hormones and on thyrotropin in outdoor workers exposed to urban pollutants. MATERIALS AND METHODS: A total of 164 outdoor workers were studied and divided by sex and smoking habit. Each worker underwent measurement of urinary nickel and of blood triiodothyronine, L-thyroxine, and thyrotropin levels. The statistical analysis was performed. RESULTS: Statistical analysis shows a significant and positive correlation between urinary nickel and L-thyroxine, both in total sample and in males. DISCUSSION AND CONCLUSION: The study suggests that occupational exposure to a low dose of nickel may affect thyroid function in municipal police workers. These data may provide information on other categories of outdoor workers with similar exposure

Olson KD, Fogelman N, Maturo L, Alvarado J, Ball S, Forray A, et al. COVID-19 Traumatic disaster appraisal and stress symptoms among health care workers: insights from the Yale Stress Self-assessment. *Journal of Occupational & Environmental Medicine*. 2022; 64(11):934-941.

<https://doi.org/10.1097/JOM.0000000000002673> [open access]

Abstract: OBJECTIVE: To determine to what extent did health care workers experience the pandemic as a severe stress event. METHODS: This cross-sectional evaluation of 8299 health care workers, representing a 22% response rate, utilized machine learning to predict high levels of escalating stress based on demographics and known predictors for adverse psychological outcomes after trauma. RESULTS: A third of health care workers experienced the pandemic as a potentially traumatic stress event; a greater proportion of health care workers experienced high levels of escalating stress. Predictive factors included sense of control, ability to manage work-life demands, guilt or shame, age, and level of education. Gender was no longer predictive after controlling for other factors. Escalating stress was especially high among nonclinical academics and clinical private practitioners. CONCLUSION: Findings suggest adverse effects on total worker health, care quality, professionalism, retention, and acute and chronic mental health

Ruco A, Nichol K, Edwards B, Roy M, Morgan D, Holness DL, et al. Spot it, prevent it: evaluation of a rapid response algorithm for managing workplace violence among home care workers. *Workplace Health & Safety*. 2022; 70(11):493-499.

<https://doi.org/10.1177/21650799221110891> [open access]

Abstract: BACKGROUND: Workplace violence incidents remain pervasive in health care. Home care workers like personal support workers (PSWs) provide services for clients with dementia, which has been identified as a risk factor for workplace violence. The objective of this study was to evaluate whether the implementation of a rapid response algorithm

resolved unsafe working conditions associated with responsive behaviors and decreased perception of risk. **METHODS:** A nonexperimental pre- and post-evaluation design was utilized to collect data from PSWs and supervisors. PSWs completed an online survey about their experience with workplace violence and perception of risk. Bi-weekly check-ins were conducted with supervisors to track incidents and their level of resolution in the algorithm. Semi-structured interviews were also conducted to gather in-depth feedback about the algorithm in practice. **FINDINGS:** We found no difference in risk perception among PSWs pre- and post-implementation. However, PSWs who had been employed for less than 1 year had a significantly higher risk perception. Overall, the algorithm was found to be helpful in resolving workplace violence incidents. **CONCLUSION AND APPLICATION TO PRACTICE:** Opportunity exists to further refine the algorithm and ongoing dissemination, and implementation of the algorithm is recommended to continually address incidents of workplace violence. Newly hired PSWs may require additional supports. Ongoing education and training were identified as key mitigation strategies

Salerno S and Giliberti C. Women's wrist and elbow at work: analysis of acute injuries and cumulative trauma disorders to improve ergonomics in female-dominated activities.

Ergonomics. 2022; 65(11):1477-1485.

<https://doi.org/10.1080/00140139.2022.2095037>

Abstract: The aim of this study is to analyse women's wrist and elbow acute work injuries together with cumulative trauma disorders, such as carpal tunnel syndrome (CTS) and epicondylitis. Five years records (2015-2019) on women's wrist/elbow acute work injuries and CTS/epicondylitis, from Italian National Compensation Authority, were collected and pooled all together as 'dis-ac' (disorders + acute) events. A statistical analysis was performed in comparing the different female-dominated work sectors. Results showed that hairdressing/laundry sector was associated with the highest risk for wrist acute work injuries and cleaning for elbow while manufacturing for CTS and epicondylitis. Hairdressing/laundry and manufacturing were associated with the highest risk for dis-ac events (hairdressing: wrist dis-ac OR: 4.89; CI 95% 4.22-5.67; elbow dis-ac OR: 3.70; CI 95% 2.99-4.58; manufacturing: wrist dis-ac OR: 3.39; CI 95% 3.13-3.66; elbow dis-ac OR: 2.45; CI 95% 2.20-2.73). The relationship between acute injuries and cumulative trauma disorders is discussed to preserve women's safety and health in ergonomics. **Practitioner Summary:** Women's wrist and elbow acute work injuries and cumulative trauma disorders (carpal tunnel syndrome and epicondylitis) were analysed and studied all together (dis-ac events) in female-dominated activities. Hairdressing and manufacturing work sectors were associated with the highest risk, showing the need to safeguard the health and safety of female workers.

Solberg E, Sverdrup TE, Sandvik AM, and Schei V. Encouraging or expecting flexibility? How small business leaders' mastery goal orientation influences employee flexibility through different work climate perceptions. *Human Relations*. 2022; 75(12):2246-2271.

<https://doi.org/10.1177/00187267211042538> [open access]

Abstract: The employee flexibility desired in changing and uncertain business environments is amplified in small business settings. How can small business leaders facilitate the employee flexibility needed in this context? In the present study, we proposed that mastery goal-oriented leaders who are concerned with learning and competence development would create a work climate that promoted employee flexibility in their firms. We tested our hypotheses with multi-wave, multi-level data collected from leaders and employees in 141 small accounting firms in Norway. Findings revealed that leaders' mastery goal orientation (MGO) was positively related to employee flexibility through a work climate that encouraged learning and development (a mastery climate). Yet, we also found that leaders' MGO was negatively related to employee flexibility through a work climate that emphasized the expectations to be adaptive and flexible (an adaptability climate). Taken together, our study suggests that leaders' mastery goal orientation may fuel employee flexibility when encouraging flexible-related behavior yet backfire when they signal that the same behavior is expected.

Wright E, Chen JT, Beckfield J, Theodore N, and Krieger N. Workplace hazards and health among informally employed domestic workers in 14 cities, United States, 2011-2012: using four approaches to characterize workers' patterns of exposures. *American Journal of Industrial Medicine*. 2022; 65(12):959-974.

<https://doi.org/10.1002/ajim.23433>

Abstract: Background: We characterized informally employed US domestic workers' (DWers) exposure to patterns of workplace hazards, as well as to single hazards, and examined associations with DWers' work-related and general health. Methods: We analyzed cross-sectional data from the sole nationwide survey of informally employed US DWers with work-related hazards data, conducted in 14 cities (2011-2012; N = 2086). We characterized DWers' exposures using four approaches: single exposures (n = 19 hazards), composite exposure to hazards selected a priori, classification trees, and latent class analysis. We used city fixed effects regression to estimate the risk ratio (RR) of work-related back injury, work-related illness, and fair-to-poor self-rated health associated with exposure as defined by each approach. Results: Across all four approaches-net of individual, household, and occupational characteristics, and city fixed effects-exposure to workplace hazards was associated with increased risk of the three health outcomes. For work-related back injury, the estimated RR associated with heavy lifting (the single hazard with the largest RR), exposure to all three hazards selected a priori (worker did heavy lifting, climbed to clean, and worked long hours) versus none, exposure to the two hazards identified by classification trees (heavy lifting, verbally abused) versus "no heavy lifting," and membership in the most- versus least-exposed latent class were, respectively, 3.4 (95% confidence interval [CI] 2.7-4.1); 6.5 (95% CI 4.8-8.7);

4.4 (95% CI 3.6-5.3), and 6.6 (95% CI 4.6-9.4). Conclusions: Measures of joint work-related exposures were more strongly associated than single exposures with informally employed US DWers' health profiles.

Xu J, Cheung C, Manu P, Ejohwomu O, and Too J. Implementing safety leading indicators in construction: toward a proactive approach to safety management. *Safety Science*. 2023; 157:105929.

<https://doi.org/10.1016/j.ssci.2022.105929> [open access]

Abstract: Safety leading indicators have been investigated as a proactive management approach to managing construction safety. However, there is a lack of insight into the implementation of safety leading indicators in construction projects and organizations. This causes difficulties in the adoption and consistent use of safety leading indicators in the construction industry. The aim of the research is to explore what and how safety leading indicators can be implemented to improve safety management in the construction industry. Built upon Xu et al. (2021), the study prioritized the relative importance of 17 safety leading indicators through a three-round Delphi survey and voting analytic hierarchy process (VAHP). It was found that organization commitment; client, designer and contractor engagement; training and orientation; safety climate and competence were most critical to safety performance in construction. Furthermore, operational, organizational and strategic barriers to the effective implementation of safety leading indicators were identified through the focus group discussion. The study suggested strategies for addressing these barriers and moving toward a proactive safety management approach. This study contributes to the theories and practices of construction safety management by linking the deployment of safety leading indicators with organizational and strategic issues at firm and project levels and addressing the root causes of poor performance. The effective deployment of safety leading indicators needs the engagement of clients, contractors, designers and supply chains to develop organizational capabilities to drive improvements from the project front-end to completion.

Ziam S, Lakhal S, Laroche E, Lane J, Alderson M, and Gagne C. Musculoskeletal disorder (MSD) prevention practices by nurses working in health care settings: facilitators and barriers to implementation. *Applied Ergonomics*. 2023; 106:103895.

<https://doi.org/10.1016/j.apergo.2022.103895>

Abstract: The incidence of musculoskeletal disorders (MSD) in the healthcare professional population is concerning. In particular, the high incidence of back injuries is an issue for nurses. Although many MSD prevention initiatives are being implemented, these practices are not succeeding in reducing MSDs. Why are these efforts struggling to close the gap between knowledge and practice? This article aims to report on individual and organizational factors that may influence nurses' implementation of MSD prevention practices. A survey was sent to nurses in the Quebec health and social services network. A total of 399 questionnaires were completed and analyzed. The results revealed that nurses have the required knowledge on MSD prevention practices, but have difficulty applying them in their professional context.

It would appear that successful implementation of MSD prevention practices relies mainly on organizational factors, including management support, organizational culture, feedback mechanisms, and training that is adapted to the work environment

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