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

***Van Eerd D, Irvin E, Le Pouesard M, Butt A, and Nasir K. Workplace musculoskeletal disorder prevention practices and experiences. *Inquiry*. 2022; [epub ahead of print]. <https://doi.org/10.1177/00469580221092132> [open access]**

Abstract: Introduction. Musculoskeletal disorders (MSD) remain a substantial burden to society and to workplaces worldwide. Evidence-based practice approaches may be helpful; however, current research evidence is not consistently strong. Workplaces must address MSD regardless of the state of the research evidence. The study objective was to describe workplace MSD prevention practices experiences and perspectives of workers, managers, and occupational health and safety practitioners. Methods. This descriptive study used a convenience sample from Newfoundland and Labrador workplaces. Data were collected via survey and interviews. The survey data was analyzed using descriptive statistics and the interview data was analyzed using thematic analysis. Results. Results were examined from 645 survey respondents and 17 interviewees. Survey findings revealed that about half of respondents reported MSD policies existed in their workplace. Many MSD practices (such as ergonomics and force reduction) were considered available by most respondents. Over fifty percent of respondents received some training on MSD. The person most often endorsed as responsible to support workers with MSD was a manager. Interview findings showed that MSD prevention practices related to awareness, training, and hazard reduction are considered important and effective. Facilitators of MSD prevention include practices that are proactive and customized and increase knowledge about MSD prevention. Barriers concerning lack of resources and poor implementation were consistently mentioned.

Conclusions. Evidence from current practices may help workplaces reduce MSD burden. However, with only about fifty percent of respondents reporting that MSD policies exist in the workplace, further work to address MSD is required. Future research should examine workplace practices as an important source of evidence. OHS professionals can use the study findings and adapt it to their context(s) to guide their design and implementation of MSD prevention practices. Improved MSD prevention practices and interventions can lead to decreases in MSD in workplaces across all industrial sectors

Aktas E, Bergbom B, Godderis L, Kreshpaj B, Marinov M, Mates D, et al. Migrant workers occupational health research: an OMEGA-NET working group position paper. *International Archives of Occupational & Environmental Health*. 2022; 95(4):765-777.

<https://doi.org/10.1007/s00420-021-01803-x> [open access]

Abstract: OBJECTIVE: The aims of the study were: (1) to clarify the definitions of "migrant" used in occupational health research; (2) to summarize migrant workers' industry sectors, occupations and employment conditions; (3) to identify the occupational health and safety services available to migrant workers; (4) to summarize work-related health problems found among migrant workers; (5) to identify the methodological challenges to research into occupational health of migrant workers; and (6) to recommend improvements in migrant occupational health research. METHODS: This position paper was prepared by researchers from several European countries and Australia, working within the EU COST Action OMEGA-NET. The paper drew on two recent systematic reviews on the occupational health of international migrant workers and other literature, and also identified uncertainties and gaps in the research literature. Migrants may, for example, be temporary or permanent, moving for specific jobs migrants or other reasons. Their ethnicity and language capabilities will affect their work opportunities. RESULTS: The occupational health literature seldom adequately identifies the heterogeneity or characteristics of the migrant group being studied. Migrants tend to work in more physically and mentally demanding environments with higher exposures than native workers. Migrants tend to have an increased risk of physical and mental ill health, but less access to health care services. This has been demonstrated recently by high rates of COVID-19 and less access to health care. There have been a number of cross-sectional studies of migrant health but few long-term cohort studies were identified. Other study designs, such as registry-based studies, surveys and qualitative studies may complement cross-sectional studies. Mixed-methodology studies would be valuable in research on migrants' occupational health. Language and lack of trust are barriers to migrant research participation. CONCLUSION: Targeted research, especially longitudinal, identifying how these economically important but often-vulnerable workers can be best assisted is needed. Researchers should identify the characteristics of the migrant workers that they are studying including visa/migration circumstances (temporary, permanent, undocumented), racial and ethnic characteristics, existing skills and language abilities

Bernacki EJ, Hunt DL, Tsourmas NF, Yuspeh L, Lavin RA, Kalia N, et al. Attributes of long duration COVID-19 workers' compensation claims. *Journal of Occupational & Environmental Medicine*. 2022; 64(5):e327-e332.

<https://doi.org/10.1097/JOM.0000000000002523>

Abstract: Objective: To examine the attributes associated with long duration COVID-19 workers' compensation (WC) claims. Methods: A study was conducted on 13,153 COVID-19 WC claims accepted by a workers' compensation insurance carrier between January 1, 2020 and November 30, 2021. Results: 1) Ninety-five percent of accepted WC claims were closed within the study period; 2) five percent of claims had 30 days or longer of lost time accounting for 65% of total paid WC costs; 3) medical costs increased 8-fold once paid days lost crossed the threshold of 60 days or greater; 4) age was the strongest risk factor associated with increased WC costs and prolonged impairment. Conclusion: Age at the time of infection was the major factor associated with prolonged impairment and high costs of COVID-19 related WC claims.

Blaizot A, Veettil SK, Saidoung P, Moreno-Garcia CF, Wiratunga N, Aceves-Martins M, et al. Using artificial intelligence methods for systematic review in health sciences: a systematic review. *Research Synthesis Methods*. 2022; 13(3):353-362.

<https://doi.org/10.1002/jrsm.1553>

Abstract: The exponential increase in published articles makes a thorough and expedient review of literature increasingly challenging. This review delineated automated tools and platforms that employ artificial intelligence (AI) approaches and evaluated the reported benefits and challenges in using such methods. A search was conducted in 4 databases (Medline, Embase, CDSR, and Epistemonikos) up to April 2021 for systematic reviews and other related reviews implementing AI methods. To be included, the review must use any form of AI method, including machine learning, deep learning, neural network, or any other applications used to enable the full or semi-autonomous performance of one or more stages in the development of evidence synthesis. Twelve reviews were included, using nine different tools to implement 15 different AI methods. Eleven methods were used in the screening stages of the review (73%). The rest were divided: two in data extraction (13%) and two in risk of bias assessment (13%). The ambiguous benefits of the data extractions, combined with the reported advantages from 10 reviews, indicating that AI platforms have taken hold with varying success in evidence synthesis. However, the results are qualified by the reliance on the self-reporting of the review authors. Extensive human validation still appears required at this stage in implementing AI methods, though further evaluation is required to define the overall contribution of such platforms in enhancing efficiency and quality in evidence synthesis

d'Errico A, Falkstedt D, Almroth M, Badarin K, Hemmingsson T, and Kjellberg K. Long-term sick leave for back pain, exposure to physical workload and psychosocial factors at work, and risk of disability and early-age retirement among aged Swedish workers. *International Archives of Occupational & Environmental Health*. 2022; [epub ahead of print].

<https://doi.org/10.1007/s00420-022-01862-8>

Abstract: Purpose: To assess the risk of disability and early-age retirement associated with previous long-term sickness absence for back pain (back-pain SA), exposure to high physical workload, low job control, high demands and high strain, and to evaluate effect modification by work factors on the relationship between back-pain SA and premature retirement. Methods: All employed Swedish residents born 1946-1955 (n = 835,956) were followed up from 2010 to 2016 for disability (DP) and early-age pension (EAP). Associations of premature retirement with exposure to work factors and back-pain SA in the 3 years before follow-up were estimated through proportional hazards models. Retirement, back-pain SA and covariates were assessed through administrative sources, and exposure to work factors through a job-exposure matrix. Results: In both genders, back-pain SA was associated with DP (> 1 episode: HR 3.23 among men; HR 3.12 among women) and EAP (> 1 episode: HR 1.24 among men; HR 1.18 among women). Higher physical workload and lower job control were also associated with an increased DP risk in both genders, whereas higher job demands showed a decreased risk. For EAP, associations with work factors were weak and inconsistent across genders. No effect modification by work factors was found, except for a negative effect modification by job strain on DP risk among women, i.e. a reduced effect of back-pain SA with increasing exposure. Conclusion: Back-pain SA was a significant predictor of both DP and EAP, while work factors were consistently associated only with DP. Our results indicate that the joint effect of back-pain SA and work factors on DP is additive and does not support effect modification by work factors.

Hanumegowda PK and Gnanasekaran S. Risk factors and prevalence of work-related musculoskeletal disorders in metropolitan bus drivers: an assessment of whole body and hand-arm transmitted vibration. *Work*. 2022; 71(4):951-973.

<https://doi.org/10.3233/WOR-205007>

Abstract: BACKGROUND: Metropolitan bus drivers have higher prevalence of work-related musculoskeletal disorders (WMSDs) due to their nature of work and working environment. OBJECTIVE: To identify the prevalence of WMSDs and associated risk factors and to conduct real-time testing to evaluate Whole Body Vibration (WBV) and Hand-Arm Vibration (HAV) in buses based on the ISO standards to assess the vibrations levels at different speeds. METHODS: Participants in this study were 370 full-time male bus drivers from the north and south zones of 13 depots of Bengaluru Metropolitan Transport Corporation (BMTTC), Bengaluru, south India. Information regarding WMSDs symptoms during the previous 7 days and 12 months were collected by Modified Nordic Musculoskeletal Questionnaire (MNMQ). WBV and HAV testing was performed and vibration levels were compared with ISO-2631-1 (1997) and ISO-5349-1-2001 standards. It was found that 68.7% of participants reported

WMSDs. RESULTS: Several individuals and work-related factors were found to be statistically significant with WMSDs. From the Gini impurity measure, vibration and road types (Asphalt pavement and Rough road) were considered as vital risk factors associated with WMSDs. CONCLUSION: From the WBV and HAV evaluations, it was found that for buses on asphalt pavement at >60km/h, the vibration level was higher compared to a lower speed. The vibration level exceeded the Exposure Action Value (EAV) on rough roads at all speeds (20km/h, 40km/h and 60km/h) and in several situations considered based on assumptions the vibration level exceeded the Exposure Limiting Value (ELV)

Hu X, Jimmieson NL, and White KM. Understanding compliance with safe work practices: the role of 'can-do' and 'reason-to' factors. Journal of Occupational and Organizational Psychology. 2022; 95(2):405-430.

<https://doi.org/10.1111/joop.12382> [open access]

Abstract: This study addresses the psychological mechanisms that lead to compliance with safe work practices among electrical workers. Compliance with safe work practices can be challenging as it involves substantive cognitive effort and often takes place in the presence of multiple competing demands and situational constraints. Guided by expectancy-value theory, we advance theorizing on compliance by conceptualizing it as a task choice. Our key proposition is that compliance is motivated by the unique and interactive effects of "can-do" (i.e., self-efficacy) and "reason-to" (i.e., perceived usefulness and perceived low cost) psychological states. Distal individual (i.e., safety knowledge and sensation seeking personality) and organizational (i.e., psychological safety climate) antecedents also were considered. Data from a sample of 386 Australian electrical workers in which the focal variables were assessed at Time 1 and compliance with safe work practices was assessed three months later at Time 2 confirmed the hypothesized relationships. A compensating interactive effect between self-efficacy and perceived usefulness also was found. When self-efficacy was high, perceived usefulness no longer had a significant positive relationship with compliance. Overall, this study demonstrates that expectancy-value theory provides a meaningful explanation for the underlying psychological mechanisms that lead to safety compliance. Managers and safety practitioners should focus on cultivating self-efficacy and utility perceptions when enforcing compliance with safe work practices. Practitioner points
This research examined psychological states of a cognitive nature that encourage electricians' compliance with safe work practices. Self-efficacy was found to have the strongest positive association with compliance, and to a lesser extent, perceived usefulness. When feelings of confidence in being compliant were high, perceived usefulness no longer had a significant positive relationship with compliance, suggesting a compensating effect.

Kromydas T, Green M, Craig P, Katikireddi SV, Leyland AH, Niedzwiedz CL, et al. Comparing population-level mental health of UK workers before and during the COVID-19 pandemic: a longitudinal study using Understanding Society. Journal of Epidemiology & Community Health. 2022; 76(6):527-536.

<https://doi.org/10.1136/jech-2021-218561> [open access]

Abstract: Objectives: The COVID-19 pandemic has substantially affected workers' mental health. We investigated changes in UK workers' mental health by industry, socioeconomic class and occupation and differential effects by UK country of residence, gender and age. **Methods:** We used representative Understanding Society data from 6474 adults (41 207 observations) in paid employment who participated in pre-pandemic (2017-2020) and at least one COVID-19 survey. The outcome was General Health Questionnaire-12 (GHQ-12) caseness (score: =4). Exposures were industry, socioeconomic class and occupation and are examined separately. Mixed-effects logistic regression was used to estimate relative (OR) and absolute (%) increases in distress before and during pandemic. Differential effects were investigated for UK countries of residence (non-England/England), gender (male/female) and age (younger/older) using three-way interaction effects. **Results:** GHQ-12 caseness increased in relative terms most for 'professional, scientific and technical' (OR: 3.15, 95% CI 2.17 to 4.59) industry in the pandemic versus pre-pandemic period. Absolute risk increased most in 'hospitality' (+11.4%). For socioeconomic class, 'small employers/self-employed' were most affected in relative and absolute terms (OR: 3.24, 95% CI 2.28 to 4.63; +10.3%). Across occupations, 'sales and customer service' (OR: 3.01, 95% CI 1.61 to 5.62; +10.7%) had the greatest increase. Analysis with three-way interactions showed considerable gender differences, while for UK country of residence and age results are mixed. **Conclusions:** GHQ-12 caseness increases during the pandemic were concentrated among 'professional and technical' and 'hospitality' industries and 'small employers/self-employed' and 'sales and customers service' workers. Female workers often exhibited greater differences in risk by industry and occupation. Policies supporting these industries and groups are needed.

Lovvik C, Overland S, Nielsen MB, Jacobsen HB, and Reme SE. Associations between workplace bullying and later benefit reciprocity among workers with common mental disorders. International Archives of Occupational & Environmental Health. 2022; 95(4):791-798.

<https://doi.org/10.1007/s00420-021-01764-1> [open access]

Abstract: Objective: In this study, we examined exposure to workplace bullying as a predictor of registry-based benefit reciprocity among workers struggling with work participation due to common mental disorders. Further, we examined if the experience of receiving social support moderated the association between workplace bullying and benefit reciprocity. **Design:** Secondary analyses of a randomized controlled trial. **Patients:** People struggling with work participation due to common mental disorders (CMD). **Methods:** Study participants (n = 1193) were from a randomized controlled trial (The At Work and Coping trial (AWaC), trial registration <http://www.Clinicaltrials.gov> NCT01146730), and self-reported CMD as a main obstacle for work participation. Participants were at risk of sickness absence, currently on sickness absence or on long-term benefits. Benefit reciprocity indicated sickness absence and/or long-term benefits (i.e., disability pension) at 6-month follow-up. **Results:** Of the 1193 participants, 36% reported exposure to workplace bullying. Workplace bullying was

significantly associated with benefit reciprocity at 6-month follow-up (OR 1.41, CI 1.11-1.79). Social support did not moderate the association between bullying and benefit reciprocity. Conclusions: The finding that workplace bullying increases the risk of later benefit reciprocity suggest that bullying is a significant obstacle for work participation.

Maxwell J, Pryce R, and Wilson LB. The impact of increasing the United Kingdom national minimum wage on self-reported health. *Health Economics*. 2022; 31(6):1167-1183.

<https://doi.org/10.1002/hec.4490> [open access]

Abstract: There is a growing but mixed literature on the health effects of minimum wages. If minimum wage changes have a statistically significant impact on health, this suggests health effects should be incorporated into cost-benefit analyses to capture wider policy impacts. Whilst most existing UK based literature examines the introduction of a minimum wage, this paper exploits the 2016, 2017 and 2018 UK National Minimum Wage (NMW) increases as natural experiments using a series of difference-in-differences models. Short Form-12 (SF-12) mental and physical component summary scores are used as dependent variables. In the base case and all sensitivity analyses, the estimated impact of NMW increases on mental and physical health are insignificant. The policy implication is that health effects should not be included in cost-benefit analyses examining the NMW

Migliore A, Petrick M, Dierks K, Finkle P, and Suyer A. Leveraging electronic documentation software to improve employment outcomes of job seekers with disabilities. *Journal of Vocational Rehabilitation*. 2022; 56(3):231-236.

<https://doi.org/10.3233/JVR-221187>

Ojsterud KL. A balancing act: the employer perspective on disability disclosure in hiring. *Journal of Vocational Rehabilitation*. 2022; 56(3):289-302.

<https://doi.org/10.3233/JVR-221192>

Parsons V, Oxley G, Hines J, Gallagher R, Sunley K, Fellows C, et al. A national survey of skin health in nursing personnel. *Occupational Medicine*. 2022; 72(4):264-272.

<https://doi.org/10.1093/ocmed/kqac012>

Abstract: BACKGROUND: Hand dermatitis is a well-established occupational risk in nursing staff. AIMS: To explore skin health in nursing staff and to develop resources and recommendations to promote good skincare at work. METHODS: Cross-sectional survey. RESULTS: We analysed data from 1,545 surveys. Forty-six percent reported 'poor' skin health and the majority (93%) experienced at least one skin problem over the previous 12 months, with only 22% seeking help from their employer. Only 2% took time off work due to skin problems, with many expressing concerns that taking sick leave would be viewed negatively by others. Over half (53%) had reduced or stopped using antibacterial rubs and soap, and 18% had reduced the use of gloves. Most respondents used hand cream and over half used products they had purchased themselves. Only 42% received skin health care information

from employers, with fewer (26%) receiving training on how to identify early signs of skin disease. Only 16% had access to skin surveillance in line with regulatory requirements. Only 26% of respondents were aware of the support offered by their professional nursing association. Suggestions for improving skin health included increasing publicity concerning the importance of skin health in healthcare settings, improving access to hand creams, better quality products, enhanced education and training and more involvement from Occupational Health (OH). CONCLUSIONS: Results confirm that poor skin health remains a persistent problem for nurses. Employers could do more to promote skin health and nurses need to be made more aware of the support and guidance offered by professional bodies

Ruettger K, Varela-Mato V, Chen YL, Edwardson CL, Guest A, Gilson ND, et al. Physical activity, sedentary time, and cardiometabolic health in heavy goods vehicle drivers. *Journal of Occupational & Environmental Medicine*. 2022; 64(4):e217-e223.

<https://doi.org/10.1097/JOM.0000000000002484>

Abstract: Objective: Physical inactivity, prolonged sitting, and unhealthy dietary habits are common in Heavy Goods Vehicle (HGV) drivers. These factors increase risk of long-term health conditions. Methods: 329 HGV drivers across 25 UK depots completed a health assessment, including questionnaire completion, and objectively measured anthropometrics, blood biomarkers, physical activity (PA), and sedentary behavior. Results: The sample demonstrated a high-risk cardiometabolic health profile. 88.1% were overweight or had obesity, and 11.9% had pre-diabetes or diabetes. 28.3% had hypertension, 83.6% had clinically elevated circulating low-density lipoprotein-cholesterol concentrations (>2mmol/l), and 66.6% had high total cholesterol levels (>4mmol/l). On workdays drivers accumulated 12 hours/day of sitting, 1.7 hours/day of light PA, and 9.8 mins/day of moderate-to-vigorous PA. Associations between light PA and cardiometabolic markers were observed. Conclusion: This sample presents high levels of inactivity, overweight, and obesity, and unhealthy cardiometabolic health profiles.

Scholl LS, Thiese MS, and Handy R. Incidence of workers' compensation claims in opioid-using truck drivers. *Journal of Occupational & Environmental Medicine*. 2022; 64(4):314-319.

<https://doi.org/10.1097/JOM.0000000000002423>

Abstract: Objective: This study examines the relationship between opioid use prevalence and subsequent filing of workers' compensation claims. Methods: A retrospective cohort study design was utilized to examine data from drivers' initial commercial driver medical exam, employment data, and workers' compensation claims data. Results: Data from 57,733 over 7 years were analyzed. Drivers who reported opioid use at their initial medical exam visit filed subsequent workers' compensation claims 1.81 times sooner ($P = 0.0001$; 95% CI 1.34, 2.44) than drivers who did not report opioid use at their CDME when controlling for age, gender, BMI, and diastolic blood pressure. Conclusions: These findings provide information that may aid in improving regulations to control for incidents, training programs to inform professional

drivers of factors that increase accident risk and educating prescribers about increased risks of injury among opioid-using drivers.

Utzet M, Bacigalupe A, and Navarro A. Occupational health, frontline workers and COVID-19 lockdown: new gender-related inequalities? *Journal of Epidemiology & Community Health*. 2022; 76(6):537-543.

<https://doi.org/10.1136/jech-2021-217692> [open access]

Abstract: INTRODUCTION: The abrupt onset of COVID-19, with its rapid spread, has had brutal consequences in all areas of society, including the workplace. In this paper, we report the working conditions, health, and tranquilisers and opioid analgesics use of workers during the first months of the ensuing pandemic, according to whether they were frontline workers or not and also according to sex. METHODS: Our analysis is based on cross-sectional survey data (collected during April and May 2020) from the wage-earning population in Spain (n=15 070). We estimate prevalences, adjusted prevalence differences and adjusted prevalence ratios by sex and according to whether the worker is a frontline worker or not. RESULTS: Employment and working conditions, exposure to psychosocial risks, as well as health status and the consumption of tranquilisers and opioid analgesics all showed sex and sectoral (frontline vs non-frontline) inequalities, which placed essential women workers in a particularly vulnerable position. Moreover, the consumption of tranquilisers and opioid analgesics increased during the pandemic and health worsened significantly among frontline women workers. CONCLUSIONS: The exceptional situation caused by the COVID-19 pandemic provides an opportunity to revalue essential sectors and to dignify such employment and working conditions, especially among women. There is an urgent need to improve working conditions and reduce occupational risk, particularly among frontline workers. In addition, this study highlights the public health problem posed by tranquilisers and opioid analgesics consumption, especially among frontline women

Veerasammy S, Davidson JB, and Fischer SL. Multi-task exposure assessment to infer musculoskeletal disorder risk: a scoping review of injury causation theories and tools available to assess exposures. *Applied Ergonomics*. 2022; 102:103766.

<https://doi.org/10.1016/j.apergo.2022.103766> [open access]

Abstract: Exposure assessment is critical for understanding musculoskeletal disorder (MSD) risk. Previous reviews summarized the tools available for single-task exposure assessment, however no reviews summarize tools available to assess the accumulation or aggregation of exposure associated with the performance of multiple tasks (i.e., multi-task assessment). We address this gap by using a scoping review methodology to: 1) summarize the theories explaining how multi-task exposures may lead to MSDs, and 2) summarize the models and tools available to assess multi-task exposures, stratified based on prevailing theories. Using a systematic search strategy, 3230 articles were identified, of which 34 were retained for data extraction. Of the retained articles, 13 described MSD causation theories, 12 described mathematical models (not yet accessible as tools), six described readily accessible tools, and

three described both theories and a model or tool. We summarized the state-of-the-art in multi-task exposure assessment and highlight the need for more tools that assess muscle fatigue and inform on recovery

Vlasak T, Dujlovic T, and Barth A. Neurocognitive impairment in night and shift workers: a meta-analysis of observational studies. *Occupational & Environmental Medicine*. 2022; 79(6):365-372.

<https://doi.org/10.1136/oemed-2021-107847>

Abstract: Objective: Shift work is an essential element of modern labour, ensuring ideal conditions of service for today's economy and society. Despite the beneficial properties, its impact on the neurobehavioural performance of exposed subjects remains controversial. This meta-analysis aimed to provide the first summarising effects regarding the association between shift work exposure and different cognitive functions. Methods: A literature search was performed using the databases PubMed, PsycINFO, PsycARTICLES, MedLine, PsycNET and Scopus including eligible studies up to April 2021 that compared shift workers with non-shift workers regarding neurobehavioural performance tests. We carried out a random-effects model using Hedges' g as a meta-analytical effect size with a restricted likelihood estimator to summarise the mean differences between the exposure group and controls. Positive effect sizes indicate higher performance for non-shift workers. The heterogeneity of effect sizes was addressed by sensitivity analysis using funnel plots, Egger's tests, p-curve analysis, meta-regressions and subgroup analysis. Results: We included 18 studies resulting in a total sample of 18 802 participants and 37 effect sizes concerning six different neurobehavioural outcomes. Our results showed significantly worse performance in shift workers compared with non-shift workers in the following cognitive functions with g (95% CI): processing speed 0.16 (0.02 to 0.30), working memory 0.28 (0.51 to 0.50), psychomotor vigilance 0.21 (0.05 to 0.37), cognitive control 0.86 (0.45 to 1.27) and visual attention 0.19 (0.11 to 0.26). Conclusions: We provide the first meta-analytical findings that associate shift work with decreased cognitive performance in processing speed, working memory, psychomotor vigilance, cognitive control and visual attention.

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