

International Journal of Occupational Safety and Ergonomics – rok 2011, ročník 17

Číslo 2



PROTECTION OF HUMAN IN THE WORKING ENVIRONMENT

Károly Hercegi. *Improved Temporal Resolution Heart Rate Variability Monitoring : Pilot Results of Non-Laboratory Experiments Targeting Future Assessment of Human-Computer Interaction. S. 105–117.*

This paper outlines the INTERFACE software ergonomic evaluation methodology and presents new validation results. The INTERFACE methodology is based on a simultaneous assessment of heart rate variability, skin conductance, and other data. The results of using this methodology on-site, in a nonlaboratory environment indicate that it is potentially capable of identifying quality attributes of elements of software with a temporal resolution of only a few seconds. This paper presents pilot results supporting this hypothesis, showing empirical evidence in spite of the definitely non-laboratory environment: they indicate that the method is robust enough for practical usability tests. Naturally, in the future these pilot results will have to be followed with further laboratory-based verification and refinement. This paper focuses only on some characteristics of this method, not on an actual analysis of human-computer interaction; however, its results can establish a future practical and objective event-related analysis of software use.

Károly Hercegi. *Event-Related Assessment of Hypermedia-Based E-Learning Materials With an HRVBased Method That Considers Individual Differences in Users. S. 119–127.*

This paper reports results of an assessment of e-learning materials with the INTERFACE software evaluation methodology. On the one hand, this method of analysis allows us to identify ergonomics problems; on the other, to decide to what extent those problems and their severity concern all users in general and to what extent they depend on the users' type and characteristics. This is the first publication to apply the new marking, export, and statistical features of INTERFACE used in a quantitative analysis of heart rate variability (HRV) curves instead of earlier time-based statistics and qualitative methods. It presents correlations between event-related characteristics of human-computer interaction and the currently required mental effort showed with HRV. The paper also discusses correlations between variables and cognitive-style test scores which indicate the role of individual differences in ergonomics.

Joanna Bugajska, Teresa Makowiec-Dąbrowska, Alicja Bortkiewicz, Elżbieta Gadzicka, Anna Marszałek, Zbigniew Lewandowski, Maria Konarska. *Physical Capacity of Occupationally Active Population and Capability to Perform Physical Work. S. 129–138.*

The aim of this study was to determine what proportion of occupationally active Poles have working capacity that enables them to tolerate hard and very hard physical work. For this purpose physical capacity of 1188 occupationally active subjects (524 women and 664 men), aged 18–64 years was examined. Their maximal oxygen consumption ($V_{O_{2max}}$) was determined indirectly on the basis of their heart rate during an incremental exercise test on a bicycle ergometer. It was found that hard occupational physical work was an excessive load for almost 40% of men and women. This paper discusses how this load should be decreased with planned, appropriately long rest breaks. The percentage of persons for whom their hard physical work becomes an excessive load increases with age to such a degree that a new assessment of individual capability for such work is recommended for persons over 40 years old.

Caroline Joseph, Daniel Imbeau, Iuliana Nastasia. *Measurement Consistency Among Observational Job Analysis Methods During an Intervention Study. S. 139–146.*

Several observational methods are available for ergonomists to evaluate the exposure to musculoskeletal disorder (MSD) risk factors associated with work. Those methods can be used to evaluate the impact of modifications done at a workstation on the exposure to risk factors. Three methods (QEC, OCRA and 4D Watbak) were used to assess the exposure to MSD risk factors before and after the implementation of changes at a saw and block opening workstation. The results from those 3 methods served to compare the methods and evaluate their consistency. Comparisons among the methods showed positive association between QEC and OCRA indices, and between the QEC back index and 4D Watbak.

Gyuseok Hwang, Chungsik Yoon, Hyesun Jung, Yongbae Kim. *Evaluation of an Incentive-Based Obesity Management Program in a Workplace. S. 147–154.*

This study is to analyze the effectiveness of an incentive-based obesity management program (the Midas Project aimed to improve good health habits) at an electronics company in 2005. A total of 95 company participants with a high body mass index (BMI) were recruited for a health promotion program for 3 months that awarded gold medals as an incentive for body fat loss. BMI decreased from 28.8 to 27.8 kg/m² ($p = .000$), body weight decreased from 87.2 to 83.5 kg ($p = .000$), and body fat weight decreased from 25.4 to 23.3 kg ($p = .000$). Systolic and diastolic blood pressure decreased from 130.5 to 125.1 mmHg ($p = .002$), from 86.4 to 81.7 mmHg ($p = .009$). The percentage of participants exercising more than 3 times per week increased from 27.3 to 52.3% ($p = .000$). The percentage who avoided overeating at parties and midnight eating increased from 65.9 to 72.7% ($p = .767$) and 70.5 to 84.1% ($p = .172$), respectively. This incentive-based obesity management program was effective in improving not only BMI but also health status.

PROTECTION OF HUMAN AT THE WORKSTATION

Pei Wang, Pei-Luen Patrick Rau, Gavriel Salvendy. *Chinese Drivers' Risky Driving and Risk Taking in Other Life Situations. S. 155–164.*

The first aim of this study was to investigate Chinese drivers' preferences to risk-taking behaviors encountered in daily life, including safety and health, finance, recreation, social

areas, and ethics. The second aim was to evaluate the association between Chinese risky driving and other risk-taking behaviors. A questionnaire survey was conducted with the 324 Chinese drivers who responded. Through a principal component analysis an 8-factor structure was created to interpret different domains of risk-taking behaviors. They were risks in driving, ethics, recreation, gambling, abused health (voluntarily engaging in smoking and binge drinking), investment, ignored health (ignoring personal health, such as eating expired food), and monetary social areas. The result of multiple regression analysis showed that drivers who were likely to engage in driving risks were also likely to take risks in domains of ethics, abused health, gambling, investment, recreation, and ignored health.

Iwona Sudoł-Szopińska, Anna Bogdan, Tomasz Szopiński, Anna K. Panorska, Małgorzata Kołodziejczak. *Prevalence of Chronic Venous Disorders Among Employees Working in Prolonged Sitting and Standing Postures*. S. 165–173.

Research was conducted to determine the prevalence and severity of chronic venous disorders (CVD) among people working in prolonged sitting or static standing postures. Clinical examination and duplex Doppler sonography were performed on 126 employees working in a sitting (96 individuals) or a standing posture (30 individuals). Evidence of CVD was found in 59.4% of individuals working in a sitting posture and in 83.4% of those working in a standing posture, and was significantly higher in employees working in a standing posture ($p = .015$). Incompetent perforating veins and vena saphena magna valves, and bilateral changes were the more frequent signs of CVD. The investigation showed that prolonged standing and sitting at work increases risk of developing CVD. Further, people working in a standing posture are at a significantly greater risk for CVD than those working in a prolonged sitting posture. They should thus be the subject of specific prophylaxis interventions.

Aron Lindqvist, Olle Nilsson. *Hand Injury From Powered Wood Splitters : Machine Safety, Patterns of Use and Injury Events*. S. 175–186.

Introduction. The purpose of this study was to describe factors of possible importance for the occurrence of hand injury from powered wood splitters. **Patients.** Patients were identified by a computerized patient registry. Information was obtained from hospital records, a written questionnaire and a structured telephone interview. **Results.** Very few splitters were constructed according to European standards. Twenty-one percent of patients injured with wedge splitters thought that having more than one person at the machine was one cause of the accident. Seventy-nine percent of patients injured with screw splitters stated that glove use was one cause of the accident. **Conclusions.** The level of safety in wood splitters that cause hand injury is often poor. Having more than one person at the machine during work may contribute to wedge Splittem injury. Glove use commonly contributes to screw splitter injury. Prevention should be directed towards unsafe machines and dangerous patterns of use.

Tzu-Hsien Lee, Te-Shiang Cheng. *Asymmetric Lifting Capabilities for Different Container Dimensions*. S. 187–193.

This study recruited 14 young male participants to examine human 4-h maximum acceptable weight of lifting (MAWL) and maximum weight of lifting (MWL) for different modes of asymmetric lifting and containers. The results showed that asymmetric lifting with trunk rotation decreased MAWL and MWL by 9.1 and 17.3%, respectively, and asymmetric lifting with body turn decreased MAWL and MWL by 6.1%, when compared with the symmetric lifting. The decreasing effects of container width and MAWL and MWL were greater than those of container length. Participants selected MAWL of ~33–37% of their MWL capability.

Sohair Fouad El-Bestar, Ashraf Abdel-Moniem El-Mitwalli, Eman Omar Khashaba. *Neck–Upper Extremity Musculoskeletal Disorders Among Workers in the Telecommunications Company at Mansoura City. S. 195–205.*

Objectives. This study was to determine the prevalence and work-related risk factors of neck–upper extremity musculoskeletal disorders (MSDs) among video display terminal (VDT) users. **Methods.** A comparative cross-sectional study was conducted; there were 60 VDT users and 35 controls. The participants filled in a structured questionnaire, had electrophysiological tests and an X-ray of the neck. **Results.** The prevalence of MSDs was higher (28.3%) among VDTs users compared to controls (14.3%) with no statistically significant difference. The prevalence of cervical disorders with or without radiculopathy (18.3%) was the most common disorder followed by carpal tunnel syndrome (6.6%). The mean (SD) age of MSD cases (51 ± 7.2 years) was statistically significantly higher than of the controls (42.8 ± 9). Physical exposure to prolonged static posture (OR: 6.9; 95% CI: 0.83–57.9), awkward posture (OR: 5.5; 95% CI: 0.6–46.4) and repetitive movements (OR: 5.5; 95% CI: 0.65–46.4) increased risk of MSDs with a statistically significant difference for static posture only ($p < .05$). VDT users experienced more job dissatisfaction, work-overload and limited social support from supervisors and colleagues. **Conclusion.** VDT use did not increase the risk of neck–upper extremity MSDs. The risk increased with older age and static posture.

NOTES

Joanna Kurpiewska, Jolanta Liwkowicz, Krzysztof Benczek, Kamila Padlewska. *A Survey of Work-Related Skin Diseases in Different Occupations in Poland. S. 207–214.*

Occupational skin disorders, in particular inflammations, dryness and erythema, in 80% of cases affect the skin of hands. The most frequent diagnosis, in over 90% of cases of occupational skin diseases, points to an irritant or allergic contact dermatitis. Our aim was to study the prevalence of self-reported skin symptoms on hands and forearms in different populations. The study was conducted on 581 healthcare workers, 61 hair stylists, 149 beauticians, 90 food services workers, 90 cleaners, 181 metal factory workers and 69 textile workers. Healthcare workers had greatest exposure. Eighty-six percent of dentists, 67% of midwives, 51% of nurses and 41% of physicians reported skin disorders. Problems with latex gloves were declared by 30% of healthcare workers. Thirty-four percent of food services workers, 24% of textile workers, 30% of metal factory workers, 21% of hair stylists and beauticians, and 64% of cleaners reported skin manifestations during the time of employment, which they thought could be work-related.