Ergonomics– rok 2011, ročník 54

Číslo 5


Significant discord has been aired regarding the widening research-practice gap in several disciplines (e.g. psychology, healthcare), especially with reference to research published in academic journals. The research-practice gap has profound and wide-ranging implications for the adequacy of ergonomics and human factors (E/HF) research and the implementation of research findings into practice. However, no substantive research on this issue has been identified in E/HF. Using an online questionnaire, practitioners were asked about their application of scientific research findings published in peer-reviewed journals and to suggest ways to improve research application in practice. A total of 587 usable responses were collected, spanning 46 countries. This article describes some of the key differences and correlations concerning reading, usefulness and barriers to application among respondents, who varied in terms of organisational type, percentage of work time devoted to application vs. research, society membership and experience. Various solutions proposed by the survey respondents on ways to bridge the research-practice gap are discussed. Statement of Relevance: The relationship between research and practice in E/HF has long been a subject of discussion, with commentators pointing to tension and possible implications for the adequacy of the discipline. Findings from a cross-sectional survey provide ergonomics practitioners' views on research, leading to discussion of strategies for achieving better integration.

- Keywords: ergonomics; ergonomists; human factors; research-practice gap

Leif W. Rydstedt; Mark Cropley; Jason Devereux. Long-term impact of role stress and cognitive rumination upon morning and evening saliva cortisol secretion. Pages 430 – 435.

The long-term impact of role stress (conflict and ambiguity), cognitive rumination and their interaction were analysed upon morning and evening saliva cortisol secretion. The sample consisted of 52 male and 24 female British white-collars who had participated in a survey study on psychosocial working conditions 3.5 years earlier. Saliva cortisol secretion was measured over seven consecutive days with two measures: in the morning on awakening and at 22.00 hours. Stepwise linear multiple regression analyses was used for the statistical analyses. Role ambiguity at baseline and the interaction between role
ambiguity and trait rumination contributed to explaining elevations in morning saliva cortisol secretion 3.5 years later ($R^2 = 0.045$; $F = 4.57; p < 0.05$), while role conflict at baseline significantly predicted increases in long-term evening saliva cortisol ($R^2 = 0.057$; $F = 8.99; p < 0.01$). The findings support a long-term relationship between chronic stress exposure and saliva cortisol secretion and some support for the assumption of cognitive rumination moderating the stressor-strain relationship.

Statement of Relevance: The study is of interest for ergonomics practice because it demonstrates that work role ambiguity and role conflict, typically associated with organisational downsizing and restructuring, may contribute to long-term psycho-physiological reactivity. This could expose workers to increased health risks. Therefore, stress management programmes should include the concept of role stress, especially at a time where many work organisations are undergoing significant change. Management should also be made aware of the importance of communicating clear goals, objectives and lines of authority as well as providing sufficient training for those in new job roles.

- Keywords: cortisol; longitudinal; role stress; rumination

Brendan Ryan; Rong Qu; Alex Schock; Tony Parry. Integrating human factors and operational research in a multidisciplinary investigation of road maintenance. Pages 436 – 452.

There has been limited collaboration between researchers in human factors and operational research disciplines, particularly in relation to work in complex, distributed systems. This study aimed to investigate work at the interface between human factors and operational research in the case example of road resurfacing work. Descriptive material on the factors affecting performance in road maintenance work was collected with support from a range of human factors-based methods and was used to inform operational research analyses. Investigation of the case example from a different perspective, for the supply of asphalt from a distribution centre to multiple work locations, gave a broader picture of the complexity and challenges for the improvement of road maintenance processes. Factors affecting performance in the road maintenance context have been assessed for their potential for further investigation using an integrated human factors and operational research approach. Relative strengths of the disciplines and a rationale for ongoing, collaborative work are described. Statement of Relevance: The paper provides evidence of the potential benefits of greater collaboration across human factors and operational research disciplines, using investigation of a case example in the complex, distributed system of road resurfacing.

- Keywords: human factors; operational research; road maintenance; scheduling

Yong-Ku Kong; Inseok Lee; Myung-Chul Jung; Young-Woong Song. The effects of age, viewing distance, display type, font type, colour contrast and number of syllables on the legibility of Korean characters. Pages 453 – 465.

This study evaluated the effects of age (20s and 60s), viewing distance (50 cm, 200 cm), display type (paper, monitor), font type (Gothic, Ming), colour contrast (black letters on white background, white letters on black background) and number of syllables (one, two) on the legibility of Korean characters by using the four legibility measures (minimum letter size for 100% correctness, maximum letter size for 0% correctness, minimum letter size for the least discomfort and maximum letter size for the most discomfort). Ten subjects in each age group read the four letters presented on a slide (letter size varied from 80 pt to 2 pt). Subjects also subjectively rated the reading discomfort of the letters on a 4-point scale ($1 = $no discomfort, $4 = $most discomfort). According to the ANOVA procedure, age, viewing distance and font type significantly affected the four dependent variables ($p < 0.05$), while the main effect of colour contrast was not statistically
significant for any measures. Two-syllable letters had smaller letters than one-syllable letters in the two correctness measures. The younger group could see letter sizes two times smaller than the old group could and the viewing distance of 50 cm showed letters about three times smaller than those at a 200 cm viewing distance. The Gothic fonts were smaller than the Ming fonts. Monitors were smaller than paper for correctness and maximum letter size for the most discomfort. From a comparison of the results for correctness and discomfort, people generally preferred larger letter sizes to those that they could read. The findings of this study may provide basic information for setting a global standard of letter size or font type to improve the legibility of characters written in Korean. **Statement of Relevance:** Results obtained in this study will provide basic information and guidelines for setting standards of letter size and font type to improve the legibility of characters written in Korean. Also, the results might offer useful information for people who are working on design of visual displays.

- **Keywords:** age; display type; font type; Korean character; Number of syllables; viewing distance

**Xuguang Wang; Jules Trasbot. Effects of target location, stature and hand grip type on in-vehicle reach discomfort. Pages 466 – 476.**

In order to improve car interior design, data of perceived discomfort and reach posture were collected for 75 different target locations. Altogether, 24 males and females of different statures participated in the experiment. In addition to three-finger grip, index fingertip reach and five finger grip were also compared. The effects of target location, stature and hand grip on reach discomfort were analysed. Predictive regression equations were provided. In addition to the confirmation of target location effects, the results showed that seat back and steering wheel affected discomfort. Their effects differed according to the subject’s anthropometry. A detailed analysis of possible interference between the car interior and reach movement showed that short females were more likely impeded by the seat back when a target was close to the body. A significant difference between three hand grip types could be explained by the change of hand reach distance when changing hand grip type. **Statement of Relevance:** The present study analysed the effects of target location, stature and hand grip type on reach discomfort, based on the statistical analysis of subjective ratings when reaching a target in a vehicle. The results would help to optimise the location of automotive controls for improving car interior design.

- **Keywords:** automotive; discomfort; posture; reach

**Ewa Gustafsson; Peter W. Johnson; Agneta Lindegård; Mats Hagberg. Technique, muscle activity and kinematic differences in young adults texting on mobile phones. Pages 477 – 487.**

The aim of this study was to investigate whether there are differences in technique between young adults with and without musculoskeletal symptoms when using a mobile phone for texting and whether there are differences in muscle activity and kinematics between different texting techniques. A total of 56 young adults performed a standardised texting task on a mobile phone. Their texting techniques were registered using an observation protocol. The muscular activity in six muscles in the right forearm/hand and both shoulders were registered by surface electromyography and the thumb abduction/adduction and flexion/extension were registered using a biaxial electrogoniometer. Differences in texting techniques were found between the symptomatic and the asymptomatic group, with a higher proportion of sitting with back support and forearm support and with a neutral head position in the asymptomatic group. Differences in muscle activity and kinematics were also found between different texting techniques. The differences in texting technique between symptomatic and asymptomatic subjects cannot be explained by them having symptoms but may be a
possible contribution to their symptoms. **Statement of Relevance:** There has been a dramatically increased use of mobile phones for texting especially among young people during the last years. A better understanding of the physical exposure associated with the intensive use is important in order to prevent the development of musculoskeletal disorders and decreased work ability related to this use.

- **Keywords:** electrogoniometer; electromyography; mobile phone; posture; thumb movements

**Helga E. Laszlo; Michael J. Griffin. The transmission of vibration through gloves : effects of push force, vibration magnitude and inter-subject variability. Pages 488 – 496.**

The extent to which a glove modifies the risks from hand-transmitted vibration is quantified in ISO 10819:1996 by a measure of glove transmissibility determined with one vibration magnitude, one contact force with a handle and only three subjects. This study was designed to investigate systematically the vibration transmissibility of four 'anti-vibration' gloves over the frequency range 16-1600 Hz with 12 subjects, at six magnitudes of vibration (0.25-8.0 ms\(^2\) r.m.s.) and with six push forces (5 N to 80 N). The four gloves showed different transmissibility characteristics that were not greatly affected by vibration magnitude but highly dependent on push force. In all conditions, the variability in transmissibility between subjects was as great as the variability between gloves. It is concluded that a standardised test of glove dynamic performance should include a wide range of hands and a range of forces representative of those occurring in work with vibratory tools. **Statement of Relevance:** The transmission of vibration through anti-vibration gloves is highly dependent on the push force between the hand and a handle and also highly dependent on the hand that is inside the glove. The influence of neither factor is well reflected in ISO 10819:1996, the current standard for anti-vibration gloves.

- **Keywords:** anti-vibration glove; hand-arm vibration; handle push force; vibration magnitude