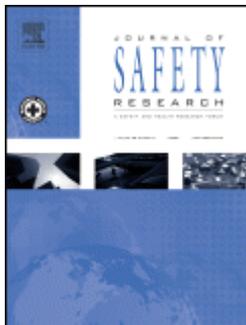


Journal of Safety Research – rok 2009, ročník 40

Číslo 4



Charles C. Liu, Simon G. Hosking, Michael G. Lenné. *Predicting driver drowsiness using vehicle measures : recent insights and future challenges.* Pages 239-245.

Introduction: Driver drowsiness is a significant contributing factor to road crashes. One approach to tackling this issue is to develop technological countermeasures for detecting driver drowsiness, so that a driver can be warned before a crash occurs. **Method:** The goal of this review is to assess, given the current state of knowledge, whether vehicle measures can be used to reliably predict drowsiness in real time. **Results:** Several behavioral experiments have shown that drowsiness can have a serious impact on driving performance in controlled, experimental settings. However, most of those studies have investigated simple functions of performance (such as standard deviation of lane position) and results are often reported as averages across drivers, and across time. **Conclusions:** Further research is necessary to examine more complex functions, as well as individual differences between drivers. **Impact on Industry:** A successful countermeasure for predicting driver drowsiness will probably require the setting of multiple criteria, and the use of multiple measures.

- **Keywords:** Fatigue; Sleepiness; Lane position; Steering wheel; Intelligent Transport Systems

Christina A. Holcroft, Laura Punnett. *Work environment risk factors for injuries in wood processing.* Pages 247-255.

Problem: The reported injury rate for wood product manufacturing in Maine, 1987-2004, was almost twice the state-wide average for all jobs. **Method:** A case-control study was conducted in wood processing plants to determine preventable risk factors for injury. A total of 157 cases with injuries reported to workers' compensation and 251 controls were interviewed. **Results:** In multivariable analyses, variables associated with injury risk were high physical workload, machine-paced work or inability to take a break, lack of training, absence of a lockout/tagout program, low seniority, and male gender. Different subsets of these variables were significant when acute incidents and overexertions were analyzed separately and when all injuries were stratified by industry sub-sector. **Impact on industry:** Generalizability may be limited somewhat by non-representative participation of workplaces and individuals. Nevertheless, these findings provide evidence that many workplace injuries occurring in wood processing could be prevented by application of ergonomics principles and improved work organization.

- **Keywords:** Ergonomics; Physical effort; Psychosocial strain; Safety programs; Sawmill

Zhirui Ye, Dominique Lord. *Estimating the variance in before-after studies*. Pages 257-263.

Problem: To simplify the computation of the variance in before-after studies, it is generally assumed that the observed crash data for each entity (or observation) are Poisson distributed. Given the characteristics of this distribution, the observed value (x_i) for each entity is implicitly made equal to its variance. However, the variance should be estimated using the conditional properties of this observed value (defined as a random variable), that is, $f(x_i|\mu_i)$, since the mean of the observed value is in fact unknown.

Method: Parametric and non-parametric bootstrap methods were investigated to evaluate the conditional assumption using simulated and observed data. **Results:** The results of this study show that observed data should not be used as a substitute for the variance, even if the entities are assumed to be Poisson distributed. Consequently, the estimated variance for the parameters under study in traditional before-after studies is likely to be underestimated. **Conclusions:** The proposed methods offer more accurate approaches for estimating the variance in before-after studies.

- **Keywords:** Before-after study; Variance estimation; Bootstrap; Resampling; Non-parametric

Panagiotis 'Takis' Mitropoulos, Gerardo Cupido. *The role of production and teamwork practices in construction safety : a cognitive model and an empirical case study*. Pages 265-275.

Problem: In construction, the challenge for researchers and practitioners is to develop work systems (production processes and teams) that can achieve high productivity and high safety at the same time. However, construction accident causation models ignore the role of work practices and teamwork. This study investigates the mechanisms by which production and teamwork practices affect the likelihood of accidents. **Method:** The paper synthesizes a new model for construction safety based on the cognitive perspective (Fuller's Task-Demand-Capability Interface model, 2005) and then presents an exploratory case study. The case study investigates and compares the work practices of two residential framing crews: a 'High Reliability Crew' (HRC)—that is, a crew with exceptional productivity and safety over several years, and an average performing crew from the same company. **Results:** The model explains how the production and teamwork practices generate the work situations that workers face (the task demands) and affect the workers ability to cope (capabilities). The case study indicates that the work practices of the HRC directly influence the task demands and match them with the applied capabilities. These practices were guided by the 'principle' of avoiding errors and rework and included work planning and preparation, work distribution, managing the production pressures, and quality and behavior monitoring. **Summary:** The Task Demand-Capability model links construction research to a cognitive model of accident causation and provides a new way to conceptualize safety as an emergent property of the production practices and teamwork processes. The empirical evidence indicates that the crews' work practices and team processes strongly affect the task demands, the applied capabilities, and the match between demands and capabilities. **Impact on Industry:** The proposed model and the exploratory case study will guide further discovery of work practices and teamwork processes that can increase both productivity and safety in construction operations. Such understanding will enable training of construction foremen and crews in these practices to systematically develop high reliability crews.

- **Keywords:** Construction accidents; Cognitive engineering; Accident causation model; Production practices; Teamwork; Framing

Nicoletta Cavazza, Alessandra Serpe. *Effects of safety climate on safety norm violations: exploring the mediating role of attitudinal ambivalence toward personal protective equipment.* Pages 277-283.

Problem: Research on the role of organizational and psychosocial factors in influencing risk behaviors and the likelihood of injury at work showed that safety climate also has great impact on workers' behavior. However, the mechanisms through which this impact operates are still partially unclear. **Method:** In order to explore the role that attitudinal ambivalence toward wearing PPE might play in mediating the impact of safety climate on safety norm violations, a questionnaire was administered to 345 Italian workers. **Results:** Three dimensions of safety climate (i.e., company safety concern, senior managers' safety concern, supervisors' attitudes towards safety) were found to be positively associated with the individual ambivalence level, whereas the fourth one (i.e., work pressure) was negatively correlated with it. In turn, low levels of ambivalence were associated with a lower tendency to break the safety norms, even though the perception of a good safety climate also maintained a direct effect on unsafe behaviors. **Impact on industry:** Designers of training program for the prevention of work related injuries must pay great attention to the psycho-social factors (such as the effects of the safety climate perception by employees on their attitudes and behaviors), and include specific contents into the prevention programs in order to improve workers compliance with safety norms.

- **Keywords:** safety climate; ambivalence; safety norm violations; work injuries prevention; personal protective equipment

Richard D. Blomberg, Raymond C. Peck, Herbert Moskowitz, Marcelline Burns, Dary Fiorentino. *The Long Beach/Fort Lauderdale relative risk study.* Pages 285-292.

Problem: The role of alcohol as a major factor in traffic crash causation has been firmly established. However, controversy remains as to the precise shape of the relative risk function and the BAC at which crash risk begins to increase. **Methods:** This study used a case-control design in two locations: Long Beach, California, and Fort Lauderdale, Florida. Data were collected on 2,871 crashes of all severities and a matched control group of drivers selected from the same time, location, and direction of travel as the crash drivers. Of the 14,985 sample drivers, 81.3% of the crash drivers and 97.9% of the controls provided a valid BAC specimen. **Results:** When adjusted for covariates and nonparticipation bias, increases in relative risk were observed at BACs of .04-.05, and the elevations in risk became very pronounced when BACs exceeded .10. **Discussion:** The results provide strong support for .08 per se laws and for state policies that increase sanctions for BACs in excess of .15. **Impact on Industry:** This study provides further precision on the deleterious effects of alcohol on driving and, by implication, on other complex tasks.

- **Keywords:** Crashes; Relative risk; Drinking and driving; Impaired driving; Hit-and-run drivers; Blood alcohol concentration

Jose M. Adam, Francisco J. Pallarés, Pedro A. Calderón. *Falls from height during the floor slab formwork of buildings : current situation in Spain.* Pages 293-299.

Problem: One of the phases with the highest risk of falls from a height in the construction of a building is during the floor slab formwork stage. This paper analyzes this particular risk, as well as the most frequently used fall-protection systems. **Method:** A survey was carried out to define the current situation in Spain with regard to falls from a height during floor slab formwork and the fall-protection systems used to prevent such a risk.

Results: The results of the survey clarified the current situation in Spain with regard to this risk, and made it clear that there is considerable risk of falling from a height during the floor slab formwork stage. **Discussion:** All the safety systems analyzed presented a series of weak points that should be studied in detail before they can be used on building sites. **Impact on industry:** The risk of falling associated with floor slab formwork and the most frequently used protection systems are analyzed. As no research had been carried out to date on this type of risk, we consider the research presented in this article to be a pioneer in the field.

- **Keywords:** Construction industry; Occupational safety; Formwork; Accident prevention; Injuries; Fatalities; Concrete slabs

Sami Mynttinen, Anna Sundström, Jan Vissers, Marita Koivukoski, Kari Hakuli, Esko Keskinen. *Self-assessed driver competence among novice drivers – a comparison of driving test candidate assessments and examiner assessments in a Dutch and Finnish sample.* Pages 301-309.

Problem: This study examined novice drivers' overconfidence by comparing their self-assessed driver competence with the assessments made by driving examiners. **Method:** A Finnish (n = 2,739) and a Dutch sample (n = 239) of drivers license candidates assessed their driver competence in six areas and took the driving test. **Result and Discussion:** In contrast to previous studies where drivers have assessed their skill in comparison to the average driver, a smaller proportion overestimated and a larger proportion made realistic self-assessments of their driver competence in the present study, where self-assessments were compared with examiner assessments. Between 40% and 50% of the candidates in both samples made realistic assessments and 30% to 40% overestimated their competence. The proportion of overestimation was greater in the Dutch than in the Finnish sample, which might be explained by greater possibilities for practicing self-assessment in the Finnish driver education system. Similar to other self-assessment studies that indicate that incompetence is related to overestimation, a larger proportion of candidates that failed the test overestimated their skill compared to those who passed. In contrast to other studies, males did not overestimate their skills more than females, and younger driver candidates were not more overconfident than older drivers. **Impact on traffic safety:** Although a great proportion of the candidates made a realistic assessment of their own driver competence, overestimation is still a problem that needs to be dealt with. To improve the accuracy of novice drivers' self-assessment, methods for self-assessment training should be developed and implemented in the driver licensing process.

- **Keywords:** Novice Drivers; Driving test; Self-assessment; Overconfidence; GDE-model

Sungyop Kim, Leanna Depue, LaGena Spence, Judi Reine. *Analysis of teenage seat belt use : from the 2007 Missouri high school seat belt survey.* Pages 311-316.

Introduction: This study analyzed high school teenagers' seat belt use based on the observational surveys of more than 15,000 teenagers at 150 schools and was conducted in the state of Missouri, U.S., in 2007. Since fatal car accidents involving high school teenagers are disproportionately high, and increased seat belt use saves lives in what would otherwise be fatal accidents, it is imperative that teenagers' safety be protected through an increase in use. **Method:** This study investigated various personal, vehicle, school, and locational factors associated with high school teenagers' seat belt use. Descriptive and binary logit analyses were conducted. **Results:** We find that low seat belt use is associated with males, African-Americans, pick-up trucks, accompanying occupants, weekends, inclement driving conditions, small size of school, lower socio-economic status, and rural county school locations. Several factors influencing teenage

seat belt use are quite similar to those affecting adult seat belt use, in addition to certain risky behaviors to which teenagers are prone, supporting the importance of early intervention. **Conclusions:** Programs in schools, the adoption of primary seat belt laws, GDL provisions requiring seat belt use, targeted education and campaign efforts for African-American teenagers, seat belt reminder systems, and more resources for rural counties on safety education and enforcement may help increase seat belt use in this vulnerable age group, though other research questions are implied.

- **Keywords:** Seat belt; Teenager; High school; GDL

Abhishek Das, Mohamed Abdel-Aty, Anurag Pande. *Using conditional inference forests to identify the factors affecting crash severity on arterial corridors. Pages 317-327.*

Introduction: The study aims at identifying traffic/highway design/driver-vehicle information significantly related with fatal/severe crashes on urban arterials for different crash types. Since the data used in this study are observational (i.e., collected outside the purview of a designed experiment), an information discovery approach is adopted for this study. **Method:** Random Forests, which are ensembles of individual trees grown by CART (Classification and Regression Tree) algorithm, are applied in numerous applications for this purpose. Specifically, conditional inference forests have been implemented. In each tree of the conditional inference forest, splits are based on how good the association is. Chi-square test statistics are used to measure the association. Apart from identifying the variables that improve classification accuracy, the methodology also clearly identifies the variables that are neutral to accuracy, and also those that decrease it. **Results:** The methodology is quite insightful in identifying the variables of interest in the database (e.g., alcohol/ drug use and higher posted speed limits contribute to severe crashes). Failure to use safety equipment by all passengers and presence of driver/passenger in the vulnerable age group (more than 55 years or less than 3 years) increased the severity of injuries given a crash had occurred. A new variable, 'element' has been used in this study, which assigns crashes to segments, intersections, or access points based on the information from site location, traffic control, and presence of signals. **Impact:** The authors were able to identify roadway locations where severe crashes tend to occur. For example, segments and access points were found to be riskier for single vehicle crashes. Higher skid resistance and k-factor also contributed toward increased severity of injuries in crashes.

- **Keywords:** Multilane arterials; Severe crashes; Crash types; Conditional inference trees and forests; Classification trees

Ruth A. Shults, Randy W. Elder, Daniel W. Hungerford, Brian J. Strife, George W. Ryan. *Emergency department visits for alcohol-related unintentional traumatic injuries, United States, 2001. Pages 329-331.*

In the United States, excessive alcohol consumption is responsible for more than \$180 billion in economic costs per year and is the third leading preventable cause of death (Harwood, 2000; Mokdad, Marks, Stroup, & Gerberding, 2005). The single greatest contributor to alcohol-related mortality in the United States is unintentional injury, accounting for approximately 26,000 deaths per year (CDC, 2004) and placing a substantial burden on emergency departments (EDs). In this study we analyzed 2001 data from a nationally representative sample of hospital EDs to examine characteristics of ED visits for alcohol-related unintentional traumatic injuries and compared them with visits for unintentional traumatic injuries for which alcohol use was not noted in the ED medical chart.