

Journal of Safety Research – rok 2011, ročník 42

Číslo 5 (October 2011)



Randa Oqab Mujalli, Juan de Oña. *A method for simplifying the analysis of traffic accidents injury severity on two-lane highways using Bayesian network.* Pages 317-326.

Introduction: This study describes a method for reducing the number of variables frequently considered in modeling the severity of traffic accidents. The method's efficiency is assessed by constructing Bayesian networks (BN). Method: It is based on a two stage selection process. Several variable selection algorithms, commonly used in data mining, are applied in order to select subsets of variables. BNs are built using the selected subsets and their performance is compared with the original BN (with all the variables) using five indicators. The BNs that improve the indicators' values are further analyzed for identifying the most significant variables (accident type, age, atmospheric factors, gender, lighting, number of injured, and occupant involved). A new BN is built using these variables, where the results of the indicators indicate, in most of the cases, a statistically significant improvement with respect to the original BN. Conclusions: It is possible to reduce the number of variables used to model traffic accidents injury severity through BNs without reducing the performance of the model. Impact on Industry: The study provides the safety analysts a methodology that could be used to minimize the number of variables used in order to determine efficiently the injury severity of traffic accidents without reducing the performance of the model.

- **Keywords:** Injury severity; Variable selection; Bayesian networks; Data mining; Classification

Emanuel Vital, Raul Oliveira, Maria do Céu Machado, Margarida Gaspar de Matos. *Injuries and risk-taking behaviours in Portuguese adolescents : highlights from the health behaviour in school-aged children survey.* Pages 327-331.

Aim: Injuries in adolescence are an important public health problem and a major cause of morbidity and mortality in this age group. This study aimed to determine the behaviour profile associated to risk of injury and the differences between genders, region and ethnic origin. Methods: A cross-sectional study design of a nationally representative sample of 1581 adolescents of the Portuguese Health Behaviour in School-Aged Children study. Results: An occurrence of one injury-related event in the previous year was reported by 21.4% of the respondents and 5.9% referred having more than one injury-related event. Boys reported higher frequency of those events when compared to girls, and non-Portuguese subjects referred higher frequency of events. Scoring higher in

violence-related behaviour and psychosomatic complaints was associated to higher chances of referring more than one injury-related event. Conclusion: Gender, social background and behaviour profile are factors that seem to influence the risk of injuries. This information should guide those involved in the planning of injuries prevention programs in youth.

- **Keywords:** Injuries; Adolescence; Risk-taking behaviour; Portuguese Students; Health

Romain Jallon, Daniel Imbeau, Nathalie de Marcellis-Warin. *A process mapping model for calculating indirect costs of workplace accidents.* Pages 333-344.

This article follows an earlier one in which four criteria and four bases for the development of an indirect-cost calculation model adapted to the accuracy requirements and time constraints of workplace decision-makers were established. A two-level model for calculating indirect costs using process mapping of the organizational response to a workplace accident is presented. The model is based on data collected in interviews with those employees in charge of occupational health and safety in 10 companies of various sizes in different industry sectors. This model is the first to use process mapping to establish the indirect costs of workplace accidents. The approach allows easy identification of the duration and frequency of actions taken by stakeholders when a workplace accident occurs, facilitates the collection of the information needed to calculate indirect costs and yields a usable, precise result. A simple graphic representation of an organization's accident processes helps the user understand each accident's cost components, allowing the identification and reduction of inefficiencies in the overall process. Impact on Industry: By facilitating data collection and shortening the time needed to assess indirect costs of workplace accidents, this indirect cost calculation tool is better suited for workplace use than those currently available

- **Keywords:** Process mapping; Accident costs; Indirect costs calculation model; Occupational injuries; Ergonomic interventions

Rebecca Mitchell, Ann Williamson, Kate Curtis. *What is the potential of trauma registry data to be used for road traffic injury surveillance and informing road safety policy?* Pages 345-350.

Introduction: Information from hospital trauma registries is increasingly being used to support injury surveillance efforts. This research examines the potential of using trauma registry data for road traffic injury surveillance for different types of road users in terms of both the information collected and how representative trauma data are compared to two population-based road traffic injury data collections. Methods: The three data collections were assessed against recommended variables to be collected for injury surveillance purposes and the representativeness of the distribution of road traffic-related injury data from the trauma registry was compared to hospital admission and road traffic authority data collections. Results: Data from the trauma registry was largely not representative of the distribution of age groups or activities compared to the two population-based collections, but was representative for gender for some road user groups to at least one population-based data collection. Conclusions: Trauma data could be used to supplement information from population-based data collections to inform road safety efforts. Impact on Industry: Road safety policy makers should be aware of the potential and the limitations of using trauma registry data for road traffic injury surveillance.

- **Keywords:** Road safety; Surveillance; Trauma; Police reports; Hospitalisation; Injury

Jean M. Gaines, Kasey L. Burke, Katherine A. Marx, Mary Wagner, John M. Parrish. *Enhancing older driver safety : a driving survey and evaluation of the CarFit program. Pages 351-358.*

Objective: To evaluate CarFit, an educational program designed to promote optimal alignment of driver with vehicle. Methods: A driving activity survey was sent to 727 randomly selected participants living in retirement communities. Drivers (n = 195) were assigned randomly to CarFit intervention (n = 83, M age = 78.1) or Comparison (n = 112, M age = 79.6) groups. After 6 months, participants completed a post-test of driving activity and CarFit recommendations. Results: Nonconsenting drivers were older and participated in fewer driving activities. CarFit participation was moderate (71%) with 86% of the participants receiving recommendations. 60% followed the recommendations at the 6-month re-evaluation). The CarFit (67.6%) and Comparison (59.3%) groups reported at least one type of self-regulation of driving activity at baseline. There was no significant change in the driving behaviors at the six-month follow-up. Conclusion: CarFit was able to detect addressable opportunities that may contribute to the safety of older drivers. Impact on industry: CarFit recommendations may need stronger reinforcement in order to be enacted by a participant

- **Keywords:** Driver education; Vehicle modifications; Driver safety; Older adult; CarFit

Wei Zhang, Konstantina Gkritza, Nir Keren, Shashi Nambisan. *Age and gender differences in conviction and crash occurrence subsequent to being directed to Iowa's driver improvement program. Pages 359-365.*

Introduction: This paper investigates potential gender and age differences in conviction and crash occurrence subsequent to being directed to attend Iowa's Driver Improvement Program (DIP). Methods: Binary logit models were developed to investigate the factors that influence conviction occurrence after DIP by gender and age. Because of the low crash occurrence subsequent to DIP, association rules were applied to investigate the factors that influence crash occurrence subsequent to DIP, in lieu of econometric models. Results: There were statistical significant differences by driver gender, age, and conviction history in the likelihood of subsequent convictions. However, this paper found no association between DIP outcome, crash history, and crash occurrence. Impact on industry: Evaluating the differences in conviction and crash occurrence subsequent to DIP between female and male drivers, and among different age groups can lead to improvements of the effectiveness of DIPs and help to identify low-cost intervention measures, customized based on drivers' gender and age, for improving driving behaviors.

- **Keywords:** Driver improvement program; Conviction occurrence; Crash occurrence; Gender differences; Age differences

Roni Factor, Gad Yair, David Mahalel. *Acciphilia on the road : an analysis of severe collisions. Pages 367-374.*

Introduction: Although prior studies of road traffic accidents have found between-group differences in risk, little attention has been given to the encounter between drivers involved in severe collisions. Method: The present study empirically evaluates two different possible causes of "social accidents," which are defined as collisions between two or more drivers where some faulty social interaction might be assumed, and which are the most prevalent cause of road injuries. The analyses use merged Israeli collision records from 1983 to 2004 with data from two national censuses, thus providing an unprecedented empirical basis to study the social foundations of car accidents. The data are used to adjudicate between two alternative hypotheses: the heterogeneity hypothesis (socially different drivers tend to collide) versus the homogeneity hypothesis (socially

similar drivers tend to collide). Results: Multivariate analyses provide preliminary support for the latter hypothesis. Given an accident, there are more collisions among drivers from the same broad educational group, and the factors that influence this correlation are independent of geography. The paper thus leads to the idea that severe collisions reflect a sociological or ecological process that is akin to acciphilia. Impact on Industry: The preliminary findings suggest that variation between drivers may be preferable to similarity, since apparently there is a greater tendency toward collisions between similar drivers.

- **Keywords:** Public health; Road traffic accidents; Cultural influence; Social factors; Socioeconomic characteristics

Wen Hu, Eric T. Donnell. *Severity models of cross-median and rollover crashes on rural divided highways in Pennsylvania. Pages 375-382.*

Introduction: Crossover and rollover crashes in earth-divided, traversable medians on rural divided highways can lead to severe injury outcomes. This study estimated severity models of these two crash types. Vehicle, driver, roadway, and median cross-section design data were factors considered in the models. A unique aspect of the data used to estimate the models were the availability of median cross-slope data, which are not commonly included in roadway inventory data files. Methods: A binary logit model of cross-median crash severity and a multinomial logit model of rollover crash severity were estimated using five years of data from rural divided highways in Pennsylvania. Results: The highest probability of a fatal or major injury in cross-median and rollover crashes was found to occur in cases when a driver was not wearing a seatbelt. While flatter cross-slopes and narrower medians were associated with more severe cross-median crash outcomes, steeper cross-slopes and narrower medians significantly increased rollover crash severity outcomes. The presence of horizontal curves was associated with increased probabilities of high-severity outcomes in a median rollover crash. Impact on Industry: Modeling results in this study confirmed that cross-median and median rollover crash severity outcomes are associated with median cross-section design characteristics. Based on the estimated models, it appears that flatter and narrower medians lead to more severe injury outcomes in cross-median crashes. Steeper median cross-slopes and narrower medians were associated with higher probabilities of more severe outcomes in median rollover crashes. The results presented in this study suggest that there is a trade-off between median cross-section design and cross-median and rollover crashes in earth-divided, traversable medians on rural divided highways. While the severity models can be included in a framework to develop design guidance in relation to this trade-off, models of crash frequency should also be considered.

- **Keywords:** Cross-median crash severity; Median rollover crash severity; Binary logit model; Multinomial logit model; Rural divided highways

Brian N. Mills, Jean Andrey, Derrick Hambly. *Analysis of precipitation-related motor vehicle collision and injury risk using insurance and police record information for Winnipeg, Canada. Pages 383-390.*

Introduction: Police records are the most common source of data used to estimate motor-vehicle collision risks, understand causal or contributing factors, and evaluate the efficacy of interventions. The literature notes concerns about this information citing discrepancies between police reports and other sources of injury occurrence and severity data. The primary objective of the analysis was to assess the adequacy of police reports for an examination of weather-related injury collision risk. Method: Analyses of relative risk were carried out using both police records and comprehensive insurance claim data for Winnipeg, Canada over the period 1999–2001. Results and conclusions: Both data sets yielded very similar results—precipitation substantially increases the risk of injury collision (police records: RR 1.76, CI 1.55-2.00; insurance: RR 1.80, CI 1.62-1.99) and

risk of injury (police records, RR 1.74, CI 1.55-1.96; insurance, RR 1.69, CI 1.55-1.85) relative to corresponding dry weather control periods. Both rainfall and snowfall were associated with large increases in collisions and injuries. Impact on Industry: While relative risks are almost identical, over 64% more injury collisions and 74% more injuries were identified using the insurance data, which is an important difference for evaluating absolute risk and exposure.

- **Keywords:** motor vehicle collisions; injuries; precipitation; insurance; police records

Miguel A. Camino López, Dale O. Ritzel, Ignacio Fontaneda González, Oscar J. González Alcántara. *Occupational accidents with ladders in Spain: Risk factors. Pages 391-398.*

Introduction: Occupational accidents suffered by workers in Spain when using ladders were analyzed over a six year period from 2003–2008, during which the total of notified ladder-related accidents amounted to 21,725. Method: Different accident-related factors were identified for the purpose of developing a pattern of those factors that had the greatest influence on the seriousness and the fatality of such accidents. Thus, a series of variables were examined such as age and length of service of the injured worker, firm size, the work sector, the injury suffered, and the part of the body that was injured. Since falls is the most frequent and most serious of ladder related occupational accidents, a special analysis of falls was performed. Results: The findings showed that the seriousness of ladder-related accidents increased with the age of the injured worker. Likewise, accidents at places other than the usual workplace were more serious and registered higher fatalities than those that occurred at the usual place of work. Conclusions: The analysis of falls from ladders established that accidents in smaller-sized firms were of greater seriousness and involved more fatalities than those in larger-sized firms. The investigation also underlined the need for stricter compliance with preliminary safety assessments when working with ladders.

- **Keywords:** Accidents; Ladder; Risk; Seriousness; Falls

Tsung-Chih Wu. *The roles and functions of safety professionals in Taiwan : comparing the perceptions of safety professionals and safety educators. Pages 399-407.*

Introduction: The perspectives of both internal and external members have to be considered when developing safety curricula. This study discusses perceptual differences between safety educators (SEs) and safety professionals (SPs) regarding the function of SPs. The findings will serve as a reference framework for the establishment of core safety competencies and the development of safety curricula for SPs. Method: 248 respondents, including both SEs and SPs, completed self-administered questionnaires, which included the 45-item safety function scale (SFS). Nine factors were extracted from the scale using exploratory factor analysis (EFA), namely inspection and research, regulatory tasks, emergency procedures and settlement of damage, management and financial affairs, culture change, problem identification and analysis, developing and implementing solutions, knowledge management, and training and communications. Results: Descriptive statistical results indicated that SPs and SEs hold differing views on the rank of the frequency of safety functions. MANOVA results indicated that SPs' perceptions of developing and implementing solutions, training and communications, inspection and research, and management and financial affairs were significantly higher than that of SEs. On the other hand, SE's perceptions regarding participation in regulatory tasks were significantly higher than those of SPs. Based on these results, the author suggests that a clear communication channel should be established between universities and industry to reduce the gap between the perceptions of SEs and SPs. Impact on industry: The results of the study are statistically and practically significant. In

addition to serving as a reference for the development of safety curricula, the results are also conducive to the establishment of SP roles and functions. Ultimately the development of more suitable safety curricula would open up employment competition for students who graduate from safety-related programs. SPs, on the other hand, can correctly recognize their roles and functions so as to realize the safety expectations invested in them by organizations.

- **Keywords:** Safety professionals (SP); Safety educators (SE); Safety role; Safety function; Safety competency

Ying Liu, Amy E. Holland, Karin Mack, Shane Diekman. *Disparities in the prevalence of smoke alarms in U.S. households : conclusions drawn from published case studies. Pages 409-413.*

Introduction: Deaths from fires and burns are a leading cause of fatal home injury in the United States. Smoke alarms are one of the most effective interventions to prevent residential fire deaths. Nationwide, more than 95% of homes are estimated to have at least one smoke alarm. There is evidence that homes at highest risk of fire deaths lag behind national averages in smoke alarm use and maintenance. Method: We compiled a comprehensive list of published studies that focus on smoke alarm prevalence in high-risk homes. Our findings show that there are substantial gaps in both smoke alarm presence and functional status between high-risk homes and national average estimates. Conclusions: To save more lives, improved efforts are needed to reduce the disparity in smoke alarm prevalence and functional use in the United States.

- **Keywords:** Smoke alarms; Fire injury; Home safety; Injury prevention; Home visits; Home inspections; Intervention