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C. Goldenbeld, M. Houtenbos, E. Ehlers, D. De Waard. *The use and risk of portable electronic devices while cycling among different age groups*. Pages 1-8.

Introduction: In the Netherlands, a survey was set up to monitor the extent of the use of portable, electronic devices while cycling amongst different age groups of cyclists and to estimate the possible consequences for safety. Method: The main research questions concerned age differences in the self-reported use of electronic devices while cycling, self-reported crash involvement and risk, and self-reported compensatory behaviour. Teen cyclists (12–17 years) and young adult cyclists (18–34 years) were more frequent users, and also more indiscriminate users of portable devices while cycling than middle-aged and older adult cyclists (35–49 years; 50 + years). Results: After statistical correction for influences on crash risk of urbanization level, weekly time spent cycling, and cycling in more demanding traffic situations, the odds of being involved in a bicycle crash were estimated to be higher for teen cyclists and young adult cyclists who used electronic devices on every trip compared to same age groups cyclists who never used these devices. For middle-aged and older adult cyclists, the use of portable electronic devices was not a significant predictor of bicycle crashes, but frequency of cycling in demanding traffic situations was. Possible implications for education or legal measures are discussed. Impact on Industry: Results may inform researchers, policy makers, and cyclists themselves. Educational campaigns may use risk information to warn young cyclists about risk of device use while cycling.

Highlights: ► A survey on the use and risk of portable electronic devices while cycling. ► Younger cyclists use portable devices more often than older cyclists. ► Younger cyclists are more indiscriminate users of portable devices. ► Among younger cyclists, use of electronic devices predicted bicycle crashes. ► Results may inform researchers, policy makers, and cyclists themselves.

- **Keywords:** Cyclists; Electronic device use; Bicycle crash; Age differences; Risk

Koon-Chuen Yeung, Charles C. Chan. *Measuring safety climate in elderly homes*. Pages 9-20.

Introduction: Provision of a valid and reliable safety climate dimension brings enormous benefits to the elderly home sector. The aim of the present study was to make use of the safety climate instrument developed by OSHC to measure the safety perceptions of employees in elderly homes such that the factor structure of the safety climate

dimensions of elderly homes could be explored. Method: In 2010, surveys by mustering on site method were administered in 27 elderly homes that had participated in the "Hong Kong Safe and Healthy Residential Care Home Accreditation Scheme" organized by the Occupational Safety and Health Council. Results: Six hundred and fifty-one surveys were returned with a response rate of 54.3%. To examine the factor structure of safety climate dimensions in our study, an exploratory factor analysis (EFA) using principal components analysis method was conducted to identify the underlying factors. The results of the modified seven-factor's safety climate structure extracted from 35 items better reflected the safety climate dimensions of elderly homes. The Cronbach alpha range for this study (0.655 to 0.851) indicated good internal consistency among the seven-factor structure. Responses from managerial level, supervisory and professional level, and front-line staff were analyzed to come up with the suggestion on effective ways of improving the safety culture of elderly homes. The overall results showed that managers generally gave positive responses in the factors evaluated, such as "management commitment and concern to safety," "perception of work risks and some contributory influences," "safety communication and awareness," and "safe working attitude and participation." Supervisors / professionals, and frontline level staff on the other hand, have less positive responses. The result of the lowest score in the factors - "perception of safety rules and procedures" underlined the importance of the relevance and practicability of safety rules and procedures. Conclusion: The modified OSHC safety climate tool provided better evidence of structural validity and reliability for use by elderly homes' decision makers as an indicator of employee perception of safety in their institution. Impact on industry: The findings and suggestions in the study provide useful information for the management, supervisors/professionals and frontline level staff to cultivate the safety culture in the elderly home sector. Most important, elderly homes can use the modified safety climate scale to identify problem areas in their safety culture and safety management practices and then target these for intervention.

Highlights: ► Provision of a valid and reliable safety climate dimension brings enormous benefits to the elderly home sector. ► Managers give positive responses than supervisors and frontline level staff. ► We need to address the importance of the relevance and practicability of safety rules and procedures.

- **Keywords:** Safety climate; Safety culture; Elderly homes; Factor analysis; Safety rules and procedures

Lela Jacobsohn, J. Felipe García-España, Dennis R. Durbin, Danielle Erkoboni, Flaura K. Winston. *Adult-supervised practice driving for adolescent learners : the current state and directions for interventions*. Pages 21-28.

Introduction: The aim of this study was to quantify and identify correlates to the amount of parent-supervised behind-the-wheel practice hours by novice teen drivers. Methods: A national survey of 945 parents of recently licensed teen drivers was conducted. Multivariate logistic regression was used to identify factors related to the number of practice hours completed. Results: Sixty-one percent of parents reported practicing 50 or more hours with their teen. Two-parent involvement was associated with more practice hours, though use of a professional driving instructor was not. Parents of teens licensed in states mandating 50 or more hours of practice driving were more likely to report at least 50 practice hours than those in states mandating 20–40 hours or in states without mandates. Impact on Industry: The findings underscore the integral role of parents in the learning to drive process and provide further support for GDL requirements for practice hours.

Highlights: ► Most parents reported 50–75 hours of practice driving with their teen novice driver. ► Most families reported that more than one adult helped teach their teen to drive. ► A two-parent teaching team was associated with completion of more practice

hours. ► Families in states with GDL requiring practice driving reported more practice hours.

- **Keywords:** Injury Prevention; Motor Vehicle Safety; Teen Driving; Parenting; Adolescent Health

Joshua D. Lyon, Rong Pan, Jing Li. *National evaluation of the effect of graduated driver licensing laws on teenager fatality and injury crashes*. Pages 29-37.

Problem: Automobile crashes remain a prominent cause of death and injury for teenagers in the United States. While it is generally agreed that graduated drivers licensing (GDL) influences crash rates, it is unclear which components have the strongest effect on any specific types of crashes. Method: We analyze the relative effect of different stages of GDL on teenage fatal and injury crash risk via a negative binomial generalized linear model with random state effects. Overall, nighttime, and crashes with multiple teenage passengers are considered. Results: The strongest effects are seen by 16-year-olds, for which a strict permit stage is associated with a 58% reduction in fatal crash risk over a lenient permit stage. Similar reductions are seen for injury crashes. The intermediate stage, involving nighttime and passenger restrictions, is associated with a 44% reduction in fatalities but has relatively little effect on injury crashes. The strongest effects are generally seen for passenger crashes, followed by nighttime, and then overall crashes. Impact on Industry: This study identifies stronger relationships between GDL and crash risk than has previously been discovered and captures the relative effects of permit and intermediate licensing restrictions, two high-level components of GDL which differ in intent and implementation.

Highlights: ► We model the relationship of licensing laws to teen fatal and injury crash rates. ► The model delineates between permit and intermediate licensing. ► Our results show stronger relationships than previously uncovered. ► The permit stage is consistently effective across ages and crash types. ► The intermediate stage has less effect on injury than it does fatal crash rates.

- **Keywords:** Graduate Drivers Licensing; Teenager; Crash; Regression Analysis; Random effects

James Stewart. *Reducing impaired driving through the identification of Repeat Target Vehicles : a case study*. Pages 39-47.

Introduction: One of the most persistent groups of impaired drivers that are seemingly unaffected by social pressure, moral appeals, and the fear of arrest is that of the repeat impaired driver. This smaller group accounts for a disproportionate number of all impaired driving trips, often with high blood alcohol contents. New approaches are needed to identify and deal with the repeat impaired driver. Method: We propose a method based on the discovery that almost 10% of all impaired driving calls for service involve repeat vehicles. Using the number of times a vehicle appears in our data, the average time to repeat, and the personality characteristics of the repeat impaired driver, we are able to create a comprehensive and predictive description of a Repeat Target Vehicle (RTV). Conclusions: Our method provides an opportunity to explore new and innovative crime reduction strategies that were never before possible.

Highlights: ► A new approach for identifying and dealing with repeat impaired drivers. ► Opportunity for new and innovative crime reduction strategies never before possible. ► Improved police response at all impaired driving intervention points. ► Predictively take action against offenders before they are known to police.

- **Keywords:** DUI; DWI; Drunk driving; Repeat impaired driver; Repeat Target Vehicle

William J. Horrey, Mary F. Lesch, Marvin J. Dainoff, Michelle M. Robertson, Y. Ian Noy. *On-Board Safety Monitoring Systems for Driving : review, Knowledge Gaps, and Framework*. Pages 49-58.

Introduction: Fatal highway incidents remain the leading type of fatal work-related event, carrying tremendous personal, social, and economic costs. While employers with a fixed worksite can observe and interact directly with workers in an effort to promote safety and reduce risk, employers with workers who operate a motor vehicle as part of their job have fewer options. New technologies such as on-board safety monitoring systems offer the potential to further improve safety. These technologies allow vehicle owners to collect safety-specific information related to a driver's on-the-road behavior and performance. While many such devices are being developed and implemented in both commercial fleets and private vehicles, the scientific examination of these devices has lagged by comparison. Method: In the current paper, we: (a) describe the general features and functionality of current generations of on-board monitoring devices and how they might impact various driver behaviors; (b) review the current state of scientific knowledge specific to on-board devices; (c) discuss knowledge gaps and potential areas for future research, borrowing from the related domain of computer-based electronic performance monitoring (EPM); and (d) propose a framework that can be used to explore some of the human-system interactions pertaining to monitoring systems. Impact on Industry: Motor vehicle crashes can carry tremendous costs for employers, in terms of injury, disability, and loss of potentially productive work years. New technologies can offer tremendous benefits in terms of promoting safer on-the-road behaviors.

Highlights: ► On-board monitoring systems offer the potential to improve driver safety. ► The technology has outpaced scientific study of the implications of these systems. ► We describe features of current systems and how they can impact driver behavior. ► We review the literature; discuss knowledge gaps and areas for future research. ► We propose a framework to explore human-system interactions with these systems.

- **Keywords:** On-board safety monitoring systems; Commercial drivers; Teenage drivers; Driver safety; Lens model

John M. Sullivan, Michael J. Flannagan. *The influence of rear turn-signal characteristics on crash risk*. Pages 59-65.

Introduction: The relationship between the relative risk of a rear-end collision during a turn, merge, or lane change maneuver and the characteristics of the rear turn-signal configuration was examined using crash data from seven states in the United States. Method: Rear turn-signal characteristics—including color, optics, separation, and light source—were identified for 55 vehicle models and used in a logistic regression analysis to model the odds of a rear-end collision. Additional variables including driver demographics (gender, age), vehicle age, and light condition were also modeled. Risk was assessed using a contrast group of striking vehicles in similar collisions. Results: The results suggest that the odds of being the struck vehicle were 3% to 28% lower among vehicles equipped with amber versus red turn signals. Although the analysis suggests that there may be a safety benefit associated with amber rear turn signals, it is unclear whether turn-signal color alone is responsible. Impact on Industry: The results suggest that aspects of a vehicle's rear signal characteristics may influence crash risk.

Highlights: ► Odds of being struck party in a rear end crash are 16% less with amber turn signals. ► Signal color or signal luminance could play a role. ► Limited evidence that LED turn signals also reduce odds of being the struck party.

- **Keywords:** Rear turn signals; Crash risk; Rear end collisions; Amber turn signals; Logistic regression

Todd D. Smith, David M. DeJoy. *Occupational Injury in America : an analysis of risk factors using data from the General Social Survey (GSS)*. Pages 67-74.

Introduction: Although much is known about the distribution of occupational injury in terms of various job and employment factors, considerably less is known about other possible risk factors, particularly those involving psychosocial and organizational factors. These factors have not been emphasized in most injury surveillance systems or large scale, population based surveys. Method: In this study, data from the 2002 General Social Survey (GSS) and NIOSH Quality of Work Life (QWL) module were used to examine the risk of occupational injury in terms of socio-demographic factors, employment characteristics, and organizational factors. Results: The most informative results were obtained from Poisson regression analyses, which identified race, occupational category, and work-family interference as risk factors, and safety climate and organizational effectiveness as protective factors for occupational injury. These results provide guidance for targeting interventions and protective measures to curtail occupational injury in the United States.

Highlights: ► This study identified risk factors associated with occupational injury ► Data from the General Social Survey and NIOSH QWL module were analyzed ► Race, occupation and work-family interference were risk factors for injury ► Safety climate and organizational effectiveness were protective against injury

- **Keywords:** Occupational injury; Organizational factors; Safety climate; Quality of Worklife; Work organization

Eduardo O. Romano, Raymond C. Peck, Robert B. Voas. *Traffic environment and demographic factors affecting impaired driving and crashes*. Pages 75-82.

Introduction: Data availability has forced researchers to examine separately the role of alcohol among drivers who crashed and drivers who did not crash. Such a separation fails to account fully for the transition from impaired driving to an alcohol-related crash. Method: In this study, we analyzed recent data to investigate how traffic-related environments, conditions, and drivers' demographics shape the likelihood of a driver being either involved in a crash (alcohol impaired or not) or not involved in a crash (alcohol impaired or not). Our data, from a recent case–control study, included a comprehensive sampling of the drivers in nonfatal crashes and a matched set of comparison drivers in two U.S. locations. Multinomial logistic regression was applied to investigate the likelihood that a driver would crash or would not crash, either with a blood alcohol concentration (BAC) = .00 or with a BAC ≥ .05. Conclusions: To our knowledge, this study is the first to examine how different driver characteristics and environmental factors simultaneously contribute to alcohol use by crash-involved and non-crash-involved drivers. This effort calls attention to the need for research on the simultaneous roles played by all the factors that may contribute to motor vehicle crashes.

Highlights: ► Analyses of data from a crash-control study. ► A simultaneous look at alcohol and demographics in the transition to a crash. ► Crash risk for sober drivers was largely defined by demographics and SES. ► Males were overrepresented in impaired driving and crashes. ► Females were more likely to be involved in alcohol-free crashes than male drivers.

- **Keywords:** Impaired driving; alcohol-related crashes; traffic environment; demographics; socioeconomic status