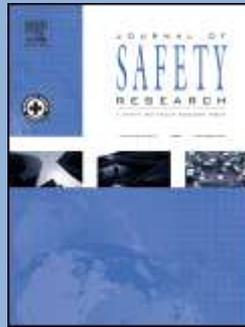


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**Amy Jewett, Laurie F. Beck, Christopher Taylor, Grant Baldwin. *Bicycle helmet use among persons 5 years and older in the United States, 2012. Pages 1-7.***

**Introduction:** In 2013, injuries to bicyclists accounted for 925 fatalities and 493,884 nonfatal, emergency department-treated injuries in the United States. Bicyclist deaths increased by 19% from 2010 to 2013. The greatest risk of death and disability to bicyclists is head injuries. The objective of this study was to provide estimates of prevalence and associated factors of bicycle riding and helmet use among children and adults in the United States. **Method:** CDC analyzed self-reported data from the 2012 Summer ConsumerStyles survey. Adult respondents (18 + years) were asked about bicycle riding and helmet use in the last 30 days for themselves and their children (5 to 17 years). For bicycle riders, CDC estimated the prevalence of helmet use and conducted multivariable regression analyses to identify factors associated with helmet use. **Results:** Among adults, 21% rode bicycles within the past 30 days and 29% always wore helmets. Respondents reported that, of the 61% of children who rode bicycles within the past 30 days, 42% always wore helmets. Children were more likely to always wear helmets (90%) when their adult respondents always wore helmets than when their adult respondents did not always wear helmets (38%). Children who lived in states with a child bicycle helmet law were more likely to always wear helmets (47%) than those in states without a law (39%). **Conclusions:** Despite the fact that bicycle helmets are highly effective at reducing the risk for head injuries, including severe brain injuries and death, less than half of children and adults always wore bicycle helmets while riding. **Practical application:** States and communities should consider interventions that improve the safety of riding such as policies to promote helmet use, modeling of helmet wearing by adults, and focusing on high risk groups, including Hispanic cyclists, occasional riders, adults, and children ages 10 to 14.

- **Keywords:** Bicycle; Helmet; Children; Adults

**Celeste Jacinto, Fernando P. Santos, Carlos Guedes Soares, Sílvia A. Silva. *Assessing the coding reliability of work accidents statistical data: How coders make a difference. Pages 9-21.***

**Introduction:** This study assesses the reliability of the coding procedure for a set of variables belonging to the European Statistics of Accidents at Work (ESAW). The work focused on the Portuguese data and experience with the system. In Portugal, this task has been systematically carried out by GEP (the governmental Cabinet for Strategy and

Planning), here defined as the “reference group” or “expert group.” However, it is anticipated that this coding task will be performed by non-expert people, since paper-forms will be replaced by e-forms, similarly to what happened in a few EU countries. **Objective:** This study aims to: (a) assess the current situation, that is, to quantify reliability of data coded by GEP (reference group), and (b) assess the impact on the reliability level when the coding is carried out by non-experts (two different groups of coders). **Methods:** The study comprises the estimation of both intercoder and intracoder reliability for a set of 8 nominal variables. The assessment applies 3 reliability coefficients calculated by 3 software packages. **Results:** The results reveal that the expert group (GEP) holds good to excellent reliability (inter- and intracoder agreements), between 68–98%, while there is a considerable “loss of reliability” (– 5% to – 39%) when the coding process is transferred to other people, without special training or knowledge in this task. **Conclusions:** This work gives quantified evidence that reliability of coding accident data is substantially affected by the coders' profile. Moreover, certain variables, regardless of the coder, systematically hold a higher level of coding reliability than others, suggesting that certain codes may need improvement. Future studies should assess coding quality across the EU countries using the ESAW protocol. **Practical applications:** Directions for improving the quality of accident data and related statistics; data that is used by researchers and governmental decision-makers to derive prevention strategies.

- **Keywords:** Accident data; Content analysis; Reliability coefficients; Intercoder reliability; ESAW variables

**Elise Lagerstrom, Sheryl Magzamen, Lorann Stallones, David Gilkey, John Rosecrance. *Understanding risk factor patterns in ATV fatalities: A recursive partitioning approach.* Pages 23-31.**

**Introduction:** Although there are hundreds of ATV-related deaths each year in the United States, contributing factors have not been clearly identified. The purpose of this study was to investigate associations between factors contributing to ATV fatalities using the agent–host–environment epidemiological triangle. **Method:** Incident reports of ATV fatalities occurring between 2011 and 2013 were obtained from the United States Consumer Product Safety Commission (CPSC). Narrative reports included details of the decedent and a description of the ATV crash. A chi-square automatic interaction detector (CHAID) analysis was performed for three major risk factors representing each facet of the epidemiologic triangle: helmet use (host), type of crash (agent), and location where death occurred (environment). The output of the CHAID analysis is a classification tree that models the relationship between the predictor variables and a single outcome variable. **Results:** A total of 1193 ATV fatalities were reported to the CPSC during the 3-year study period. In cases with known helmet and/or drug and alcohol use status, descriptive statistics indicated helmets were not worn in 88% of fatalities and use of alcohol or drugs was present in 84% of fatalities. Reoccurring factors within the CHAID analysis included age, helmet use, geographic region of the country, and location (e.g., farm, street, home, etc.) at the time of death. Within the three CHAID models, there were seven significant partitions related to host, one related to agent, and eight related to the environment. **Conclusions:** This research provides a model for understanding the relationship between risk factors and fatalities. The combination of the CHAID analysis method and the epidemiologic triangle allows for visualization of the interaction between host–agent–environment factors and fatalities. **Practical applications:** By modeling and characterizing risk factors associated with ATV fatalities, future work can focus on developing solutions targeted to specific factions of ATV users.

- **Keywords:** ATV; All-terrain vehicle; Risk factors; Epidemiologic triangle; Helmet use

**Sverre A. Kvalheim, Øyvind Dahl. *Safety compliance and safety climate: A repeated cross-sectional study in the oil and gas industry.* Pages 33-41.**

**Introduction:** Violations of safety rules and procedures are commonly identified as a causal factor in accidents in the oil and gas industry. Extensive knowledge on effective management practices related to improved compliance with safety procedures is therefore needed. Previous studies of the causal relationship between safety climate and safety compliance demonstrate that the propensity to act in accordance with prevailing rules and procedures is influenced to a large degree by workers' safety climate. Commonly, the climate measures employed differ from one study to another and identical measures of safety climate are seldom tested repeatedly over extended periods of time. This research gap is addressed in the present study. **Method:** The study is based on a survey conducted four times among sharp-end workers of the Norwegian oil and gas industry (N = 31,350). This is done by performing multiple tests (regression analysis) over a period of 7 years of the causal relationship between safety climate and safety compliance. The safety climate measure employed is identical across the 7-year period. **Conclusions:** Taking all periods together, the employed safety climate model explained roughly 27% of the variance in safety compliance. The causal relationship was found to be stable across the period, thereby increasing the reliability and the predictive validity of the factor structure. The safety climate factor that had the most powerful effect on safety compliance was work pressure. **Practical applications:** The factor structure employed shows high predictive validity and should therefore be relevant to organizations seeking to improve safety in the petroleum sector. The findings should also be relevant to other high-hazard industries where safety rules and procedures constitute a central part of the approach to managing safety.

- **Keywords:** Safety climate; Safety compliance; Procedure violations; Safety management

**Andrea H. Okun, Rebecca J. Guerin, Paul A. Schulte. *Foundational workplace safety and health competencies for the emerging workforce.* Pages 43-51.**

**Introduction:** Young workers (aged 15–24) suffer disproportionately from workplace injuries, with a nonfatal injury rate estimated to be two times higher than among workers age 25 or over. These workers make up approximately 9% of the U.S. workforce and studies have shown that nearly 80% of high school students work at some point during high school. Although young worker injuries are a pressing public health problem, the critical knowledge and skills needed to prepare youth for safe and healthy work are missing from most frameworks used to prepare the emerging U.S. workforce. **Methods:** A framework of foundational workplace safety and health knowledge and skills (the NIOSH 8 Core Competencies) was developed based on the Health Belief Model (HBM). **Results:** The proposed NIOSH Core Competencies utilize the HBM to provide a framework for foundational workplace safety and health knowledge and skills. An examination of how these competencies and the HBM apply to actions that workers take to protect themselves is provided. The social and physical environments that influence these actions are also discussed. **Conclusions:** The NIOSH 8 Core Competencies, grounded in one of the most widely used health behavior theories, fill a critical gap in preparing the emerging U.S. workforce to be cognizant of workplace risks. **Practical applications:** Integration of the NIOSH 8 Core Competencies into school curricula is one way to ensure that every young person has the foundational workplace safety and health knowledge and skills to participate in, and benefit from, safe and healthy work.

- **Keywords:** Young workers; Life skills; Career readiness; Health Belief Model; Workplace safety and health

**James Freeman, Elizabeth Szogi, Verity Truelove, Evelyn Vingilis. *The law isn't everything: The impact of legal and non-legal sanctions on motorists' drink driving behaviors.* Pages 53-60.**

**Introduction:** The effectiveness of drink driving countermeasures (such as sanctions) to deter motorists from driving over the legal limit is extremely important when considering the impact the offending behavior has on the community. However, questions remain regarding the extent that both legal and non-legal factors influence drink driving behaviors. This is of particular concern given that both factors are widely used as either sanctioning outcomes or in media campaigns designed to deter drivers (e.g., highlighting the physical risk of crashing). **Method:** This paper reports on an examination of 1,253 Queensland motorists' perceptions of legal and non-legal drink driving sanctions and the corresponding deterrent impact of such perceptions on self-reported offending behavior. Participants volunteered to complete either an online or paper version of the questionnaire. **Results:** Encouragingly, quantitative analysis of the data revealed that participants' perceptions of both legal sanctions (e.g., certainty, severity and swiftness) as well as non-legal sanctions (e.g., fear of social, internal or physical harm) were relatively high, with perceptual certainty being the highest. Despite this, a key theme to emerge from the study was that approximately 25% of the sample admitted to drink driving at some point in time. Multivariate analyses revealed six significant predictors of drink driving, being: males, younger drivers, lower perceptions of the severity of sanctions, and less concern about the social, internal, and physical harms associated with the offense. However, a closer examination of the data revealed that the combined deterrence model was not very accurate at predicting drink driving behaviors (e.g., 21% of variance). **Practical applications:** A range of non-legal deterrent factors have the potential to reduce the prevalence of drink driving although further research is required to determine how much exposure is required to produce a strong effect.

- **Keywords:** Drink driving; Deterrence; Legal and non-legal sanctions

**Audis Bethea, Damayanti Samanta, John A. Willis, Franck C. Lucente, Julton Tomanguillo Chumbe. *Substance exposure and helmet use in all-terrain vehicle accidents: Nine years of experience at a level 1 trauma center.* Pages 61-67.**

**Introduction:** The surging popularity of all-terrain vehicles (ATV) in the United States has caused an "epidemic of injuries and mortality." The U.S. Consumer Product Safety Commission reported 99,600 injuries and 426 fatalities from ATV accidents in 2013. The aim of this study was to examine the relationship between helmet use and positive toxicology screenings on outcomes in ATV accident victims. **Methods:** This is a retrospective study of patients admitted to a Level 1 Trauma Center in southwestern West Virginia following an ATV accident between 2005 and 2013. Data were obtained from the institution's Trauma Registry. **Results:** A total of 1,857 patients were admitted during the study period with 39 (1.9%) reported deaths. Positive serum alcohol and/or urine drug screens were obtained in 66.4% of the patients tested (n = 1,293). Those with positive screenings were 9.5% less likely to utilize a helmet (13.2% vs. 22.7%, p < 0.001); and the lack of helmet use was associated with an increase in traumatic brain injury (57.1% vs. 41.7%, p < 0.001). Positivity for substances or the lack of helmet use was significantly associated with higher morbidity. Lack of helmet use resulted in a 3.94-fold increase in the risk of discharge in a vegetative state or death. **Conclusions:** Drugs and alcohol use may predispose riders to be less likely to wear helmets and significantly increase the risk of a poor clinical outcome following an ATV accident. Rigorous efforts should be made to enhance safety measures through educational endeavors and amendment of current regulations to promote safe and responsible use of ATVs. **Practical applications:** Modification of regulatory requirements should be considered in order to mandate the wearing of helmets during ATV operation.

In addition, expansion of safety programs should be considered in an effort to improve availability, affordability and awareness of safe ATV practices.

- **Keywords:** Injury diagnosis; Helmet; ATV; Drugs; Alcohol

**Fabius Steinberger, April Moeller, Ronald Schroeter. *The antecedents, experience, and coping strategies of driver boredom in young adult males.* Pages 69-82.**

**Introduction:** Road crash statistics are evidence of the severe consequences resulting from human error, especially among young adult males. Drivers perform best and safest when they are adequately engaged in the driving task. Boredom and a lack of engagement in the driving task may cause risk taking and phone use. However, the antecedents to driver boredom, the subjective experience itself, as well as the coping strategies to combat boredom are not well understood. The aim of this study was to investigate these aspects. **Method:** We carried out a qualitative study in a simulated, safe, yet highly immersive driving environment. The 24 participants included male drivers aged 18 to 25 susceptible to risky driving and phone use. A phenomenological framework was used to analyze their accounts of the experience of boredom while driving. **Results:** Results indicate that situations giving rise to driver boredom include low traffic, slow or constant speed, and routine drives. Feelings comprising the experience were frustration, vigilance, relaxing, autopilot, mind wandering, and discomfort. Coping mechanisms manifest themselves in approach strategies related to the driving task such as speeding, which are often dangerous, and avoidance strategies, which include phone use. **Conclusions:** We conclude that driver boredom bears similarities to the experience of boredom at work (unlike boredom at home) due to the situational constraints, where people feel stuck, trapped, or obliged to remain vigilant. **Practical applications:** The findings present an opportunity for the road safety and automotive technology community to address the issue of under-stimulation through safety interventions aimed at increased task engagement. Our work can also aid in investigating driver experiences in partially automated driving, which is likely to induce boredom as well.

- **Keywords:** Road safety; Distraction; Risk taking; Phenomenology

**Giannis Adamos, Eftihia Nathanail. *Predicting the effectiveness of road safety campaigns through alternative research designs.* Pages 83-95.**

**Introduction:** A large number of road safety communication campaigns have been designed and implemented in the recent years; however their explicit impact on driving behavior and road accident rates has been estimated in a rather low proportion. **Method:** Based on the findings of the evaluation of three road safety communication campaigns addressing the issues of drinking and driving, seat belt usage, and driving fatigue, this paper applies different types of research designs (i.e., experimental, quasi-experimental, and non-experimental designs), when estimating the effectiveness of road safety campaigns, implements a cross-design assessment, and conducts a cross-campaign evaluation. An integrated evaluation plan was developed, taking into account the structure of evaluation questions, the definition of measurable variables, the separation of the target audience into intervention (exposed to the campaign) and control (not exposed to the campaign) groups, the selection of alternative research designs, and the appropriate data collection methods and techniques. **Results:** Evaluating the implementation of different research designs in estimating the effectiveness of road safety campaigns, results showed that the separate pre-post samples design demonstrated better predictability than other designs, especially in data obtained from the intervention group after the realization of the campaign. **Conclusions:** The more constructs that were added to the independent variables, the higher the values of the predictability were. The construct that most affects behavior is intention, whereas the

rest of the constructs have a lower impact on behavior. This is particularly significant in the Health Belief Model (HBM). On the other hand, behavioral beliefs, normative beliefs, and descriptive norms, are significant parameters for predicting intention according to the Theory of Planned Behavior (TPB). **Practical applications:** The theoretical and applied implications of alternative research designs and their applicability in the evaluation of road safety campaigns are provided by this study.

- **Keywords:** Road safety; Communication campaign; Research design; Behavioral modeling; Experimental design

**Matthew A. Taylor, Oliver Wirth, Marc Olvina, Alicia M. Alvero.** *Experimental analysis of using examples and non-examples in safety training.* Pages 97-104.

**Introduction:** The effects of training content consisting of examples and/or non-examples was studied on the acquisition of safety-related skills. **Method:** Participants (N = 160) were randomly assigned to first receive computer-based training on office ergonomics that included either no examples of safe or at-risk postures, safe examples only, at-risk examples only, or both safe and at-risk examples. Participants then attempted to classify as safe or at-risk various postures depicted in short video clips and demonstrate with their own posture the range of safe postures. **Results:** Groups that were trained with both safe and at-risk examples showed greater classification accuracy and less error in their demonstration of safe postures. Training with only safe or at-risk examples resulted in a moderate amount of error and a consistent underestimation of risk. **Conclusion:** Training content consisting of both examples and non-examples improved acquisition of safety-related skills. **Practical applications:** The strategic selection of training content may improve identification of risks and safe work practices.

- **Keywords:** Education; Observation; Performance; Error; Ergonomics

**Qiang Zeng, Huiying Wen, Helai Huang.** *The interactive effect on injury severity of driver-vehicle units in two-vehicle crashes.* Pages 105-111.

**Introduction:** This study sets out to investigate the interactive effect on injury severity of driver-vehicle units in two-vehicle crashes. **Method:** A Bayesian hierarchical ordered logit model is proposed to relate the variation and correlation of injury severity of drivers involved in two-vehicle crashes to the factors of both driver-vehicle units and the crash configurations. A total of 6417 crash records with 12,834 vehicles involved in Florida are used for model calibration. **Results:** The results show that older, female and not-at-fault drivers and those without use of safety equipment are more likely to be injured but less likely to injure the drivers in the other vehicles. New vehicles and lower speed ratios are associated with lower injury degree of both drivers involved. Compared with automobiles, vans, pick-ups, light trucks, median trucks, and heavy trucks possess better self-protection and stronger aggressivity. The points of impact closer to the driver's seat in general indicate a higher risk to the own drivers while engine cover and vehicle rear are the least hazardous to other drivers. Head-on crashes are significantly more severe than angle and rear-end crashes. We found that more severe crashes occurred on roadways than on shoulders or safety zones. **Conclusions:** Based on these results, some suggestions for traffic safety education, enforcement and engineering are made. Moreover, significant within-crash correlation is found in the crash data, which demonstrates the applicability of the proposed model.

- **Keywords:** Injury severity; Interactive effect; Driver-vehicle unit; Two-vehicle crash; Hierarchical ordered logit model

**Holly Billie, Carolyn E. Crump, Robert J. Letourneau, Bethany A. West. *Child safety and booster seat use in five tribal communities, 2010–2014. Pages 113-117.***

**Problem:** Motor-vehicle crashes are a leading cause of death for American Indian/Alaska Natives (AI/AN) including AI/AN children. Child safety seats prevent injury and death among children in a motor-vehicle crash, yet use is low among AI/AN children. **Methods:** To increase the use of child safety seats (CSS; car seats and booster seats), five tribal communities implemented evidence-based strategies from the Guide to Community Preventive Services during 2010–2014. Increased CSS use was evaluated through direct observational surveys and CSS event data. CSS events are used to check the installation, use, and safety of CSS and new CSS can be provided. **Results:** CSS use increased in all five programs (ranging from 6% to 40%). Four out of five programs exceeded their goals for increased use. Among the five communities, a total of 91 CSS events occurred resulting in 1417 CSS checked or provided. **Conclusions and practical applications:** Evidence-based child passenger safety interventions are both feasible in and transferable to tribal communities.

- **Keywords:** Child passenger safety; American Indian/Alaska Native; Racial/ethnic disparities; Tailoring evidence-based interventions; Motor vehicle

**Amy Jewett, Ruth A. Shults, Geeta Bhat. *Parental perceptions of teen driving: Restrictions, worry and influence. Pages 119-123.***

**Introduction:** Parents play a critical role in preventing crashes among teens. Research of parental perceptions and concerns regarding teen driving safety is limited. We examined results from the 2013 Summer ConsumerStyles survey that queried parents about restrictions placed on their teen drivers, their perceived level of “worry” about their teen driver’s safety, and influence of parental restrictions regarding their teen’s driving. **Methods:** We produced frequency distributions for the number of restrictions imposed, parental “worry,” and influence of rules regarding their teen’s driving, reported by teen’s driving license status (learning to drive or obtained a driver’s license). Response categories were dichotomized because of small cell sizes, and we ran separate log-linear regression models to explore whether imposing all four restrictions on teen drivers was associated with either worry intensity (“a lot” versus “somewhat, not very much or not at all”) or perceived influence of parental rules (“a lot” versus “somewhat, not very much or not at all”). **Results:** Among the 456 parent respondents, 80% reported having restrictions for their teen driver regarding use of safety belts, drinking and driving, cell phones, and text messaging while driving. However, among the 188 parents of licensed teens, only 9% reported having a written parent-teen driving agreement, either currently or in the past. Worrying “a lot” was reported less frequently by parents of newly licensed teens (36%) compared with parents of learning teens (61%). **Conclusions and Practical Applications:** Parents report having rules and restrictions for their teen drivers, but only a small percentage formalize the rules and restrictions in a written parent-teen driving agreement. Parents worry less about their teen driver’s safety during the newly licensed phase, when crash risk is high as compared to the learning phase. Further research is needed into how to effectively support parents in supervising and monitoring their teen driver.

- **Keywords:** Driver safety; Teen safety; Motor vehicle; Adolescents; Parent perception