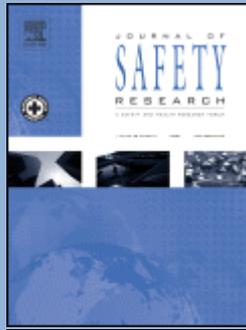


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Arun Vijayan, Saniyat Islam, Michael Jones, Rajiv Padhye, Lyndon Arnold. *Degradation of fluorescent high-visibility colors used in safety garments for the Australian railway industry.* Pages 1-7.

Introduction: This study investigated the compliance of four fluorescent orange high-visibility garment substrates that are predominantly used in the Australian railway industry. While Special Purpose Orange (SPO), a shade of the Fluorescent orange (FI-orange) is recommended by most Australian states as the high-visibility background color of a safety garment, there appear to be variations in the background color of clothing used by line-workers and rail contractors. The color of the garment was assessed for compliance with the Australian Standard AS/NZS 1906.2.2010 for high-visibility materials for safety garments. The results were also compared with ANSI Z535.2011 and BS EN ISO 20471.2013 Standards. **Method:** Photometric and colorimetric assessments of the background color of the garment substrates were performed using a spectrophotometer and were evaluated for compliance with the Standards after washing and exposure to UV. **Results:** The spectrophotometry measurements showed that FI-orange background color for all samples except one complied with the AS/NZS 1906.2 Standard for daytime high-visibility garments after 20 washes but failed to comply after exposure to UV. It was also found that the chromaticity coordinates of the corners of the FI-orange color space, specified in the AS/NZS 1906.4.2010 Standard are much wider and yellower when compared with the ANSI Z535.1.2011 and BS EN ISO 20471.2013 Standards. The sample that failed to comply with the Australian and American Standards however complied with the ISO Standard. **Practical Applications:** Irrespective of the Standard used, the research has shown the degrading effect of washing and light exposure and raises the questions as to how regularly, and under what conditions high-visibility garments need to be replaced. These findings will provide information for safety garment manufacturers about the characteristics and performance of high-visibility safety garments which make them conspicuous during daytime use. This research recommends that colors for railway workers should be chosen based on the conspicuity, commercial viability, reproducibility and durability rather than simply adopting standards from other industry domains or other countries.

- **Keywords:** High-visibility safety garments; Fluorescent orange; Degradation; Chromaticity; Railway

Allan F. Williams, Anne T. McCartt, Laurel B. Sims. *History and current status of state graduated driver licensing (GDL) laws in the United States. Pages 9-15.*

Introduction: The objective of this study is to describe changes in teenage driver licensing policies in the United States during the past two decades with the introduction of graduated driver licensing (GDL) programs, assess GDL laws currently in place, and discuss the possibilities and likely consequences of further changes. **Methods:** The history of laws introducing and amending GDL programs was tracked, based on records maintained by the Insurance Institute for Highway Safety (IIHS). Counts of states included the District of Columbia. **Results:** A few states had elements of GDL prior to the mid-1990s, and between 1996 and 2006 all other states adopted a learner period of 2 months or more, a minimum supervised practice hours requirement for the learner period, or a night or passenger restriction once initially licensed. All but seven states have upgraded their original laws one or more times. Very few states weakened their laws, usually in minor ways. In 158 instances, minimum learner periods, minimum practice hour requirements, or night or passenger restrictions were added or strengthened. Fifteen states raised the minimum age for a license allowing any unsupervised driving. **Conclusion:** GDL policies have reduced teenage driver crashes. Most states now have at least minimum requirements for basic GDL features, although there is substantial opportunity for strengthening existing policies. Additional upgrades would result in further crash reductions, but very few have been made in recent years. **Practical applications:** Guidelines for maximizing the crash reduction potential of GDL programs are available, based on the experience of U.S. states, other countries with GDL programs, and the evaluation literature in regard to GDL components.

- **Keywords:** Graduated driver licensing; Teenage drivers; Teenage driver licensing laws; GDL

Shelby L. Bachman, Garrett A. Salzman, Rita V. Burke, Helen Arbogast, Pearl Ruiz, Jeffrey S. Upperman. *Observed child restraint misuse in a large, urban community: Results from three years of inspection events. Pages 17-22.*

Problem: Child restraints (CRs) are vital for optimizing child passenger safety and reducing the risk of pediatric injury and fatality in motor vehicle crashes. However, most CRs are installed improperly. **Methods:** This present study was an assessment of observed instances of CR misuse. Participants were recruited through advertisements for CR inspection events in Los Angeles County, California. Child Passenger Safety Technicians collected information about each child passenger, vehicle, and aspects of CR selection and installation. **Results:** Of 693 CRs installed upon arrival, only 3.8% were used with no instances of misuse. The most common misuses were inappropriate use of the top tether and failure to secure the seatbelt in locked mode. **Conclusions:** The majority of observed CRs were installed with instances of misuse. CRs in newer vehicles were less likely to be installed in front of airbags and more likely to have the seatbelt routed inappropriately compared to those in older vehicles. Older children were more likely to be prematurely restrained in the front vehicle seat. **Practical Applications:** The majority of CRs are installed improperly. We identified specific instances of CR misuse that are common in a large, urban community and present recommendations to improve child passenger safety practices and education.

- **Keywords:** Car seat; Child passenger safety; Child restraint system; Installation; Misuse

W. Kathy Tannous, Mark Whybro, Chris Lewis, Michael Ollerenshaw, Graeme Watson, Susan Broomhall, Kingsley E. Agho. *Using a cluster*

randomized controlled trial to determine the effects of intervention of battery and hardwired smoke alarms in New South Wales, Australia: Home fire safety checks pilot program. Pages 23-27.

Introduction: In 2014, Fire & Rescue New South Wales piloted the delivery of its home fire safety checks program (HFSC) aimed at engaging and educating targeted top “at risk” groups to prevent and prepare for fire. This pilot study aimed to assess the effectiveness of smoke alarms using a cluster randomized controlled trial. **Methods:** Survey questionnaires were distributed to the households that had participated in the HFSC program (intervention group). A separate survey questionnaire was distributed to the control group that was identified with similar characteristics to the intervention group in the same suburb. To adjust for potential clustering effects, generalized estimation equations with a log link were used. **Results:** Multivariable analyses revealed that battery and hardwired smoking alarm usage increased by 9% and 3% respectively among the intervention group compared to the control group. Females were more likely to install battery smoke alarms than males. Respondents who possessed a certificate or diploma (AOR = 1.31, 95% CI 1.00–1.70, P = 0.047) and those who were educated up to years 8–12 (AOR = 1.32, 95% CI 1.06–1.64, P = 0.012) were significantly more likely to install battery smoke alarms than those who completed bachelor degrees. Conversely, holders of a certificate or diploma and people who were educated up to years 8–12 were 31% (AOR = 0.69, 95% CI 0.52–0.93, P = 0.014) and 24% (AOR = 0.76, 95% CI 0.60–0.95, P = 0.015) significantly less likely to install a hardwired smoke alarm compared to those who completed bachelor degrees. **Conclusions:** This pilot study provided evidence of the benefit of the HFSC in New South Wales. Practical Applications: Fire safety intervention programs, like HFSC, need to be targeted to male adults with lower level of schooling even when they are aware of their risks.

- **Keywords:** Cluster randomized controlled trial; New South Wales; Smoke alarm; Intervention; Public health

Mark B. Johnson, Robert Voas, Brenda A. Miller, Hilary Byrnes, Beth Bourdeau. *Night club patrons who feel safe will return: Evidence to encourage management to address club violence. Pages 29-32.*

Introduction: There is substantial evidence that heavy drinking is associated with aggression and violence. Most managers of drinking establishments are required to maintain a security staff to deal with disruptive patrons who threaten an organization's business or legal status. However, managers may focus little on minor instances of aggression even though these may escalate into more serious events. We hypothesize that proactive security efforts may positively affect patrons' perceptions of nighttime safety and influence their decisions to return to the club, thereby affecting the club's bottom line. **Method:** Data for this study were collected from entry and exit surveys with 1714 attendees at 70 electronic music dance events at 10 clubs in the San Francisco Bay Area (2010–2012). Participants were asked to report on observations and experiences with aggressive behavior while in the club, their overall perception of club safety, and their plans to return to the same club in the next 30 days. Mediation multiple regression analysis was used to relate observations of club security to perceptions of personal safety and plans to return to the club. **Results:** Reported observations of an active club security staff were positively related to perceptions of personal safety. Safety perceptions, in turn, were significantly related to plans to return to the club. The indirect path between perceptions of security and plans to return was significant as well. **Conclusions:** The results suggest that an active security presence inside clubs can encourage club attendance by providing an environment where minor altercations are minimized, contributing to the perception of club safety. **Practical Applications:** Evidence that proactive security efforts appear to increase return customers might motivate managers to implement better security policies.

- **Keywords:** Intoxication; Aggression; Security; Safety perceptions; Clubs

Ward Vanlaar, Marisela Mainegra Hing, Robyn Robertson, Dan Mayhew, David Carr. *An evaluation of Ontario's Group Education Session (GES) for license renewal of seniors aged 80 and above. Pages 33-39.*

Introduction: In 1996, the Ministry of Transportation in Ontario (MTO) implemented the Group Education Session (GES), which is a mandatory license renewal program for drivers aged 80 and older. This study describes an evaluation of the GES to assess its impact on road safety in Ontario, as well as its effect on the safety of individual drivers who participated in the program. **Methods:** Time series analysis of senior driver records both before and after implementation of the GES, and logistic regression and survival analysis examining senior driver records prior to, and following, their participation in the GES. **Results:** Using time series analysis there is some evidence to suggest that the GES had a positive impact on road safety. According to the other analyses, participation in the GES is associated with a decrease in the odds of collisions and convictions, regardless of whether drivers pass their first attempt of the knowledge test or not. In addition, failing the first road test and/or having demerit points are strong indicators of future collision and conviction involvement. **Discussion:** Results from this evaluation suggest that the GES has had a protective effect on the safety of senior drivers. **Practical Applications:** The findings and discussion will help MTO improve the GES program and provide insights to other jurisdictions that have, or are considering, introducing new senior driver programs.

- **Keywords:** Senior drivers; License renewal; Education session; Evaluation; Road safety

Elliot Fishman, Paul Schepers. *Global bike share: What the data tells us about road safety. Pages 41-45.*

Introduction: Bike share has emerged as a rapidly growing mode of transport in over 800 cities globally, up from just a handful in the 1990s. Some analysts had forecast a rise in the number of bicycle crashes after the introduction of bike share, but empirical research on bike share safety is rare. The goal of this study is to examine the impact of bike share programs on cycling safety. **Methods:** The paper has two substudies. Study 1 was a secondary analysis of longitudinal hospital injury data from the Graves et al. (2014) study. It compared cycling safety in cities that introduced bike share programs with cities that did not. Study 2 combined ridership data with crash data of selected North American and European cities to compare bike share users to other cyclists. **Results:** Study 1 indicated that the introduction of a bike share system was associated with a reduction in cycling injury risk. Study 2 found that bike share users were less likely than other cyclists to sustain fatal or severe injuries. **Conclusions:** On a per kilometer basis, bike share is associated with decreased risk of both fatal and non-fatal bicycle crashes when compared to private bike riding. **Practical Applications:** The results of this study suggest that concerns of decreased levels of cycling safety are unjustified and should not prevent decision makers from introducing public bike share schemes, especially if combined with other safety measures like traffic calming.

- **Keywords:** Road safety; Safety in numbers; Bike share; Cycling; Shared transport

Tahira M. Probst, Lixin Jiang, Maja Graso. *Leader–member exchange: Moderating the health and safety outcomes of job insecurity*. Pages 47-56.

Introduction: Job insecurity has been repeatedly linked with poor employee health and safety outcomes. Although research on high quality leader–member exchange (LMX) has demonstrated many beneficial effects, no research to date has examined the extent to which positive LMX might attenuate those adverse health and safety-related consequences of job insecurity. The current study extends research in this area by specifically examining the buffering impact of LMX on the relationship between job insecurity and safety knowledge, reported accidents, and physical health conditions. Furthermore, the study also examines whether positive LMX mitigates the typically seen negative impact of job insecurity on supervisor satisfaction. **Methods:** The hypotheses were tested using survey data collected from 212 employees of a mine located in southwestern United States. **Results:** As predicted, job insecurity was related to lower levels of supervisor satisfaction, more health ailments, and more workplace accidents, and was marginally related to lower levels of safety knowledge. Results indicated that LMX significantly attenuated these observed relationships. **Conclusions:** The quality of the dyadic relationship between supervisor and subordinate has a significant impact on the extent to which job insecurity is associated with adverse health and safety outcomes. **Practical applications:** Practical implications for supervisor behavior and developing high quality LMX are discussed in light of today's pervasive job insecurity.

- **Keywords:** Leader–member exchange; Job insecurity; Workplace safety; Employee health; Supervisor satisfaction

A. Jafari Anarkooli, M. Hadji Hosseinlou. *Analysis of the injury severity of crashes by considering different lighting conditions on two-lane rural roads*. Pages 57-65.

Introduction: Many studies have examined different factors contributing to the injury severity of crashes; however, relatively few studies have focused on the crashes by considering the specific effects of lighting conditions. This research investigates lighting condition differences in the injury severity of crashes using 3-year (2009–2011) crash data of two-lane rural roads of the state of Washington. **Method:** Separate ordered-probit models were developed to predict the effects of a set of factors expected to influence injury severity in three lighting conditions; daylight, dark, and dark with street lights. A series of likelihood ratio tests were conducted to determine if these lighting condition models were justified. **Results:** The modeling results suggest that injury severity in specific lighting conditions are associated with contributing factors in different ways, and that such differences cannot be uncovered by focusing merely on one aggregate model. Key differences include crash location, speed limit, shoulder width, driver action, and three collision types (head-on, rear-end, and right-side impact collisions). **Practical Applications:** This paper highlights the importance of deploying street lights at and near intersections (or access points) on two-lane rural roads because injury severity highly increases when crashes occur at these points in dark conditions.

- **Keywords:** Injury severity; Rural roads; Lighting condition; Ordered probit; Fixed effects

Angela H. Eichelberger, Anne T. McCartt. *Toyota drivers' experiences with Dynamic Radar Cruise Control, Pre-Collision System, and Lane-Keeping Assist*. Pages 67-73.

Introduction: Advanced crash avoidance and driver assistance technologies potentially can prevent or mitigate many crashes. Previous surveys with drivers have found

favorable opinions for many advanced technologies; however, these surveys are not necessarily representative of all drivers or all systems. As the technologies spread throughout the vehicle fleet, it is important to continue studying driver acceptance and use of them. **Method:** This study focused on 2010–2013 Toyota Sienna and Prius models that were equipped with adaptive cruise control, forward collision avoidance, and lane departure warning and prevention (Prius models only). Telephone interviews were conducted in summer 2013 with 183 owners of vehicles with these technologies. **Results:** About 9 in 10 respondents wanted adaptive cruise control and forward collision avoidance on their next vehicle, and 71% wanted lane departure warning/prevention again. Males and females reported some differences in their experiences with the systems; for example, males were more likely to have turned on lane departure warning/prevention than females, and when using this system, males reported more frequent warnings than did females. Relative to older drivers, drivers age 40 and younger were more likely to have seen or heard a forward collision warning. **Conclusions:** Consistent with the results in previous surveys of owners of luxury vehicles, the present survey found that driver acceptance of the technologies was high, although less so for lane departure warning/prevention. Experiences with the Toyota systems differed by driver age and gender to a greater degree than in previous surveys, suggesting that the responses of drivers may begin to differ as crash avoidance technology becomes available on a wider variety of vehicles. **Practical application:** Crash avoidance technologies potentially can prevent or mitigate many crashes, but their success depends in part on driver acceptance. These systems will be effective only to the extent that drivers use them.

- **Keywords:** Crash avoidance technology; Driver assistance; Driver behavior; Driver acceptance

Lucia Bortolini, Sirio R.S. Cividino, Rino Gubiani, Massimo Cecchini, Lavinia M.P. Delfanti, Andrea Colantoni. *Urban green spaces activities: A preparatory groundwork for a safety management system. Pages 75-82.*

Introduction: Urban green spaces works and maintenance are high-risk activities and usually represent possible sources of injuries. The management issues are complex and strongly influenced by companies' policies in terms of safety management and human factor. A high number of tasks—including protecting public health and safety and safe working procedures—need to be faced by professional arborists or gardeners. **Method:** The present paper provides a preparatory groundwork for modeling and describing the real risk levels during the abovementioned activities. The methodology represents a useful tool for decision making both for group leaders and safety coordinators. This goal is reached by collecting data emerging from several workplaces located in North East Italy regarding the frequency and severity of injuries. **Results:** The preliminary results point out that the most frequent injuries in green maintenance activities are represented by cuts, contusions, and ocular lesions, but none of them have lead to particularly serious consequences for the operators; indeed, the high levels of severity are related to traumas, fractures, and acute lumbar herniated discs. The riskiest activities are related to pruning, especially using mobile elevating work platforms, and grass cutting, especially when operated in escarpments and banks. Workers' behavior and companies' safety policies are key elements for a correct safety management system.

- **Keywords:** Maintenance; Accident frequency; Severity of injuries; Urban greening

Nicolas Guéguen, Chloé Eyssartier, Sébastien Meineri. *A pedestrian's smile and drivers' behavior: When a smile increases careful driving.* Pages 83-88.

Introduction: Research has reported that smiles facilitate social relationships. However, the effect of a smile on driving behavior has received less interest. **Method:** This study attempts to evaluate how a pedestrian's smile influences an oncoming driver's behavior. In the first part of our study, male and female research assistants waiting at several pedestrian crossings were asked to smile or not at oncoming drivers. **Results:** It was found that a smile increases the number of drivers who stop. The same effect was observed when the pedestrian tries to cross outside the pedestrian crossing. Finally, this study shows that motorists drive slower after they see a pedestrian smile, suggesting that a smile can induce a positive mood. **Practical Applications:** This leads to motorists stopping more readily and driving more carefully. These results also suggest that pedestrians may increase their own safety by using appropriate nonverbal signals toward drivers.

- **Keywords:** Pedestrian; Pedestrian crossing; Nonverbal sign; Smile; Driver stopping

Julien Cestac, Sami Kraïem, Jean-Pascal Assailly. *Cultural values and random breath tests as moderators of the social influence on drunk driving in 15 countries.* Pages 89-96.

Introduction: The social influence on drunk driving has been previously observed in several countries. It is noteworthy, however, that the prevalence of alcohol in road fatalities is not the same in all countries. The present study aimed to explore whether cultural values and the number of roadside breath tests moderate the link between the perceived drunk driving of one's peers and self-reported behavior. **Methods:** Based on the European survey SARTRE 4, the responses of 10,023 car drivers from 15 countries were analyzed. Two cultural values, "tradition" and "conformism," were identified as possibly being linked to social influence. Country scores for these values were taken from the European Social Survey. The number of random roadside breath tests per inhabitant was used as an indicator of drunk-driving enforcement in each country. **Results:** A hierarchical multilevel modeling analysis confirmed the link between friends' drunk driving and one's own drunk driving in all countries, but the strength of the link was much stronger in some countries (e.g., Italy, Cyprus, and Israel) than in others (e.g., Finland, Estonia, and Sweden). Both the measured value of "tradition" and the number of alcohol breath tests were found to moderate the link between friends' and one's own drunk driving. **Practical Applications:** European stakeholders should take into account cultural specificities of target countries when designing campaigns against drunk driving.

- **Keywords:** Drunk driving; Norm; Cultural values; Social influence; Random breath tests

Mioara Cristea, Patricia Delhomme. *The effects of co-presence on risk perception and intention to engage in risky behaviors.* Pages 97-103.

Introduction: This study investigated the relation between co-presence and bicyclists' riding behavior. We assumed that the presence of peer riders would either facilitate or inhibit risky behaviors depending on bicyclists' perceptions of three traffic contexts conducive to risk taking (i.e., red-light, go straight, and turn to left). **Method:** Young bicyclists (N = 207) were randomly assigned to two experimental conditions (alone vs. with peers). They filled in a scenario-based questionnaire about their intentions to adopt risky behaviors in three specific traffic situations as well as their risk perception of these situations and their general self-perceived efficacy as a bicyclist. We hypothesized that

the presence of peer riders engaged in a risky behavior will facilitate the intention to adopt risky behaviors in situations where group risk is evaluated as lower than individual risk. In opposition, the presence of peer riders engaged in a risky behavior will inhibit the intention to adopt risky behaviors in situations where group risk is evaluated as higher than individual risk. **Results:** The results confirmed the hypotheses. **Practical Applications:** The findings offer insights for developing new effective education and intervention programs in order to reduce the frequency of dangerous behavior among bicyclists.

- **Keywords:** Co-presence; Social facilitation; Risk taking; Risk perception; Bicyclists

Xinyao DeGrauw, Joseph L. Annest, Judy A. Stevens, Likang Xu, Victor Coronado. *Unintentional injuries treated in hospital emergency departments among persons aged 65 years and older, United States, 2006–2011. Pages 105-109.*

Introduction: With the aging of the United States population, unintentional injuries among older adults, and especially falls-related injuries, are an increasing public health concern. **Methods:** We analyzed emergency department (ED) data from the Nationwide Emergency Department Sample, 2006–2011. We examined unintentional injury trends by 5-year age groups, sex, mechanism, body region, discharge disposition, and primary payer. For 2011, we estimated the medical costs of unintentional injury and the distribution of primary payers, plus rates by injury mechanisms and body regions injured by 5-year age groups. **Results:** From 2006 to 2011, the age-adjusted annual rate of unintentional injury-related ED visits among persons aged ≥ 65 years increased significantly from 7987 to 8163, per 100,000 population. In 2011, 65% of injuries were due to falls. Rates for fall-related injury ED visits increased with age and the highest rate was among those aged ≥ 100 . Each year, about 85% of unintentional injury-related ED visits in this population were expected to be paid by Medicare. In 2011, the estimated lifetime medical cost of unintentional injury-related ED visits among those aged ≥ 65 years was \$40 billion. **Conclusion:** Increasing rates of ED-treated unintentional injuries, driven mainly by falls among older adults, will challenge our health care system and increase the economic burden on our society. Prevention efforts to reduce falls and resulting injuries among adults aged ≥ 65 years have the potential to increase well-being and reduce health care spending, especially the costs covered by Medicare. **Practical applications:** With the aging of the U.S. population, unintentional injuries, and especially fall-related injuries, will present a growing challenge to our health care system as well as an increasing economic burden. To counteract this trend, we must implement effective public health strategies, such as increasing knowledge about fall risk factors and broadly disseminating evidence-based injury and fall prevention programs in both clinical and community settings.

- **Keywords:** Unintentional injury; Older adults; Elderly; Emergency department; Falls