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Special Topic: Elderly Falls

David A. Sleet, Daphne B. Moffett, Judy Stevens. *CDC's research portfolio in older adult fall prevention : a review of progress, 1985-2005, and future research directions*. *Pages 259-267.*

Abstract: Problem: Falls are a leading cause of mortality and morbidity among adults age 65 and older. Population models predict steep increases in the 65 and older population bands in the next 10–15 years and in turn, public health is bracing for increased fall rates and the strain they place on health care systems and society. To assess progress in fall prevention, the Centers for Disease Control and Prevention conducted a research portfolio review to examine the quality, relevance, outcomes and successes of the CDC fall prevention program and its impact on public health. **Methods:** A peer review panel was charged with reviewing 20 years of funded research and conducting a SWOT (strengths, weaknesses, opportunities, and threats) analysis for extramural and intramural research activities. Information was collected from grantees (via a survey instrument), staff were interviewed, and progress reports and products were reviewed and analyzed. **Results:** CDC has invested over $24,900,000 in fall-related research and programs over 20 years. The portfolio has had positive impacts on research, policies and programs, increasing the public health injury prevention workforce, and delivering effective fall prevention programs. **Discussion:** Public health agencies, practitioners, and policy makers recognize that while there are some evidence-based older adult fall prevention interventions available, many remain unused or are infeasible to implement. Specific recommendations across the public health model, include: additional research in gathering robust epidemiologic data on trends and patterns of fall-related injuries at all levels; researching risk factors by setting or sub-population; developing and testing innovative interventions; and engaging in translation and dissemination research on best practices to increase uptake and adoption of fall prevention strategies. CDC has responded to a number of suggestions from the portfolio review including: funding translation research of a proven Tai Chi fall intervention; beginning to address gaps in gender, ethnic, and racial differences in falls; and collaborating with partner organizations who share in CDC's mission to improve public health by preventing falls and reducing fall-related injuries. **Impact on Industry:** Industry has an opportunity to develop more accessible and usable devices to reduce injury from falls (for example, hip protectors and force reducing flooring). By implementing effective, evidence-based interventions to prevent falls and reduce injuries from falls, significant decreases in health care costs can be expected.

- **Keywords:** Injury; Older adults; Elderly; Falls; Older adult falls; Fall intervention; Translation and dissemination; Falls research; Public health; Research portfolio review; CDC Injury Center

K.E. Thomas, J.A. Stevens, K. Sarmiento, M.M. Wald. *Fall-related traumatic brain injury deaths and hospitalizations among older adults — United States, 2005*. Pages 269-272.

Abstract: Problem: Among older adults, both unintentional falls and traumatic brain injuries (TBI) result in significant morbidity and mortality; however, only limited national data on fall-related TBI are available. *Method:* To examine the relationship between older adult falls and TBI deaths and hospitalizations, CDC analyzed 2005 data from the National Center for Health Statistics' National Vital Statistics System and the Agency for Healthcare Research and Quality's Nationwide Inpatient Sample. *Results:* In 2005, among adults ≥ 65 years, there were 7946 fall-related TBI deaths and an estimated 56,423 hospitalizations for nonfatal fall-related TBI in the United States. Fall-related TBI accounted for 50.3% of unintentional fall deaths and 8.0% of nonfatal fall-related hospitalizations. *Summary:* These findings underscore the need for greater dissemination and implementation of evidence-based fall prevention interventions.

- **Keywords:** Traumatic brain injury; Elderly; Fall

Regular Articles

Gil Luria, Dov Zohar, Ido Erev. *The effect of workers' visibility on effectiveness of intervention programs : supervisory-based safety interventions*. Pages 273-280.

Abstract: Introduction: This paper discusses an organizational change intervention program targeting safety behaviors and addresses important considerations concerning the planning of organizational change. Using layout of the plant as a proxy for ease of daily leader-member interaction, the effect of workers' visibility on the effectiveness of supervisory-based safety (SBS) interventions is examined. Through a reinforcement-learning framework, it is suggested that visibility can affect supervisors' incentive to interact with subordinates regarding safety-related issues. **Method:** Data were collected during SBS intervention studies in five manufacturing companies. **Results:** Results suggest a reinforcement cycle model whereby increased visibility generates more frequent exchanges between supervisors and employees, resulting in improved safety behavior among employees. In turn, employees' safer behavior reinforces continued supervisory safety-related interaction. **Conclusion and impact on industry:** Visibility is an important moderator in supervisory based safety interventions, and can serve to increase workplace safety. Implications of these findings for safety are discussed.

- **Keywords:** Supervisory-based safety interventions; Reinforcement learning; Visibility; Ear protection; Safe behavior

James R. Sayer, Mary Lynn Buonarosa. *The roles of garment design and scene complexity in the daytime conspicuity of high-visibility safety apparel*. Pages 281-286.

Abstract: Introduction: This study examines the effects of high-visibility garment design on daytime pedestrian conspicuity in work zones. Factors assessed were garment color, amount of background material, pedestrian arm motion, scene complexity, and driver age. **Method:** The study was conducted in naturalistic conditions on public roads in real traffic. Drivers drove two passes on a 31-km route and indicated when they

detected pedestrians outfitted in the fluorescent garments. The locations of the vehicle and the pedestrian were recorded. **Results:** Detection distances between fluorescent yellow-green and fluorescent red-orange garments were not significantly different, nor were there any significant two-way interactions involving garment color. Pedestrians were detected at longer distances in lower complexity scenes. Arm motion significantly increased detection distances for pedestrians wearing a Class 2 vest, but had little added benefit on detection distances for pedestrians wearing a Class 2 jacket. **Discussion:** Daytime detection distances for pedestrians wearing Class 2 or Class 3 garments are longest when the complexity of the surround is low. The more background information a driver has to search through, the longer it is likely to take the driver to locate a pedestrian – even when wearing a high-visibility garment. **Impact on Industry:** These findings will provide information to safety garment manufacturers about characteristics of high-visibility safety garments which make them effective for daytime use.

- **Keywords:** Daytime; Conspicuity; Fluorescent; Pedestrian; Personal protective equipment; Road worker

Jackson Williams. *Accidents, claiming, and regional subcultures : are medical errors and malpractice lawsuits related to social capital?* Pages 287-294.

Abstract: Method: This study examined states' performance on Patient Safety Indicators (PSIs), statistics on malpractice lawsuits, and analogous data on automobile accidents to identify state-level patterns in safety and claiming. **Results:** Hospital safety varied in a pattern similar to highway safety on the state level, suggesting that cultural traits may play a greater role than differences in legal or other environmental factors. States performing well or poorly in hospital and driver safety tended to correspond with states grouped together in regional culture typologies developed by Elazar and Lieske. Traits of regional culture also are associated with variations in tort claiming. **Conclusions:** The paper offers a theory of social capital as an important factor affecting safety and tort claiming. Where the regional culture is one of high cohesion and trust, people may exercise a higher degree of caution and vigilance in their interaction with others, and feel less inclination to file lawsuits subsequent to accidents.

- **Keywords:** Safety; legal liability; ethnology; hospitals; culture

Bevan B. Kirley, Andrea Feller, Elisa Braver, Patricia Langenberg. *Does the Maryland graduated driver licensing law affect both 16-year-old drivers and those who share the road with them?* Pages 295-301.

Problem: To assess effects of the 1999 Maryland graduated driver licensing (GDL) law on both 16-year-old drivers and other road users. *Method:* Calculation and comparison of crash involvement rates and non-fatal injury rates pre-GDL (1996–1998) and post-GDL (2001–2003) by type of road user, per population, and per licensed driver, with adjustment for trends among 30–59-year-old drivers. *Results:* Post-GDL, prevalence of licensure decreased 24% among 16-year-olds, and rates of 16-year-old drivers involved in crashes significantly decreased per 16-year-old population (corrected rate ratio (RRc) 0.82; 95% CI (0.71, 0.96)). A significant decrease also was observed for non-fatal injuries per 16-year-old population among 16-year-old drivers involved in crashes (RRc 0.63; 95% CI (0.41, 0.98)). Similarly, decreases, albeit not statistically significant, were observed among their passengers and other vehicle occupants. Per 16-year-old licensed driver, a slight non-significant increase was observed in crash involvement rates; non-fatal injury rates per 16-year-old licensed driver suggest decreased risk (non-significant) among 16-year-old drivers, their passengers, and other vehicle occupants. *Summary:* Maryland's GDL delayed licensure and reduced crashes and non-fatal injuries among 16-year-old drivers per population. Trends in injuries among other road users involved in crashes with 16-year-old drivers were suggestive of a benefit from GDL, although

observed decreases were not significant. Per licensed driver, findings were not significant, but suggested little change in crash involvement and decreased non-fatal injuries. Because one-third fewer 16-year-olds were licensed post-GDL, these results may suggest a selection effect in licensure. *Impact on Industry:* Because Maryland had nighttime restrictions for new drivers before 1999, this study suggests other components of GDL are beneficial for drivers and possibly for other road users. States with weak GDL laws should strongly consider revising them.

- **Keywords:** Graduated Driver Licensing; Teenage Drivers; Traffic Safety; Injury Prevention

Ward Vanlaar, Herb Simpson, Dan Mayhew, Robyn Robertson. *Fatigued and drowsy driving : a survey of attitudes, opinions and behaviors*. Pages 303-309.

Abstract: Introduction: There is evidence suggesting that the problem of fatigued or drowsy driving is an important contributor to road crashes. However, not much is known about public perceptions of the issue. The purpose of this study was to obtain information on attitudes, opinions, and professed practices related to fatigued or drowsy driving. **Methods:** The data were gathered by means of a public opinion poll among a representative sample of 750 Ontario drivers. **Results:** A majority of drivers (58.6%) admitted that they occasionally drive while fatigued or drowsy. Of greater importance, 14.5% of respondents admitted that they had fallen asleep or "nodded off" while driving during the past year. Nearly 2% were involved in a fatigue or drowsy driving related crash in the past year. Respondents were also asked about measures they take to overcome fatigue or drowsiness. Results indicate that relatively ineffective measures such as opening the window or playing music are the most popular; the most effective preventive measure - taking a rest — is the least popular. **Discussion:** The prevalence of the behavior, coupled with the ineffective prevention measures favored by the public suggest there is a need for increasing their level of awareness and knowledge about the problem. **Impact on Industry:** Results from this study further emphasize the importance of increasing the fatigued and drowsy driving knowledge base and the need to educate the public about it.

- **Keywords:** Fatigued driving; Drowsy driving; Sleepiness at the wheel; Prevalence; Opinion poll

Raymond C. Peck, Michael A. Gebers, Robert B. Voas, Eduardo Romano. *The relationship between blood alcohol concentration (BAC), age, and crash risk*. Pages 311-319.

Abstract: Problem: The role of age (youth and driving inexperience) and alcohol as major risk factors in traffic crash causation has been firmly established by numerous studies over the past 50 years. Less well established is how the two variables interrelate to influence crash risk. Some investigations have hypothesized an interactive or synergistic effect in which young drivers with less experience and a greater tendency to take risks are more adversely affected at lower blood alcohol concentrations (BACs) than are older drivers. The evidence for this hypothesis is mixed. Resolution of this issue has important implication for developing countermeasures directed at the young driver crash problem. **Method:** Case control data previously collected in Long Beach and Fort Lauderdale were reanalyzed using a more sensitive method for detecting interaction effects than used in the original analysis. A conditional logistic regression analyses found a highly significant age × BAC interaction ($P < .0001$) involving differences between drivers under 21 and those 21 and older. **Discussion:**The results clearly indicate that positive BACs in drivers under 21 are associated with higher relative crash risks than would be predicted from the additive effect of BAC and age. It is likely that two mechanisms are operating to cause the interaction. First, it seems likely that the crash

avoidance skill of young novice drivers would be more adversely affected by alcohol due to their driving inexperience, immaturity, and less experience with alcohol. Second, drivers under 21 who choose to drink and to drive after drinking probably have pre-existing characteristics that predisposed them to risk taking and crash involvement apart from any increased vulnerability to alcohol impairment. **Impact on Industry:** The results support increased enforcement of zero-tolerance BAC laws for minors.

- **Keywords:** Young drivers; Alcohol; Blood alcohol concentration (BAC); Relative risk; Interaction

Annie W.Y. Ng, Alan H.S. Chan. *The effects of driver factors and sign design features on the comprehensibility of traffic signs*. Pages 321-328.

Abstract: *Problem*: This paper addresses the effects of driver factors and sign design features on the comprehensibility of traffic signs. *Methods*: A survey was designed to capture subjects' personal particulars, ratings on sign features, and comprehension scores, and then administered to 109 Hong Kong full driving license holders. *Results*: Years with driving license and education level were significant predictors of sign comprehensibility. Contrary to expectation, the driver factors of age group, years of active driving, hours of driving, last time driving, driving frequency, and non-local driving experience had no effect on comprehension performance. Sign familiarity was correlated with comprehension score for licensed drivers, whereas sign concreteness, simplicity, and meaningfulness were not. *Impact on Industry*: The results of this study provide useful guidelines for designing more user-friendly traffic signs in the future. It identified particular driver groups who lacked good understanding of traffic signs, and this information may assist the relevant organizations to better allocate traffic training resources, and better target future studies of traffic sign comprehension.

- **Keywords:** Traffic signs; Drivers; Sign features; Comprehensibility

Brian L. Quick, Michael T. Stephenson, Kim Witte, Charles Vaught, Steve Booth-Butterfield, Dhaval Patel. *An examination of antecedents to coal miners' hearing protection behaviors : a test st of the theory of planned behavior*. Pages 329-338.

Abstract: Problem: The National Institute for Occupational Safety and Health's [NIOSH] *National Occupational Research Agenda* (DHHS Publication No. 96-115) reports that approximately 50% of miners will experience hearing loss by age 50, compared to only 9% of the general population. The present investigation examines three antecedents believed to be associated with miner's use of hearing protection. **Method:** A posttest-delayed-posttest-control group field research design was employed to assess antecedents toward wearing hearing protection. **Results:** Following the initial posttest, miners' attitudes and subjective norms were antecedents to intentions to wear hearing protection devices. Also, intentions toward wearing hearing protection predicted hearing protection behaviors. Approximately six weeks later, miners' attitudes and perceived behavioral control were each significant predictors of intentions to wear hearing protection and again, intentions were positively associated with hearing protection behaviors. **Impact on Industry:** Our results indicate that appeals to normative influences may be the most effective antecedent to employ when persuading coal miners to wear hearing protection. However, messages designed to impact attitudes and perceived behavioral control were also effective.

- **Keywords:** Coal miner; Hearing protection; Theory of planned behavior

Richard W. Goggins, Peregrin Spielholz, Greg L. Nothstein. *Estimating the effectiveness of ergonomics interventions through case studies : implications for predictive cost-benefit analysis*. Pages 339-344.

Abstract: Problem: Cost-benefit analysis (CBA) can help to justify an investment in ergonomics interventions. A predictive CBA model would allow practitioners to present a cost justification to management during the planning stages, but such a model requires reliable estimates of the benefits of ergonomics interventions. **Method:** Through literature reviews and Internet searches, 250 case studies that reported the benefits of ergonomics programs and control measures were collected and summarized. **Results:** Commonly reported benefits included reductions in the number of work-related musculoskeletal disorders (WMSDs) or their incidence rate, as well as related lost workdays, restricted workdays, and workers' compensation costs. Additional benefits reported were related to productivity, quality, turnover and absenteeism. **Discussion:** Benefits reported were largely positive, and payback periods for ergonomics interventions were typically less than one year. **Summary:** The results of this review could be used to develop predictive CBA models for ergonomics programs and individual control measures. **Impact on Industry:** Cost-justifying ergonomics interventions prior to implementation may help to secure management support for proposed changes. Numbers used for the benefits side of a cost-benefit analysis (CBA) need to be based on "real world" data in order to be credible. The data presented in this paper may help in the development of simple cost-benefit models for ergonomics programs and control measures.

- **Keywords:** Ergonomics; Musculoskeletal disorders; Cost benefit analysis; Interventions; Effectiveness

J.A. Stevens, K.A. Mack, L.J. Paulozzi, M.F. Ballesteros. *Self-Reported Falls and Fall-Related Injuries Among Persons Aged ≥ 65 Years–United States, 2006*. Pages 345-349.

Abstract: *Problem:* In 2005, 15,802 persons aged ≥ 65 years died from fall injuries. How many older adults seek outpatient treatment for minor or moderate fall injuries is unknown. *Method:* To estimate the percentage of older adults who fell during the preceding three months, the Centers for Disease Control and Prevention (CDC) analyzed data from two questions about falls included in the 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey. *Results:* Approximately 5.8 million (15.9%) persons aged ≥ 65 years reported falling at least once during the preceding three months, and 1.8 million (31.3%) of those who fell sustained an injury that resulted in a doctor visit or restricted activity for at least one day. *Discussion:* This report presents the first national estimates of the number and proportion of persons reporting fall-related injuries associated with either doctor visits or restricted activity. **Summary:** The prevalence of falls reinforces the need for broader use of scientifically proven fall-prevention interventions. **Impact on industry:** Falls and fall-related injuries represent an enormous burden to individuals, society, and to our health care system. Because the U.S. population is aging, this problem will increase unless we take preventive action by broadly implementing evidence-based fall prevention programs. Such programs could appreciably decrease the incidence and health care costs of fall injuries, as well as greatly improve the quality of life for older adults.

- **Keywords:** Aged; BRFSS; elderly; falls; injury