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Special Issue: Papers from the 2015 National Occupational Injury Research Symposium



Dawn N. Castillo, Christine R. Schuler, Cammie Chaumont Menéndez. *6th National Occupational Injury Research Symposium: Advancing Occupational Injury Research Through Integration and Partnership.* Pages 3-4.

Introduction: The National Occupational Injury Research Symposium (NOIRS) is the only regularly held forum exclusively dedicated to occupational injury research and prevention. **Method:** The 2015 conference theme, advancing occupational injury research through integration and partnership, shaped the conference and is reflected in articles selected for this special issue. **Results' Conclusion:** The 6th NOIRS, held May 19–21, 2015, brought together more than 250 researchers, occupational safety practitioners and students to share and discuss occupational injury research. Articles in this special issue highlight some of the research presented at the conference, reflect multiple scientific disciplines and approaches, cover a breadth of occupational injury causes and worker populations, and provide examples of research advanced by partnerships. **Practical Applications:** The next NOIRS, tentatively scheduled for 2018, will build upon the theme of integration and partnership as well as feedback from conference attendees.

- **Keywords:** Injury prevention; Occupational; Conference

Christine R. Schuler, Dawn N. Castillo, Cammie Chaumont Menéndez, Sergey Sinelnikov, Sydney Webb, Emily Chavez. *A post-conference evaluation of the 2015 National Occupational Injury Research Symposium.* Pages 5-8.

Introduction: The National Occupational Injury Research Symposium (NOIRS) is the only national forum focused on occupational injury research findings, data and methods, and prevention strategies; it has been convened every 3–5 years since 1997. Held in May 2015, the 6th symposium's theme was "Advancing Occupational Injury Research through Integration and Partnership." Organizers requested that attendees complete a post-meeting evaluation to assess meeting impact, and gather information useful in planning subsequent meetings and activities. **Method:** The questionnaire was publicized via a quick response code and link to the survey on symposium book cover, and mentioned at

each scientific session. The online survey was designed to be completed in ≤ 15 min; no identifying information was collected. Survey link remained open for seven days post-symposium. **Results:** About 50% of registered attendees responded. Almost half were attending their first NOIRS. Most were researchers (69%); 45% were affiliated with government and 38% with university or research institute. Five of six reported that the symposium mostly or completely met expectations. Reasons for attending included gaining exposure to new areas of research (87%), sharing their research (80%), and to develop new ideas for conducting research (79%). The majority (90%) reported that the symposium provided adequate networking opportunities. The conference venue was reported as good or better by 69%, more so among repeat attendees (77%) compared to first-timers (61%). **Discussion:** The evaluation demonstrated that NOIRS was valuable to attendees, and provided a forum for sharing research results, developing new research ideas, and networking. Respondents provided input on different aspects of NOIRS and suggestions useful in planning next NOIRS, tentatively scheduled for 2018. NOIRS 2015 objectives for integration across disciplines and partnership with industry and safety professionals were partially met. In planning NOIRS 2018, more attention should be paid to attracting and engaging a broader spectrum of attendees.

- **Keywords:** Surveys and questionnaires; Occupational injuries; Occupational health; Safety; Conference

Vitaly Volberg, Tiffani Fordyce, Megan Leonhard, Gabor Mezei, Ximena Vergara, Lovely Krishen. *Injuries among electric power industry workers, 1995–2013. Pages 9-16.*

Introduction: Workers in the electric power industry face many risks of injury due to the high diversity of work tasks performed in potentially hazardous and unpredictable work environments. **Method:** We calculated injury rates by age, sex, occupational group, and injury type among workers in the Electric Power Research Institute's (EPRI) Occupational Health and Safety Database (OHSD), which contains recordable injury, medical claims, and personnel data from 18 participating electric power companies from 1995 to 2013. **Results:** The OHSD includes a total of 63,193 injuries over 1,977,436 employee-years of follow-up, for an overall injury rate of 3.20 injuries per 100 employee-years. Annual injury rates steadily decreased from 1995 to 2000, increased sharply in 2001, and subsequently decreased to their lowest rate of 1.31 injuries per 100 employee-years in 2013. Occupations with the highest injury rates were welders (13.56 per 100 employee-years, 95% CI 12.74–14.37), meter readers (12.04 per 100 employee-years, 95% CI 11.77–12.31), and line workers (10.37 per 100 employee-years, 95% CI 10.19–10.56). Males had an overall higher injury rate compared to females (2.74 vs. 1.61 per 100 employee-years) although some occupations, such as meter reader, had higher injury rates for females. For all workers, injury rates were highest for those in the 21 to 30 age group (3.70 per 100 employee-years) and decreased with age. Welders and machinists did not follow this trend and had higher injury rates in the 65 + age group. There were 63 fatalities over the 1995 to 2013 period, with 21 fatalities (33.3%) occurring among line workers. **Conclusions:** Although injury rates have decreased over time, certain high-risk groups remain (i.e., line workers, mechanics, young males, older welders and machinists, and female meter readers). **Practical applications:** Protective measures and targeted safety programs may be warranted to ensure the safety of electric power workers.

- **Keywords:** Utility; Electrical; Occupational injury; Injury trends

Deborah B. Reed, Deborah T. Claunch. *Moving social work norms via theater for senior farmers. Pages 17-20.*

Problem: Senior farmers have a 2.6-fold risk of fatal injury compared to their younger counterparts. Usual educational interventions have resulted in limited success in reducing

injury. **Method:** An innovative strategy, didactic readers theater, was piloted. Farmers' stories provided the foundation for the scripts. The approach incorporated adult learning strategies based on Ajzen's Theory of Planned Behavior. The intervention was marketed as a "dinner theater" to farm couples. Three short socio-novels (plays) were presented by local farmers who served as actors. Following each play participants completed a reaction form and participated in a short discussion about the play's content. One week later a phone survey was completed that tapped further reaction to the content and behavior changes. **Results:** Thirty-three farm household individuals (including 16 couples) participated. Participants expressed favorable reaction to the intervention. Within one week post intervention, 42% had made safety changes and 67% were "thinking about/intending" to make changes. **Discussion:** The use of real stories contributed to the success of this intervention. Farmers identified with the stories and began to think and talk about the impact that aging exerts on their health and safety. Interaction among the group identified work modifications which empowered the farmers to make positive changes in their own work behavior. **Summary:** Educational interventions with farmers have met with limited success in reducing farm-related injuries. Moreover, few interventions have utilized the family unit. This novel program, incorporating local organizations and using limited financial resources, resulted in swift behavior changes. **Practical applications:** Total Worker Health includes not only the worker, but also the family. Interventions that include family units should be considered when possible. This format is effective, easily adapted to local issues, can be delivered using existing infrastructure, and is acceptable to the farm community. It is currently being tested on a larger scale.

- **Keywords:** Agriculture; Aging; Health behavior; Safety; Community

Keshia M. Pollack, Gerald S. Poplin, Stephanie Griffin, Wayne Peate, Virginia Nash, Ed Nied, John Gulotta, Jefferey L. Burgess. *Implementing risk management to reduce injuries in the U.S. Fire Service. Pages 21-27.*

Introduction: Risk management, a proactive process to identify and mitigate potential injury risks and implement control strategies, was used to reduce the risk of occupational injury in a fire department. The objective of this research was to study the implementation of the risk management process for future replication. A second objective was to document changes in fire personnel's knowledge, attitudes, and behaviors related to the selected control strategies that were implemented as part of the risk management process. **Method:** A number of control strategies identified through the risk management process were implemented over a 2-year period beginning in January 2011. Approximately 450 fire personnel completed each of the three cross-sectional surveys that were administered throughout the implementation periods. Fire personnel were asked about their awareness, knowledge, and use of the control strategies. **Results:** Fire personnel were generally aware of the control strategies that were implemented. Visual reminders (e.g., signage) were noted as effective by fire personnel who noticed them. Barriers to use of specific control strategies such as new procedures on the fireground or new lifting equipment for patient transfer included lack of knowledge of the new protocols, lack of awareness/access to/availability of the new equipment, and limited training on its use. Implementation challenges were noted, which limited self-reported adherence to the control strategies. **Conclusions:** Fire personnel generally recognized the potential for various control strategies to manage risk and improve their health and safety; however, implementation challenges limited the effectiveness of certain control strategies. The study findings support the importance of effective implementation to achieve the desired impacts of control strategies for improving health and safety. **Practical applications:** Employees must be aware of, have knowledge about, and receive training in safety and health interventions in order to adopt desired behaviors.

- **Keywords:** Fire service; Risk management; Implementation; Process evaluation

Avni A. Patel, Keith G. Hauret, Bonnie J. Taylor, Bruce H. Jones. *Non-battle injuries among U. S. Army soldiers deployed to Afghanistan and Iraq, 2001–2013. Pages 29-34.*

Introduction: Many non-battle injuries among deployed soldiers are due to occupational-related tasks. Given that non-battle injuries are a significant cause of morbidity and mortality, occupational safety and health are of great concern to the military. Some of the leading causes of non-battle injuries in the military are also common in non-military occupational settings. Nationally, falls and motor-vehicle accidents are leading causes of non-fatal occupational injuries in the civilian workforce. The objective of this research is to identify the leading causes, types, and anatomic locations of non-fatal non-battle injuries in Afghanistan and Iraq. **Methods:** Non-battle injuries were identified from medical air evacuation records. Causes of air evacuated injuries were identified and coded using the diagnosis and narrative patient history in the air evacuation records. Descriptive statistics were used to report the air evacuated non-battle injury rates, causes, injury types, and anatomic locations. **Results:** Between 2001 and 2013, there were 68,349 medical air evacuations from Afghanistan and Iraq. Non-battle injuries accounted for 31% of air evacuations from Afghanistan and 34% from Iraq. These injuries were the leading diagnosis category for air evacuations. The three leading causes of injury for Afghanistan and Iraq, respectively, were sports/physical training (23% and 24%), falls/jumps (19% and 16%), and military vehicle-related accidents (8% and 11%). The leading injury types were fractures (21%), overuse pain and inflammation (16%), and dislocations (11%). **Practical applications:** Given that over 30% of medical evacuations of soldiers result from non-battle injuries, prevention of such conditions would substantially enhance military readiness during combat.

- **Keywords:** Occupational injury; Military; Surveillance; Medical evacuation; Falls

Cheryl Fairfield Estill, Carol H. Rice, Thais Morata, Amit Bhattacharya. *Noise and neurotoxic chemical exposure relationship to workplace traumatic injuries: A review. Pages 35-42.*

Introduction: More than 5,000 fatalities and eight million injuries occurred in the workplace in 2007 at a cost of \$6 billion and \$186 billion, respectively. Neurotoxic chemicals are known to affect central nervous system functions among workers, which include balance and hearing disorders. However, it is not known if there is an association between exposure to noise and solvents and acute injuries. **Method:** A thorough review was conducted of the literature on the relationship between noise or solvent exposures and hearing loss with various health outcomes. **Results:** The search resulted in 41 studies. Health outcomes included: hearing loss, workplace injuries, absence from work due to sickness, fatalities, hospital admissions due to workplace accidents, traffic accidents, hypertension, balance, slip, trips, or falls, cognitive measures, or disability retirement. Important covariates in these studies were age of employee, type of industry or occupation, or length of employment. Discussion: Most authors that evaluated noise exposure concluded that higher exposure to noise resulted in more of the chosen health effect but the relationship is not well understood. Studies that evaluated hearing loss found that hearing loss was related to occupational injury, disability retirement, or traffic accidents. Studies that assessed both noise exposure and hearing loss as risk factors for occupational injuries reported that hearing loss was related to occupational injuries as much or more than noise exposure. Evidence suggests that solvent exposure is likely to be related to accidents or other health consequences such as balance disorders. **Conclusions:** Many authors reported that noise exposures and hearing loss, respectively, are likely to be related to occupational accidents. **Practical applications:** The potential significance of the study is that findings could be used by managers to reduce injuries and the costs associated with those injuries.

- **Keywords:** Workplace; Accidents; Workers' compensation; Solvent exposure; Injury

Desta Fekedulegn, Cecil M. Burchfiel, Claudia C. Ma, Michael E. Andrew, Tara A. Hartley, Luenda E. Charles, Ja K. Gu, John M. Violanti. *Fatigue and on-duty injury among police officers: The BCOPS study. Pages 43-51.*

Introduction: Policing involves inherent physical and psychological dangers as well as occupational stressors that could lead to chronic fatigue. Although accounts of adverse events associated with police fatigue are not scarce, literature on the association between chronic fatigue and on-duty injury are limited. **Methods:** Participants were officers from the Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) Study. A 10-item questionnaire was administered to assess how tired or energetic the officers generally felt irrespective of sleep hours or workload. The questionnaire consisted of five positively worded and five negatively phrased items that measured feelings of vigor/energy and tiredness, respectively. Total as well as separate scores for positive and negative items were computed by summing scores of individual items. Payroll records documenting each officer's work history were used to assess occurrence of injury. Poisson regression was used to estimate prevalence ratios (PR) of injury. **Results:** Nearly 40% of officers reported feeling drained. Overall prevalence of on-duty injury during the past year was 23.9%. Injury prevalence showed a significant increasing trend across tertiles of total fatigue score: 19.6, 21.7, and 30.8% for lowest, middle and highest tertiles, respectively (trend p-value = 0.037). After controlling for potential confounders, a 5-unit increase in total fatigue score was associated with a 12% increase in prevalence of injury which was marginally significant (p = 0.075). A 5-unit increase in fatigue score of the positively worded items was associated with a 33% increase in prevalence of injury (PR = 1.33, 95% CI: 1.04–1.70, p = 0.022). **Conclusion:** Officers who do not feel active, full of vigor, alert, or lively had a significantly higher prevalence of non-fatal work place injury compared to their counter parts. **Practical applications:** With additional prospective evidence, workplace interventions designed to enhance level of energy may reduce feelings of tiredness and hence may prevent workplace injury.

- **Keywords:** Non-fatal injuries; Chronic tiredness; Law enforcement; Work history

Stefano Porru, Stefano Calza, Cecilia Arici. *Prevention of occupational injuries: Evidence for effective good practices in foundries. Pages 53-69.*

Introduction: Occupational injuries are a relevant research and practical issue. However, intervention studies evaluating the effectiveness of workplace injury prevention programs are seldom performed. **Method:** The effectiveness of a multifaceted intervention aimed at reducing occupational injury rates (incidence/employment-based = IR, frequency/hours-based = FR, severity = SR) was evaluated between 2008 and 2013 in 29 Italian foundries (22 ferrous; 7 non-ferrous; 3,460 male blue collar workers/year) of varying sizes. Each foundry established an internal multidisciplinary prevention team for risk assessment, monitoring and prevention of occupational injuries, involving employers, occupational physicians, safety personnel, workers' representatives, supervisors. Targets of intervention were workers, equipment, organization, workplace, job tasks. An interrupted time series (ITS) design was applied. **Results:** 4,604 occupational injuries and 83,156 lost workdays were registered between 2003 and 2013. Statistical analysis showed, after intervention, a reduction of all injury rates (– 26% IR, – 15% FR, –18% SR) in ferrous foundries and of SR (– 4%) in non-ferrous foundries. A significant (p = 0.021) 'step-effect' was shown for IR in ferrous foundries, independent of secular trends (p < 0.001). Sector-specific benchmarks for all injury rates were developed separately for ferrous and non-ferrous foundries. **Conclusions:** Strengths of the study were: ITS design, according to standardized quality criteria (i.e., at least three data points before and three data points after intervention; clearly defined intervention

point); pragmatic approach, with good external validity; promotion of effective good practices. Main limitations were the non-randomized nature and a medium length post-intervention period. In conclusion, a multifaceted, pragmatic and accountable intervention is effective in reducing the burden of occupational injuries in small-, medium- and large-sized foundries. **Practical Applications:** The study poses the basis for feasible good practice guidelines to be implemented to prevent occupational injuries, by means of sector-specific numerical benchmarks, with potentially relevant impacts on workers, companies, occupational health professionals and society at large.

- **Keywords:** Occupational injuries; Foundries; Pragmatic multifaceted preventive intervention; Evaluation of effectiveness; Evidence-based good practices

Charles A. Jennissen, Karisa K. Harland, Kristel Wetjen, Pamela Hoogerwerf, Lauren O'Donnell, Gerene M. Denning. *All-terrain vehicle safety knowledge, riding behaviors and crash experience of Farm Progress Show attendees. Pages 71-78.*

Introduction: Although all-terrain vehicles (ATVs) are very popular in rural areas for both recreation and work purposes, the epidemiology of agricultural ATV use remains largely unknown. **Methods:** Farm Progress Show attendees in 2012 (Boone, Iowa) and 2013 (Decatur, Illinois) were surveyed about ATVs, including riding behaviors, crash history, and safety knowledge. Descriptive and comparative analyses were performed (N = 635 surveys). **Results:** Over half of those surveyed lived on a farm and more than 90% had ridden on an ATV. Sixty-one percent rode at least once a week and 39% reported riding almost daily. Males and respondents who lived on farms were significantly more likely to be ATV riders. Regarding unsafe behaviors, > 80% of ATV users had ridden with a passenger, 66% had ridden on a public road, and nearly one-half never or almost never wore a helmet. Nearly 40% reported having been in a crash. Multivariable logistic regression analysis of adult respondent's data showed males and younger adults were both more likely to report having crashed. In addition, those reporting riding on public roads (but not having ridden with passengers) were nearly five times more likely and respondents who reported both riding on public roads and having ridden with passengers were approximately eight times more likely to have been in a crash as compared to those not reporting these unsafe behaviors. Safety knowledge did not necessarily correspond with safer behaviors; 80% who knew there should be no passengers on an ATV still had ridden with extra riders. **Conclusion:** ATV use is prevalent in rural populations and most riders report engaging in unsafe riding behaviors. **Practical applications:** These findings may be used to inform ATV safety education and training programs targeted toward agricultural communities, with the goal of reducing occupational ATV-related deaths and injuries and their substantial economic costs.

- **Keywords:** All-terrain vehicles; Occupational safety; Injury prevention; Agriculture; Safety training

Kathleen M. Fagan, Michael J. Hodgson. *Under-recording of work-related injuries and illnesses: An OSHA priority. Pages 79-83.*

Introduction: A 2009 Government Accounting Office (GAO) report, along with numerous published studies, documented that many workplace injuries are not recorded on employers' recordkeeping logs required by the Occupational Safety and Health Administration (OSHA) and consequently are under-reported to the Bureau of Labor Statistics (BLS), resulting in a substantial undercount of occupational injuries in the United States. **Methods:** OSHA conducted a Recordkeeping National Emphasis Program (NEP) from 2009 to 2012 to identify the extent and causes of unrecorded and incorrectly recorded occupational injuries and illnesses. **Results:** OSHA found recordkeeping violations in close to half of all facilities inspected. Employee interviews identified workers' fear of reprisal and employer disciplinary programs as the most important

causes of under-reporting. Subsequent inspections in the poultry industry identified employer medical management policies that fostered both under-reporting and under-recording of workplace injuries and illnesses. **Conclusions:** OSHA corroborated previous research findings and identified onsite medical units as a potential new cause of both under-reporting and under-recording. Research is needed to better characterize and eliminate obstacles to the compilation of accurate occupational injury and illness data. **Practical applications:** Occupational health professionals who work with high hazard industries where low injury rates are being recorded may wish to scrutinize recordkeeping practices carefully. This work suggests that, although many high-risk establishments manage recordkeeping with integrity, the lower the reported injury rate, the greater the likelihood of under-recording and under-reporting of work-related injuries and illnesses.

- **Keywords:** Recordkeeping; Occupational; Data; Under-reporting; Medical management

Maria Brann, Dan Hartley. *Nursing student evaluation of NIOSH workplace violence prevention for nurses online course. Pages 85-91.*

Introduction: As primary targets of workplace violence in health care settings, nurses may suffer negative physical and psychological consequences. NIOSH created an online course to educate nurses about violence prevention techniques. **Method:** A mixed-methods approach assessed workplace violence awareness and knowledge among nursing students. A pre/post/post-test survey and focus group discussions evaluated participant awareness and knowledge, assessed course design, and solicited recommendations for increasing participation and strategies for improving message retention. **Results:** The mean awareness scores differed significantly between pre-course and both post-course time points (Wilk's $\lambda = 0.319$, $F(2, 46) = 49.01$, $p < 0.001$). Post hoc tests using the Bonferroni correction revealed that course participation increased awareness of workplace violence from pre-course scores ($M = 0.75$, $SD = 0.438$) to immediate post-course ($M = 2.13$, $SD = 0.789$) and four-week post-course ($M = 1.96$, $SD = 0.771$) scores on a 3-item measure. Similarly, mean knowledge scores increased between pre-course and both post-course time points (Wilk's $\lambda = 0.495$, $F(1.57, 73.66) = 37.26$, $p < 0.001$). Post hoc tests using the Bonferroni correction revealed that course participation increased knowledge of workplace violence from pre-course scores ($M = 6.65$, $SD = 1.45$) to immediate post-course ($M = 8.56$, $SD = 1.32$) and four-week post-course ($M = 8.19$, $SD = 1.42$) scores on a 10-item measure. Qualitative data from the focus groups reinforced the quantitative findings. Participants citing benefits from the content strongly recommended including the course in nursing curriculums. Incorporating the course early in the nursing educational experience will better prepare students to deal with workplace violence when they enter health care professions. **Conclusions:** The results indicate that NIOSH and its partners created an effective online workplace violence awareness and prevention course. **Practical applications:** Nursing students and professionals can be effectively educated about workplace violence using an online format.

- **Keywords:** Workplace violence; Health care; Online training; Nonfatal injuries; Physical and verbal assaults

Ivan Steenstra, Kimberley Cullen, Emma Irvin, Dwayne Van Eerd, M. Alavinia, D. Beaton, J. Geary, M. Gignac, D. Gross, Q. Mahood, S. Macdonald, M. Puts, H. Scott-Marshall, A. Yazdani. *A systematic review of interventions to promote work participation in older workers. Pages 93-102.*

Purpose: The objective of this systematic review was to synthesize evidence on the effectiveness of interventions aimed at promoting work participation in older workers. **Methods:** We followed a systematic review process developed by the Institute for Work & Health and a best evidence synthesis that ranked evidence as strong, moderate, limited, or insufficient. **Results:** Seven electronic databases were searched from inception to March 2014. Evidence from 14 studies were synthesized in 4 different intervention categories: multi-component, exercise, medication and other interventions. There was moderate evidence that work participation was improved by multi-component interventions encompassing at least two of three components (health service delivery, coordination of services, and work modifications). There was not enough evidence to recommend the other interventions. **Conclusions:** Although there is a vast body of research on work participation of older workers, there are only a few high quality intervention studies aimed at improving work participation in this population. We recommend that multi-component interventions could be considered for implementation by practitioners to help improve work participation in older workers. **Practical applications:** With a moderate level of evidence, multi-component interventions could be considered for use in practice if practitioners deem it suitable for their setting. There is not enough evidence to recommend exercise interventions, pharmaceutical interventions, different types of surgeries, patient education or work accommodation alone to improve work participation. However, the lack of evidence should not be considered, as absence of effect and practitioners should continue to be creative in developing solutions.

- **Keywords:** Aging; Return to work; Stay at work

Jessica Bunting, Christine Branche, Chris Trahan, Linda Goldenhar. *A national safety stand-down to reduce construction worker falls. Pages 103-111.*

Introduction: Falls are the leading cause of death and third leading cause of non-fatal injuries in construction. In an effort to combat these numbers, The National Campaign to Prevent Falls in Construction began in April 2012. As the campaign gained momentum, a week called the National Safety Stand-Down to Prevent Falls was launched to draw attention to the campaign and its goals. The purpose of this paper is to examine the reach of the Stand-Down and lessons learned from its implementation. **Methods:** The Occupational Safety & Health Administration offered a certificate of participation during the Stand-Down. To print the certificate, respondents provided information about their company and stand-down event. CPWR - The Center for Construction Research and Training conducted analyses on the data collected to assess reach and extent of participation. **Results:** In 2014, 4,882 stand-downs were reported. The total number reported in 2015 was 3,759. The number of participants, however, increased from 770,193 in 2014 to 1,041,307 in 2015. **Discussion:** The Stand-Down successfully reached the construction industry and beyond. Respondents were enthusiastic and participated nationally and internationally in variety of activities. They also provided significant feedback that will be influential in future campaign planning. **Conclusion:** Numbers of Stand-Downs and participants for both years are estimated to be substantially higher than the data recorded from the certificate database. While we cannot determine impact, the reach of the Stand-Down has surpassed expectations. **Practical applications:** The data gathered provide support for the continuation of the Stand-Down. Campaign planners incorporated findings into future Stand-Down planning,

materials creation, and promotion. This analysis also provides insight on how organizations can partner to create targeted national campaigns that include activities stakeholders in the construction industry respond to, and can be used to replicate our efforts for other safety and health initiatives in construction and other industries.

- **Keywords:** Safety stand-down; Construction falls; Fall prevention; Construction safety; Social marketing campaign

Joan M. Mazur, Susan Westneat. *A socio-cognitive strategy to address farmers' tolerance of high risk work: Disrupting the effects of apprenticeship of observation.* Pages 113-117.

Introduction: Why do generations of farmers tolerate the high-risk work of agricultural work and resist safe farm practices? This study presents an analysis inspired by empirical data from studies conducted from 1993 to 2012 on the differing effects of farm safety interventions between participants who live or work on farms and those who don't, when both were learning to be farm safety advocates. Both groups show statistically significant gains in knowledge and behavioral change proxy measures. However, non-farm participants' gains consistently outstripped their live/work farm counterparts. **Method:** Drawing on socio-cultural perspectives, a grounded theory qualitative analysis focused on identifying useful constructs to understand the farmers' resistance to adopt safety practices. **Findings:** Understanding apprenticeships of observation and its relation to experiential learning over time can expose sources of deeply anchored beliefs and how they operate insidiously to promote familiar, albeit unsafe farming practices. The challenge for intervention-prevention programs becomes how to disrupt what has been learned during these apprenticeships of observation and to address what has been obscured during this powerful socialization process. **Practical applications:** Implications focus on the design and implementation of farm safety prevention and education programs. First, farm safety advocates and prevention researchers need to attend to demographics and explicitly explore the prior experiences and background of safety program participants. Second, farm youth in particular need to explore, explicitly, their own apprenticeships of observations, preferably through the use of new social media and or digital forms of expression, resulting in a story repair process. Third, careful study of the organization of work and farm experiences and practices need to provide the foundations for intervention programs. Finally, it is crucial that farm safety programs understand apprenticeships of observation are generational and ongoing over time, and interventions prevention programs need to be 'in it' for the long haul.

- **Keywords:** Observational apprenticeships; Farmers' risk tolerance

Jennifer M. Lincoln, Chelsea C. Woodward, Grant W. King, Samantha L. Case, Devin L. Lucas, Theodore D. Teske. *Preventing fatal winch entanglements in the US southern shrimp fleet: A research to practice approach.* Pages 119-123.

Introduction: During 2000–2011, 35 injuries (8 fatal) involving winches were reported to the Coast Guard in the Southern shrimp fleet. Injuries involving the main winch drums had a higher risk for fatal outcomes compared to injuries involving the winch cathead (RR = 7.5; 1.1–53.7). The objective of this study was to design effective solutions to protect deckhands from entanglement hazards posed by winches found on the vessels in the Southern shrimp fleet. **Methods:** Based on injury characteristics, site visit observations, and input from vessel owners, NIOSH determined that the design and implementation of effective main-winch guarding was a feasible first-step in mitigating the entanglement hazard. Design considerations for stationary guards favor systems that are simple, affordable, durable, unobtrusive, and will not interfere with normal fishing operations. In addition, an auxiliary-stop method was tested to prevent entanglements in try-net

winch. **Results:** Standardized passive guards were designed for three commonly found main winch models. Initial prototype guards have been sea-tested. The design of six additional guards is underway, for a total of three iterations for each winch model identified. These will incorporate features found to be valued by fishermen, will be more efficient, and will reduce the overall cost of fabrication and maintenance. Sea testing of these iterations continues. The auxiliary-stop circuit control prototype system was designed to prevent entanglements in the try-net winch and is currently being sea tested. **Discussion:** NIOSH has completed initial designs for stationary-winch guards. Through collaborations with shrimper associations and safety groups, the successfully tested winch guard and auxiliary stop designs will be made available to qualified welders and craftsmen to use. This approach has proven effective in preventing other types of winch injuries. **Practical applications:** Injury epidemiologic methods and industry input are an effective way to identify workplace hazards and to design effective safety interventions to control hazards.

- **Keywords:** Commercial fishing; Injury prevention; Entanglement hazards; Engineering solution; Entanglements

Jennifer L. Bell, Matthew A. Taylor, Guang-Xiang Chen, Rachel D. Kirk, Erin R. Leatherman. *Evaluation of an in-vehicle monitoring system (IVMS) to reduce risky driving behaviors in commercial drivers: Comparison of in-cab warning lights and supervisory coaching with videos of driving behavior. Pages 125-136.*

Problem: Roadway incidents are the leading cause of work-related death in the United States. **Methods:** The objective of this research was to evaluate whether two types of feedback from a commercially available in-vehicle monitoring system (IVMS) would reduce the incidence of risky driving behaviors in drivers from two companies. IVMS were installed in 315 vehicles representing the industries of local truck transportation and oil and gas support operations, and data were collected over an approximate two-year period in intervention and control groups. In one period, intervention group drivers were given feedback from in-cab warning lights from an IVMS that indicated occurrence of harsh vehicle maneuvers. In another period, intervention group drivers viewed video recordings of their risky driving behaviors with supervisors, and were coached by supervisors on safe driving practices. **Results:** Risky driving behaviors declined significantly more during the period with coaching plus instant feedback with lights in comparison to the period with lights-only feedback (OR_{adj} = 0.61 95% CI 0.43–0.86; Holm-adjusted p = 0.035) and the control group (OR_{adj} = 0.52 95% CI 0.33–0.82; Holm-adjusted p = 0.032). Lights-only feedback was not found to be significantly different than the control group's decline from baseline (OR_{adj} = 0.86 95% CI 0.51–1.43; Holm-adjusted p > 0.05). **Conclusions:** The largest decline in the rate of risky driving behaviors occurred when feedback included both supervisory coaching and lights. **Practical applications:** Supervisory coaching is an effective form of feedback to improve driving habits in the workplace. The potential advantages and limitations of this IVMS-based intervention program are discussed.

- **Keywords:** In-vehicle monitoring system; Occupational safety; Driving; Motor vehicle; Injury