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Younger Workers:

An Interdisciplinary Annotated Bibliography

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Younger Workers: An Interdisciplinary Annotated Bibliography

Al-Bayati, A. J. and D. D. York (2018). "Fatal injuries among Hispanic workers in the U.S. construction industry: Findings from FACE investigation reports." J Safety Res 67: 117-123.

INTRODUCTION: Identifying and understanding the characteristics of workplace accidents can provide vital information required to clarify their causes and prevent similar accidents from happening in the future. The Hispanic workforce represents a significant segment of the U.S. construction labor force that is projected to continue increasing in population. The government statistical data show higher rates of fatalities among Hispanic workers when compared to other ethnic groups. METHOD: This study aims to provide details about the trends of fatal injuries among Hispanic workers. The study examined 92 government investigation reports to reveal the general trends, then an examination of fatal fall injuries within the study sample was conducted since falling is the predominant cause of fatal injuries. RESULTS: The findings suggest differences in accident characteristics between Hispanic workers and all workers, which could indicate a need for different interventions to improve the overall site safety. The study also revealed the dire need to propose revised investigation procedures that would help identify the root causes of accidents, which in turn leads to better recommendations and interventions.

Arnoldo, B. D., et al. (2004). "Electrical injuries: a 20-year review." J Burn Care Rehabil 25(6): 479-484.

Electrical injuries continue to present problems with devastating complications and long-term socioeconomic impact. The purpose of this study is to review one institution's experience with electrical injuries. From 1982 to 2002, there were 700 electric injury admissions. A computerized burn registry was used for data collection and analysis. Of these injuries, 263 were high voltage (> or =1000 V), 143 were low voltage (<1000 V), 277 were electric arc flash burns, and 17 were lightning injuries. Mortality was highest in the lightning strikes (17.6%) compared with the high voltage (5.3%) and low voltage (2.8%) injuries, and mortality was least in electric arc injuries without passage of current through the patient (1.1%). Complications were most common in the high-voltage group. Mean length of stay was longest in this group (18.9 +/- 1.4 days), and the patients in this group also required the most operations (3 +/- 0.2). Work-related activity was responsible for the majority of these high-voltage injuries, with the most common occupations being linemen and electricians. These patients tended to be younger men in the prime of their working lives. Electrical injuries continue to make up an important subgroup of patients admitted to burn centers. High-voltage injuries in particular have far reaching social and economic impact largely because of the patient population at greatest risk, that is, younger men at the height of their earning potential. Injury prevention, although appropriate, remains difficult in this group because of occupation-related risk.

Brown, S., et al. (2021). "Injury inequalities among U.S. construction workers." J Occup Environ Hyg 18(4-5): 159-168.

This study explores racial/ethnic inequalities in work-related injuries among U.S. construction workers. Data from the 2004-2017 National Health Interview Survey were used to estimate work-related injuries by race/ethnicity in construction. Disparities in demographic, socioeconomic, and injury status among construction workers were examined by race/ethnicity. Injury differences were also evaluated in multiple logistic regression analyses controlling for

potential confounders. Compared to white, non-Hispanic workers, minority workers were more likely to have lower socioeconomic statuses (e.g., lower educational attainment, lack of health insurance coverage, and family income below the poverty level), which considerably increased the likelihood of work-related injuries. The odds of work-related injuries were 70% higher among racial/ethnic minorities than white, non-Hispanics in construction. Injuries were also more severe among minorities than white, non-Hispanic workers. Among workers with a work-related injury, nearly 85% of Hispanics reported missing at least one workday due to injury, 45.6% higher than the proportion of 57.9% for their white, non-Hispanic counterparts. After adjusting for major demographic and socioeconomic factors, the work-related injury difference between race/ethnicity was no longer statistically significant. However, the odds of work-related injury remained significantly higher among workers who were younger (35-54 years vs. >/= 55 years: aOR = 2.2, 95% CI: 1.3-3.6); male (aOR = 5.3, 95% CI: 2.9-9.8); not college-educated (aOR = 1.5, 95% CI: 1.0-2.2); had a family income below the poverty threshold (aOR = 1.8, 95% CI: 1.2-2.8); or held a blue-collar occupation (aOR = 2.0, 95% CI: 1.2-3.4). These findings suggest that the injury differences between race/ethnicity were strongly associated with demographics and socioeconomic inequalities in these worker groups. The identified injury disparities should be reduced or eliminated, following the hierarchy of controls paradigm.

Bush, D., et al. (2019). "Essential Elements for Effective Safety and Health Education in Postsecondary Construction Career Technical Education." New Solut 29(1): 53-75.

Because Career Technical Education (CTE) programs at the community/technical college level are among the few places new construction workers receive training or preparation, they are an important vehicle for educating new and young workers about occupational health and safety (OSH). We developed recommendations for (1) OSH "core competencies" that all postsecondary construction students should achieve and (2) "essential elements" for OSH education in construction training programs. Based on a review of the literature, subject matter expert focus groups, and iterative engagement with an expert advisory group, we identified fourteen core competencies and a list of essential supporting elements at the school, program, and instructor levels. Knowledge and recognition of the importance of effective safety and health management systems served as the foundation for elements and competencies. Findings provide an important starting point for systematically improving the preparation of construction CTE students that can help keep them safe on the job.

Calkins, M. M., et al. (2019). "A case-crossover study of heat exposure and injury risk among outdoor construction workers in Washington State." Scand J Work Environ Health 45(6): 588-599.

Objectives The primary objective of this study was to assess the relationship between heat exposure and occupational traumatic injuries among construction workers. Methods We assessed the relationship between humidex, a measure of apparent temperature, and Washington State Fund workers' compensation injuries among outdoor construction workers using a case-crossover design with time-stratified referent selection. Warm month (March-October) adult outdoor construction traumatic injury claims from 2000-2012 were spatiotemporally joined with high-resolution meteorological data. We used conditional logistic regression with linear splines to assess the association between maximum daily humidex and injuries. Results There were 63 720 occupational traumatic injury claims in construction that met our eligibility criteria during the study period. The traumatic injury odds ratio (OR) was 1.005 [95% confidence

interval (CI) 1.003-1.007] per one degrees C change in humidex. In the spline analyses, we observed a nearly linear association of humidex with the risk of a traumatic injury. Effect estimates were higher among younger (18-24 years) and older (>54 years) workers, workers with lower extremity injuries, workers with less job experience, smaller employers, workers working in Western Washington, and time of injury before 12:30 hours, although CI of effect estimates overlapped in stratified analysis categories. Conclusions In this study of Washington outdoor construction workers, increasing maximum daily humidex was associated with increasing traumatic injury risk. Further work should explore mechanisms of the association between heat exposure and traumatic injuries. Injury prevention efforts targeted at construction should address heat-related risk factors. In addition, heat awareness campaigns should address outcomes beyond heat-related illness.

Choi, S. D. (2015). "Aging Workers and Trade-Related Injuries in the US Construction Industry." Saf Health Work 6(2): 151-155.

The study was designed to identify any trends of injury type as it relates to the age and trade of construction workers. The participants for this study included any individual who, while working on a heavy and highway construction project in the Midwestern United States, sustained an injury during the specified time frame of when the data were collected. During this period, 143 injury reports were collected. The four trade/occupation groups with the highest injury rates were laborers, carpenters, iron workers, and operators. Data pertaining to injuries sustained by body part in each age group showed that younger workers generally suffered from finger/hand/wrist injuries due to cuts/lacerations and contusion, whereas older workers had increased sprains/strains injuries to the ankle/foot/toes, knees/lower legs, and multiple body parts caused by falls from a higher level or overexertion. Understanding these trade-related tasks can help present a more accurate depiction of the incident and identify trends and intervention methods to meet the needs of the aging workforce in the industry.

Choi, S. H., et al. (2013). "Factors associated with smoking among operating engineers." Workplace Health and Safety 61(9): 385-392.

Although disparities in smoking prevalence between white collar workers and blue collar workers have been documented, reasons for these disparities have not been well studied. The objective of this study was to determine variables associated with smoking among Operating Engineers, using the Health Promotion Model as a guide. With cross-sectional data from a convenience sample of 498 Operating Engineers, logistic regression was used to determine personal and health behaviors associated with smoking. Approximately 29% of Operating Engineers currently smoked cigarettes. Multivariate analyses showed that younger age, unmarried, problem drinking, physical inactivity, and a lower body mass index were associated with smoking. Operating Engineers were at high risk of smoking, and smokers were more likely to engage in other risky health behaviors, which supports bundled health behavior interventions. [Workplace Health Saf 2013;61(9):385-392.]

Choi, S. H., et al. (2013). "Factors associated with sleep quality among operating engineers." Journal of Community Health 38(3): 597-602.

Blue collar workers generally report high job stress and are exposed to loud noises at work and engage in many of risky health behavioral factors, all of which have been associated with poor sleep quality. However, sleep quality of blue collar workers has not been studied extensively, and no studies have focused Operating Engineers (heavy equipment operators) among whom daytime fatigue would place them at high risk for accidents. Therefore, the purpose of this study was to determine variables associated with sleep quality among Operating Engineers. This was a cross-sectional survey design with a dependent variable of sleep quality and independent variables of personal and related health behavioral factors. A convenience sample of 498 Operating Engineers was recruited from approximately 16,000 Operating Engineers from entire State of Michigan in 2008. Linear regression was used to determine personal and related health behavior factors associated with sleep quality. Multivariate analyses showed that personal factors related to poor sleep quality were younger age, female sex, higher pain, more medical comorbidities and depressive symptoms and behavioral factors related to poor sleep quality were nicotine dependence. While sleep scores were similar to population norms, approximately 34 % (n = 143) showed interest in health services for sleep problems. While many personal factors are not changeable, interventions to improve sleep hygiene as well as interventions to treat pain, depression and smoking may improve sleep quality resulting in less absenteeism, fatal work accidents, use of sick leave, work disability, medical comorbidities, as well as subsequent mortality. © 2013 Springer Science+Business Media New York.

Cunningham, T. R., et al. (2018). "Differences in safety training among smaller and larger construction firms with non-native workers: Evidence of overlapping vulnerabilities." Saf Sci 103: 62-69.

Collaborative efforts between the National Institute for Occupational Safety and Health (NIOSH) and the American Society of Safety Engineers (ASSE) led to a report focusing on overlapping occupational vulnerabilities, specifically small construction businesses employing young, non-native workers. Following the report, an online survey was conducted by ASSE with construction business representatives focusing on training experiences of non-native workers. Results were grouped by business size (50 or fewer employees or more than 50 employees). Smaller businesses were less likely to employ a supervisor who speaks the same language as immigrant workers ($p < .001$). Non-native workers in small businesses received fewer hours of both initial safety training ($p = .005$) and monthly ongoing safety training ($p = .042$). Immigrant workers in smaller businesses were less likely to receive every type of safety training identified in the survey (including pre-work safety orientation [$p < .001$], job-specific training [$p < .001$], OSHA 10-hour training [$p = .001$], and federal/state required training [$p < .001$]). The results highlight some of the challenges a vulnerable worker population faces in a small business, and can be used to better focus intervention efforts. Among businesses represented in this sample, there are deflcits in the amount, frequency, and format of workplace safety and health training provided to non-native workers in smaller construction businesses compared to those in larger businesses. The types of training conducted for non-native workers in small business were less likely to take into account the language and literacy issues faced by these workers. The findings suggest the need for a targeted approach in providing occupational safety and health training to non-native workers employed by smaller construction businesses.

Dong, X., et al. (2004). "Effects of safety and health training on work-related injury among construction laborers." J Occup Environ Med 46(12): 1222-1228.

OBJECTIVES: This study was designed to evaluate the effects of safety and health training on work-related injury in the construction industry. METHODS: Union health insurance records, union training records, and workers compensation data for 1993 and 1994 were analyzed for more than 8000 construction laborers in Washington State. RESULTS: After controlling for demographic factors, laborers who received safety and health training during the study period were 12% (95% confidence interval [CI] = 0.75-1.02) less likely than nontrained laborers to file for workers compensation. Among workers 16 to 24 years old, training was associated with a 42% (95% CI = 0.35-0.95) reduction in claims. CONCLUSIONS: These findings provide evidence of the effectiveness of safety and health training in preventing occupational injuries among construction laborers, particularly among younger workers. However, the results cover only a limited time and the long-term effects remain unclear.

Dong, X. S., et al. (2022). "Psychological distress and suicidal ideation among male construction workers in the United States." Am J Ind Med 65(5): 396-408.

BACKGROUND: Male workers in the US construction industry have a higher suicide rate than other workers in the nation. However, related research on this population remains sparse. This study evaluated psychological distress and suicidal ideation in these workers, and possible underlying factors. METHODS: Data from the National Survey of Drug Use and Health from 2008 to 2014 were analyzed. Stratified and multiple logistic regression analyses were conducted to examine factors associated with psychological distress and suicidal ideation among male construction workers aged >/=18 years (n = 12,034). RESULTS: Nearly one-third (29.6%) of male construction workers in the United States experienced psychological distress (23.8% graded as moderate, 5.8% as severe), and 2.5% reported suicidal ideation in the past year. Higher odds of serious psychological distress and suicidal ideation were found among workers who were younger, worked part-time, missed workdays due to injury or illness, or were in poor health. Illicit opioid use (odds ratio [OR] = 1.87, 95% confidence interval [CI]: 1.22-2.89) and alcohol dependence or abuse (OR = 2.64, 95% CI: 1.74-3.99) significantly escalated the odds of suicidal ideation. The odds of suicidal ideation among workers with serious psychological distress were 33 times higher than those having no or minor psychological distress (OR = 32.91, 95% CI: 19.82-54.65) when other factors were constant. CONCLUSIONS: Occupational and nonoccupational factors were associated with constructionworkers' psychological distress and suicidal ideation. Both illicit opioid use and alcohol dependence or abuse were risk factors, and psychological distress was a strong predictor for suicidal ideation. To improve workers' mental health, it is necessary to integrate workplace injury prevention with illicit opioid-use reduction programs and suicide prevention.

Dong, X. S., et al. (2013). "Fatal falls from roofs among US construction workers." J Safety Res 44: 17-24.

This study examined trends and patterns of fatal falls from roofs in the U.S. construction industry over an 18-year period (1992–2009), with detailed analysis for 2003–2009. Roof fatalities accounted for one-third of fatal falls in construction in 1992–2009. A disproportionately high percentage (67%) of deaths from roof falls occurred in small construction establishments (1–10 employees). Roofers, ironworkers, workers employed with roofing contractors, or working at residential construction sites, had a higher risk of roof fatalities. A higher rate of roof fatalities was also found among younger (< 20 years) and older (> 44 years) workers, Hispanics, and immigrant workers.

Dong, X. S., et al. (2012). "Fatal falls among older construction workers." Hum Factors 54(3): 303-315.

OBJECTIVE: This study examines recent trends and patterns in fall fatalities in the U.S. construction industry to determine whether fatal falls among older workers are different from younger workers in this industry. BACKGROUND: Falls are the leading cause of fatalities in the U.S. construction industry. Given the increasingly aging workforce in construction, it is important to assess the risk of falls among older construction workers. METHODS: Fatality data were obtained from the Census of Fatal Occupational Injuries for the years 1992 through 2008. Denominators for death rates were estimated from the Current Population Survey. Stratified and multivariate analyses were performed to examine whether there are differences in fatal falls between older workers (> or = 55 years) and younger workers (16-54 years). Fatal falls in nonconstruction industries were excluded from this study. RESULTS: Older workers had higher rates of fatal falls than younger workers; results were significant in 11 of 14 construction occupations. Regression analysis indicated that older decedents had a higher likelihood that work-related death was caused by a fall, after controlling for major demographic and employment factors (odds ratio = 1.50, confidence interval [1.30, 1.72]). Falls from roofs accounted for one third of construction fatal falls, but falls from ladders caused a larger proportion of deadly falls in older decedents than in younger decedents. CONCLUSION: Older workers have a higher likelihood of dying from a fall. Roofs and ladders are particularly risky for older construction workers. APPLICATION: As the construction workforce ages, there is an urgent need to enhance fall prevention efforts, provide work accommodations, and match work capabilities to job duties.

Duffy, S. A., et al. (2011). "Health behaviors of Operating Engineers." AAOHN J 59(7): 293-301.

Operating Engineers (heavy equipment operators in construction) may be at particular risk for heart disease and cancer related to their exposure to environmental dust and smoking, the sedentary nature of their job, and long hours of exposure to the sun. The aim of this study was to characterize the health behaviors of Operating Engineers. This cross-sectional survey from a convenience sample of Operating Engineers (N = 498) used validated instruments to measure smoking, drinking, diet, exercise, sleep, and sun exposure. Univariate and bivariate analyses to detect differences by age were conducted. The sample scored significantly worse on all five health behaviors compared to population norms. Those who were older were less likely to smoke and chew tobacco and more likely to eat fruits and vegetables. Many were interested in services to improve their health behaviors. Health behavior interventions are needed and wanted by Operating Engineers.

Ehrlich, P. F., et al. (2004). "Understanding work-related injuries in children: a perspective in West Virginia using the state-managed workers' compensation system." J Pediatr Surg 39(5): 768-772.

BACKGROUND/PURPOSE: Little data exist that defines the consequences of occupational injuries in children. Traditional assessment of work-related injury is coupled with disability payments based on salary, which give little insight into etiology and severity. The authors hypothesize that the risk and pattern of occupational injuries in young workers are different then adults. METHODS: Claims from 1996 through 2000 were analyzed from the

West Virginia Bureau of Workers Compensation. To define the significance of an injury, child and adult groups were subdivided into injuries that required surgery (ie, serious injuries). Current Procedural Terminology (CPT) codes for anesthesia and surgical procedures were cross referenced with the claims to ensure group designation. Relative risks (RR) were used to compare groups. RESULTS: Between 1996 and 2000, 364,063 claims were submitted, 14,093 in workers < or =19 years of age. Two hundred seventy claims in children required surgery. Serious injuries in children occur more often in boys 2.2x mainly in the (16 to 24 hours) evening (48% v 23.13%; P <.05) and in July/August (26.5 v 18.4; P <.001). Falls were the main mechanism of injury. Proportionately fingers (1.70x) and hands (1.64x, 1.6 to 1.7) were injured in children. Lacerations (3.4x), fractures (1.4x), and amputations (3.75x) frequently resulted in general anesthetic procedures, and the RR of these injuries were increased versus adults. Service, manufacturing, construction, and agriculture were the main injury-related occupations in children. CONCLUSIONS: For any job category, injuries in children have unique features, tend to be more serious, and require a surgical intervention proportionately more frequently than adults.

Higgins, D. N., et al. (2002). "Preventing young worker fatalities. The Fatality Assessment and Control Evaluation (FACE) Program." AAOHN J 50(11): 508-514.

During the period between 1992 through 1998, the Bureau of Labor Statistics identified an average of 67 work related deaths of individuals younger than 18 each year. This article describes the Fatality Assessment and Control Evaluation (FACE) program and summarizes indepth data collected on 59 young worker fatalities in 26 states. These investigations were conducted between May 1986 and February 2002. Young workers ranged in age from 9 to 17 years, with a mean age of 15.3 years: 21 were working in the agriculture, forestry, and fishing industry; 12 in construction; 10 in manufacturing; 8 in services; and 8 in the retail industry. The majority worked as laborers. Ninety-three percent were young men. Each investigation resulted in the formulation and dissemination of strategies to help prevent future similar occurrences. As an example of state FACE activities, the article describes the Wisconsin FACE program's efforts to foster collaboration between regulatory agencies, researchers, educators, and occupational safety and health professionals, and to integrate efforts aimed at improving safety for young workers.

Hong, O., et al. (2014). "The association between occupational exposures and cigarette smoking among operating engineers." Archives of Environmental and Occupational Health 69(3): 172-179.

The purpose of this study was to determine the relationship between occupational exposures and cigarette smoking among operating engineers. A cross-sectional survey was conducted with operating engineers (N =412) from a midwestern state in the United States. The survey included validated questions on cigarette smoking, occupational exposures, demographics, comorbidities, and health behaviors. About 35% were current smokers. Those exposed to asphalt fumes, heat stress, concrete dust, and welding fumes were less likely to smoke (odds ratio [OR] = .79, 95% confidence interval [CI]: .64-.98). Other factors associated with smoking included younger age (OR = .97, 95% CI: .94-.99), problem drinking (OR = 1.07, 95% CI: 1.03-1.12), lower Body Mass Index (OR = .95, 95% CI: .90-.99), and being separated/widowed/divorced (OR = 2.24, 95% CI: 1.19-4.20). Further investigation is needed

for better understanding about job-specific exposure patterns and their impact on cigarette smoking among operating engineers. © 2014 Taylor & Francis Group, LLC.

Janicak, C. A. (2008). "Occupational fatalities due to electrocutions in the construction industry." J Safety Res 39(6): 617-621.

INTRODUCTION: Occupational fatalities due to contact with electricity account for approximately 9% of all deaths in the construction industry and is the fourth leading cause of death in this industry. METHOD: Differences in the proportions of electrocutions in the construction industry are significantly different from other industries based upon the age of the worker and the source of the electricity. RESULTS: This study found that, in the construction industry, the proportion of occupational fatalities due to contact with electric current is significantly higher for workers in the 16 to 19 years old age group. Contact with overhead power lines occurred more frequently with younger workers, while contact with electric wiring, transformers, and related equipment was found to occur more frequently with older workers. The proportion of fatalities due to this event was also found to account for a significantly greater proportion of fatalities in the construction industry overall. IMPACT ON INDUSTRY: The proportions of electrocution fatalities in the construction industry were found to be significantly higher for younger workers when compared to all other industries. Focusing prevention measures toward younger workers who work near overhead power lines could have a significant impact upon death rates. For older workers, the focus should be on those who work on or near transformers, electrical wiring, and components. Across the construction industry, implementation of effective lockout-tagout programs, and verification of energy isolation, can prevent approximately 125 fatalities per year in the construction industry.

Lipscomb, H. J., et al. (2009). "Compensation costs of work-related back disorders among union carpenters, Washington State 1989-2003." Am J Ind Med 52(8): 587-595.

BACKGROUND: We measured resources used to provide medical care and to estimate lost productivity represented by payments for lost work time or impairment for work-related back injuries among a large cohort of union carpenters over 15 years. METHODS: Using administrative data we identified a cohort of carpenters, their hours worked, their workers' compensation claims and associated costs. After adjustment for inflation and discounting to 2006 dollars, yearly costs for injuries and payment rates based on hours worked were calculated. Using negative binomial regression, dollars paid per claim were modeled based on age, gender, union tenure, and predominant type of work of the carpenter and whether the injury resulted from overexertion or acute trauma. RESULTS: Workers' compensation costs for back injuries exceeded $128 million dollars between 1998 and 2003, representing payments of $0.97 for each hour of work. Costs per hour of work declined substantively over time due largely to declining overexertion injury rates. Traumatic injuries, though less common than overexertion injuries, were more expensive. Costs increased with the number of prior back injuries and with increasing age, beginning as early as age 30. CONCLUSIONS: Increasing costs even among relatively young carpenters likely reflect the heavy nature of their work rather than simply the effects of biological aging. Musculoskeletal back problems remain a common, and consequently costly, source of injury among these carpenters that needs to be addressed through engineering modifications; there are also clearly needs for prevention of the often more costly back injuries associated with acute trauma.

Lipscomb, H. J., et al. (2014). "How well are we controlling falls from height in construction? Experiences of union carpenters in Washington State, 1989-2008." Am J Ind Med 57(1): 69-77.

Background: Falls from height (FFH) continue to cause significant morbidity and mortality across the construction industry. Methods: By linking data on work hours with workers' compensation records, rates of work-related injuries resulting from FFH and associated days away from work were evaluated among a large cohort (n=24,830) of union carpenters in Washington State from 1989 to 2008. Using Poisson regression we assessed rates of FFH over the 20-year period while adjusting for temporal trend in other work-related injuries. Patterns of paid lost days (PLDs) were assessed with negative binomial regression. Results: Crude rates of FFH decreased 82% over the 20-year period. Reductions were more modest and without demonstrable change since 1996 when adjusting for the temporal reduction in other injuries. Younger workers had higher injury rates; older workers lost more days following falls. Rates of PLDs associated with falls decreased over time, but there was not a consistent decline in mean lost days per fall. Conclusion: These patterns are consistent with decreased FFH for several years surrounding state (1991) and then federal (1994) fall standards; the decline during this time period exceeded those seen in injury rates overall in this cohort. While crude rates of FFH have continued to decline, the decline is not as substantial as that seen for other types of injuries. This could reflect a variety of things including more global efforts designed to control risk (site planning, safety accountability) and changes in reporting practices. Am. J. Ind. Med. 57:69-77, 2014. © 2013 Wiley Periodicals, Inc.

Lipscomb, H. J., et al. (2014). "Twenty years of workers' compensation costs due to falls from height among union carpenters, Washington State." Am J Ind Med 57(9): 984-991.

Background: Falls from height (FFH) are a longstanding, serious problem in construction. Methods: We report workers' compensation (WC) payments associated with FFH among a cohort (n=24,830; 1989-2008) of carpenters. Mean/median payments, cost rates, and adjusted rate ratios based on hours worked were calculated using negative-binomial regression. Results: Over the 20-year period FFH accounted for $66.6 million in WC payments or $700 per year for each fulltime equivalent (2,000hr of work). FFH were responsible for 5.5% of injuries but 15.1% of costs. Cost declines were observed, but not monotonically. Reductions were more pronounced for indemnity than medical care. Mean costs were 2.3 times greater among carpenters over 50 than those under 30; cost rates were only modestly higher. Conclusions: Significant progress has been made in reducing WC payments associated with FFH in this cohort particularly through 1996; primary gains reflect reduction in frequency of falls. FFH that occur remain costly. Am. J. Ind. Med. 57:984-991, 2014. © 2014 Wiley Periodicals, Inc.

Marcum, J. L., et al. (2018). "Characteristics of construction firms at risk for future workers' compensation claims using administrative data systems, Washington State." J Safety Res 65: 53-58.

INTRODUCTION: Construction is high-hazard industry, and continually ranks among those with the highest workers' compensation (WC) claim rates in Washington State (WA). However, not all construction firms are at equal risk. We tested the ability to identify those construction firms most at risk for future claims using only administrative WC and unemployment insurance data. METHODS: We collected information on construction firms with 10-50 average full time equivalent (FTE) employees from the WA unemployment insurance and WC data systems (n=1228). Negative binomial regression was used to test the

ability of firm characteristics measured during 2011-2013 to predict time-loss claim rates in the following year, 2014. RESULTS: Claim rates in 2014 varied by construction industry groups, ranging from 0.7 (Land Subdivision) to 4.6 (Foundation, Structure, and Building Construction) claims per 100 FTE. Construction firms with higher average WC premium rates, a history of WC claims, increasing number of quarterly FTE, and lower average wage rates during 2011-2013 were predicted to have higher WC claim rates in 2014. CONCLUSIONS: We demonstrate the ability to leverage administrative data to identify construction firms predicted to have future WC claims. This study should be repeated to determine if these results are applicable to other high-hazard industries. Practical Applications: This study identified characteristics that may be used to further refine targeted outreach and prevention to construction firms at risk.

Mazurek, J. M. and M. D. Attfield (2008). "Silicosis mortality among young adults in the United States, 1968-2004." Am J Ind Med 51(8): 568-578.

BACKGROUND: To describe silicosis deaths in young (aged 15-44) adults in the U.S. during 1968-2004. METHODS: We analyzed the National Center for Health Statistics multiple cause-of-death records. RESULTS: Compared with silicosis decedents aged >or=45 years (n = 15,643), young decedents (n = 237) were more likely to have silicosis listed as the underlying cause of death (74.3% vs. 48.2%, P < 0.001), to be female (9.3% vs. 2.2%, P < 0.001) and black (37.1% vs. 11.7%, P < 0.001). Twenty-nine young silicosis decedents had industry and occupation information available. Occupations in construction and manufacturing industries were associated with significantly elevated proportionate mortality ratios for young silicosis deaths. CONCLUSIONS: Silicosis deaths occur among young adults. Because these deaths are likely to reflect more intense and recent exposures, the follow-back investigations into the work sites where these individuals were exposed to silica should be conducted.

Mehta, R. K. and M. J. Agnew (2010). "Analysis of individual and occupational risk factors on task performance and biomechanical demands for a simulated drilling task." International Journal of Industrial Ergonomics 40(5): 584-591.

The purpose of this study was to evaluate age- and gender-dependent effects of shoulder fatigue on task performance and muscular responses of a drilling task commonly observed within the construction industry. Twelve younger (18-35 years) and ten older (45-60 years) participants, balanced by gender, were recruited from the local community. Task performance (task completion times and errors made), muscle activity of the anterior deltoid (static, mean, and peak amplitude probability density function), coactivity indices of the upper and lower arm, and perceived discomfort ratings were obtained for a series of drilling tasks at three levels of task difficulty, before and after manifestation of shoulder fatigue. To induce fatigue, participants performed a sustained sub-maximal fatigue task at 40% of their maximum voluntary shoulder exertion. Fatigue decreased task completion times, irrespective of age and gender. Higher errors were observed in the fatigued condition, especially for younger participants. Females showed higher shoulder muscle activity compared to men. Additionally, fatigue resulted in lower shoulder APDF measures compared to the no-fatigue condition. Muscle recruitment patterns differed within the fatigue condition, with higher coactivity indices in the upper and lower arm muscles compensating for decreases in shoulder muscle activity. Task difficulty was not found to affect any dependent measures. Participants reported higher discomfort in the fatigued state; this effect was more prominent in females. Overall, this study demonstrated, through objective and subjective measures, that task performance and biomechanical demands are affected by

fatigue, and that this effect varies with individual factors such as gender and age. Relevance to industry: This paper explored the influence of task demands (fatigue and task difficulty) and individual factors (gender and age) of a drilling task on the development of musculoskeletal injuries of construction workers. The results may contribute towards an understanding of the interplay of certain occupational task demands and worker characteristics on common construction tasks. © 2010 Elsevier B.V.

Merlino, L. A., et al. (2003). "Symptoms of musculoskeletal disorders among apprentice construction workers." Appl Occup Environ Hyg 18(1): 57-64.

Musculoskeletal disorders (MSDs) are a major cause of work-related disability and lost-time illnesses for many occupational groups. This study determined the prevalence of musculoskeletal symptoms among young construction workers. A symptom and job factors survey was self-administered to 996 construction apprentices. Prevalence was determined by the percent of positive responses to musculoskeletal symptom questions. Odds ratios and 95 percent confidence intervals were the measures of association between prevalent musculoskeletal symptoms and demographic, leisure, and job factors and were determined by logistic regression. The low back was the site most commonly reported for job-related musculoskeletal symptoms (54.4%), which was also the most common reason for seeking care from a physician (16.8%) and missing work (7.3%). Number of years worked in the construction trade was significantly associated with knee (p-trend = 0.0009) and wrist/hand (p-trend < 0.04) MSD symptoms and was suggestive of an association with low back pain (p-trend = 0.05). "Working in the same position for long periods" was the job factor identified as most problematic, with 49.7 percent of all construction apprentices rating it as a moderate/major problem contributing to musculoskeletal symptoms. Musculoskeletal symptoms are a significant problem among young construction workers at the beginning of their careers. Prevention strategies are needed early in the apprentice training program to reduce the potential disability associated with work-related musculoskeletal symptom disorders.

Nicholson, V. J., et al. (2008). "Disparities in work-related injuries associated with worker compensation coverage status." Am J Ind Med 51(6): 393-398.

BACKGROUND: This exploratory study addresses patterns of injury in an emerging population of contingent workers who are not covered by either worker's compensation (WC) or health insurance. The primary purpose is to improve the information base regarding the entire population of uninsured, injured workers. Because Latino workers are over-represented in the uninsured group, we include additional characterization of their patterns of injury. Recent studies have found that worker compensation claims and reports address a shrinking proportion of occupational injury and exposure, and about two-thirds of occupational injuries are not captured in the U.S. national surveillance system. METHODS: Following the NEISS methodology, a work-relatedness indicator was retrieved for emergency department (ED) visits to an academic health center in fiscal year 2005. RESULTS: Twenty percent of self-declared work-related injuries were not associated with self-reported WC coverage. Parametric and non-parametric statistical analysis found several significant disparities in workers without WC. These disparities included a higher proportion of Latinos, workers under age 25, and construction workers. In the uninsured group, Latino workers had a higher proportion of moderate and severe injuries. Nearly all (92 percent) workers without WC also lacked health insurance. Injured low-income workers who lack access to both WC and employer-sponsored

health insurance comprise an increasing percentage of the occupationally injured. Our exploratory study found this to be particularly true in high-risk populations. CONCLUSIONS: Work-relatedness indicators collected routinely in ED and outpatient settings should be incorporated into standard reporting systems to facilitate more accurate and comprehensive surveillance and better-targeted interventions.

Noonan, D. and S. A. Duffy (2012). "Smokeless tobacco use among operating engineers." Journal of Addictions Nursing 23(2): 132-136.

Workers in blue collar occupations have been shown to have higher rates of smokeless tobacco (ST) use compared to other occupational groups. Guided by the Health Promotion Model, the purpose of this study was to understand various factors that predict ST use in Operating Engineers. A cross-sectional design was used to determine variables related to ST use among Operating Engineers. Engineers (N 498) were recruited during their 3-day apprentice certification course to participate in the study. Logistic regression was used to assess the associations between personal, psychological and behavioral characteristics associated with ST use. Past month ST use was reported among 13% of operating engineers surveyed. Multivariate analysis showed that younger age and lower rates of past month cigarette use were significantly associated with ST use, while higher rates of problem drinking were marginally associated with ST use. Operating Engineers are at high risk for using ST products with rates in this sample well over the national average. Work site interventions, which have shown promise in other studies, may be useful in decreasing ST use among this population. © 2012 International Nurses Society on Addictions.

O'Connor, T., et al. (2005). "Adequacy of health and safety training among young Latino construction workers." J Occup Environ Med 47(3): 272-277.

OBJECTIVES: This study aimed to assess the adequacy of safety training provided to young Latino immigrant construction workers. The study posited that, because of their youth and immigrant status, these workers would be less likely to receive adequate training. METHODS: We interviewed 50 youths aged < or =21 who had worked at least 10 days in construction in the previous year. The in-person interview included 140 questions covering a range of construction work and health and safety experiences. RESULTS: Participants reported performing a range of hazardous tasks, some while under the age of 18. Of these, 68% to 72% reported receiving some training, but median training time was only 1 hour. Only 24% reported receiving written training material. Those with less English ability received less training. CONCLUSIONS: Young Latino immigrants in this study received inadequate training given the hazardous work they performed. CLINICAL SIGNIFICANCE: Results of this research, especially the relatively low level of English communication skills among young Latino workers, point to the need for increased bilingual services not just in worker safety training programs, but also in medical clinics and emergency rooms that treat Latino workers.

Rauscher, K. J., et al. (2012). "Young worker safety in construction: do family ties and workgroup size affect hazard exposures and safety practices?" Work 42(4): 549-558.

OBJECTIVE: Little is known about how social aspects of the work environment influence exposures or safety practices affecting young construction workers. Our objective was to investigate whether working on a construction site with a small number of workers (</=10 vs. 11-50) or having a family-firm connection (working in a family-owned firm or one in which

a family member also works) impacts hazard exposures and safety practices. PARTICIPANTS: Participants included 187 North Carolina construction workers 14 to 17 years old who were surveyed about their jobs. METHODS: We conducted stratified analyses using cross-tabulations and chi-square statistics to measure associations between workgroup size (i.e., the total number of workers on a jobsite) and family-firm connections (yes/no) and hazard exposures (e.g., saws) and safety practices (e.g., supervision). RESULTS: Having a family-firm connection was associated with fewer hazard exposures and greater safety practices. Youth who worked on jobsites with a larger workgroup (11-50 workers) reported more hazards but also more safety practices. CONCLUSIONS: Family-firm connections, in particular, may have a protective effect for youth in construction. Even though the statistical significance of our findings on workgroup size was limited in places, the pattern of differences found suggest that further research in this area is warranted.

Rauscher, K. J., et al. (2011). "Work-related fatalities among youth ages 11-17 in North Carolina, 1990-2008." Am J Ind Med 54(2): 136-142.

BACKGROUND: Local and national surveillance systems are in place that identify occupational deaths. However, due to certain restrictions, they are limited in their ability to accurately count these deaths among adolescent workers. METHODS: In this population-based study, we relied on primary data from the North Carolina medical examiner system to identify and describe all work-related fatalities among North Carolina youth under age 18 between 1990 and 2008. RESULTS: We identified 31 work-related deaths among youth ages 11-17. The majority occurred between 1990 and 1999. Most occurred in construction and agriculture. Vehicles and guns were responsible for the majority of deaths. CONCLUSIONS: Although the prevalence of adolescent work-related fatalities has seen a decline in North Carolina, the 31 deaths we detected signal a failure of the systems in place to prevent young worker fatalities. More remains to be done to protect the lives of adolescent workers.

Rauscher, K. J., et al. (2010). "Construction firm practices and manager beliefs regarding the employment and safety of teenaged employees: a North Carolina based study." Work 37(2): 145-154.

OBJECTIVE: The objective of this study was to examine the reported practices of construction firms and the beliefs of firm managers/supervisors with respect to employing youth under age 18 and ensuring their safety. PARTICIPANTS: The participants in this study were firm representatives from 54, mostly small to medium sized, construction firms in North Carolina. METHODS: Survey responses were analyzed for the entire sample and within strata of firm size (1-10, 11+ employees) using descriptive statistics. Percentages and 95% confidence intervals were calculated. Chi-square tests were used to test for statistical significance in differences between firm sizes. RESULTS: The findings suggest limits in the adequacy of safety training given to youth in construction, particularly in light of the minimal experience firms require of young hires, that managers' beliefs about the causes of young worker injury are largely focused on worker behaviors rather than on the presence of hazards, and that managers' compliance with child labor laws may be hampered by their lack of knowledge of these laws and an ambivalence toward their usefulness and enforcement. CONCLUSIONS: While larger studies are needed to confirm and advance these findings, when considered along with prior studies, they demonstrate the need to improve the safety of the construction environment for youth. The development of new educational interventions by health and safety professionals

targeted at construction firms are supported, as are efforts by government regulators to increase enforcement and employer knowledge of the child labor laws.

Rietdyk, S., et al. (2005). "Work experience mitigated age-related differences in balance and mobility during surface accommodation." Clin Biomech (Bristol, Avon) 20(10): 1085-1093.

BACKGROUND: Locomotor behavior at the roofing worksite is challenged by factors such as sloped surfaces, wind gusts and handling loads. Chronic exposure to this environment may result in enhanced locomotor strategies that are resistant to aging effects. The purpose of this study was to determine if roofers demonstrated enhanced locomotor strategies and if the strategies were maintained with age. METHODS: The gait of ten younger roofers (mean age 27.2 years), eight older roofers (55.4 years), ten younger controls (25.4 years) and nine older controls (57.6 years) was examined during level gait and stepping up onto a wooden surface (0.15m high). Subjects either carried no load, an empty box or the same box loaded to the equivalent of 5% body mass. FINDINGS: Work by age interactions were observed for toe clearance, step width, net angular momentum of the head, arms and trunk segment and gait speed ($P<0.0001$). Younger roofers demonstrated the greatest toe clearance; older roofers had a smaller lead clearance but decreased variability. Older control groups had the greatest risk of tripping due to low lead toe clearance and high variability, and were least likely to recover if they did trip due to faster gait speed and increased net angular momentum. Work experience resulted in enhanced changes in lead toe clearance and mitigated age-related changes in step width and net angular momentum. INTERPRETATION: Challenging environments show promise for maintaining balance skills in older adults; however care should be taken when introducing inexperienced older adults to a challenging environment.

Runyan, C. W., et al. (2006). "Work hazards and workplace safety violations experienced by adolescent construction workers." Arch Pediatr Adolesc Med 160(7): 721-727.

OBJECTIVE: To describe the working conditions of adolescents employed in construction in North Carolina, documenting hazards, safety practices, and prohibited activities. DESIGN: A cross-sectional telephone survey. SETTING: North Carolina. PARTICIPANTS: Adolescents (aged <18 years) with work permits for the construction industry in North Carolina during summer 2001. MAIN OUTCOME MEASURES: Types of jobs, work tasks, supervisory conditions, tools, equipment, and processes. RESULTS: A total of 187 survey respondents were in this study. Adolescents were employed in varied construction settings and business types. Nineteen of the 187 permitted workers were younger than 16 years, despite prohibitions against their employment in construction unless working for their parents. The remainder (n = 168) were working legally based on age, but most performed prohibited tasks. In fact, 84% of all the 16- to 17-year-olds had performed at least 1 clearly prohibited task and 47% had performed 3 or more. Although most reported being supervised and working with others, approximately 19% of all respondents reported working where they were not in hearing distance of other workers. Data were collected from teenagers with work permits, suggesting that these adolescents may work for more responsible employers. If violations of child labor laws exist in this group, it is likely that adolescents without permits are exposed to even greater hazards and violations. CONCLUSION: Involvement of teenagers in dangerous and/or prohibited tasks is cause for concern and suggests a pressing need to examine the enforcement of existing laws and the need for additional protection.

Schwatka, N. V., et al. (2013). "Age in relation to worker compensation costs in the construction industry." Am J Ind Med 56(3): 356-366.

BACKGROUND: A better understanding of how workers' compensation (WC) costs are affected by an aging US workforce is needed, especially for physically demanding industries, such as construction. METHODS: The relationship between age and injury type on claim costs was evaluated using a database of 107,064 Colorado WC claims filed between 1998 and 2008 among construction workers. RESULTS: Mean WC costs increased with increasing age for total cost ($P < 0.0001$), medical costs ($P < 0.0001$), and indemnity costs ($P < 0.0001$). For each one-year increase in age, indemnity, and medical costs increased by 3.5% and 1.1%, respectively. For specific injury types, such as strains and contusions, the association between age and indemnity costs was higher among claimants aged >/=65 compared to claimants aged 18-24. CONCLUSIONS: Our findings suggest that specific injury types may be partially responsible for the higher indemnity costs among older construction workers, compared with their younger coworkers.

Seixas, N. S., et al. (2004). "Predictors of hearing threshold levels and distortion product otoacoustic emissions among noise exposed young adults." Occup Environ Med 61(11): 899-907.

AIM: To examine the relations between noise exposure and other risk factors with hearing function as measured by audiometric thresholds and distortion product otoacoustic emissions. METHODS: A total of 456 subjects were studied (393 apprentices in construction trades and 63 graduate students). Hearing and peripheral auditory function were quantified using standard, automated threshold audiometry, tympanometry, and distortion product otoacoustic emissions (DPOAEs). The analysis addressed relations of noise exposure history and other risk factors with hearing threshold levels (HTLs) and DPOAEs at the baseline test for the cohort. RESULTS: The cohort had a mean age of 27 (7) years. The construction apprentices reported more noise exposure than students in both their occupational and non-occupational exposure histories. A strong effect of age and years of work in construction was observed at 4, 6, and 8 kHz for both HTLs and DPOAEs. Each year of construction work reported prior to baseline was associated with a 0.7 dB increase in HTL or 0.2 dB decrease DPOAE amplitude. Overall, there was a very similar pattern of effects between the HTLs and DPOAEs. CONCLUSIONS: This analysis shows a relatively good correspondence between the associations of noise exposures and other risk factors with DPOAEs and the associations observed with pure-tone audiometric thresholds in a young adult working population. The results provide further evidence that DPOAEs can be used to assess damage to hearing from a variety of exposures including noise. Clarifying advantages of DPOAEs or HTLs in terms of sensitivity to early manifestations of noise insults, or their utility in predicting future loss in hearing will require longitudinal follow up.

Simeonov, P., et al. (2011). "Postural stability effects of random vibration at the feet of construction workers in simulated elevation." Appl Ergon 42(5): 672-681.

The risk of falls from height on a construction site increases under conditions which degrade workers' postural control. At elevation, workers depend heavily on sensory information from their feet to maintain balance. The study tested two hypotheses: "sensory enhancement"--sub-sensory (undetectable) random mechanical vibrations at the plantar surface of the feet can improve worker's balance at elevation; and "sensory suppression"--supra-sensory (detectable)

random mechanical vibrations can have a degrading effect on balance in the same experimental settings. Six young (age 20-35) and six aging (age 45-60) construction workers were tested while standing in standard and semi-tandem postures on instrumented gel insoles. The insoles applied sub- or supra-sensory levels of random mechanical vibrations to the feet. The tests were conducted in a surround-screen virtual reality system, which simulated a narrow plank at elevation on a construction site. Upper body kinematics was assessed with a motion-measurement system. Postural stability effects were evaluated by conventional and statistical mechanics sway measures, as well as trunk angular displacement parameters. Analysis of variance did not confirm the "sensory enhancement" hypothesis, but provided evidence for the "sensory suppression" hypothesis. The supra-sensory vibration had a destabilizing effect, which was considerably stronger in the semi-tandem posture and affected most of the sway variables. Sensory suppression associated with elevated vibration levels on a construction site may increase the danger of losing balance. Construction workers at elevation, e.g., on a beam or narrow plank might be at increased risk of fall if they can detect vibrations under their feet. To reduce the possibility of losing balance, mechanical vibration to supporting structures used as walking/working surfaces should be minimized when performing construction tasks at elevation.

Suruda, A., et al. (2003). "Fatal injuries to teenage construction workers in the US." Am J Ind Med 44(5): 510-514.

BACKGROUND: The construction industry is second only to agriculture in the annual number of fatal injuries in workers less than 18 years of age. We examined fatal injury reports for youth and adult workers to determine risk factors for injury and applicability of existing child labor regulations. METHODS: The US Occupational Safety & Health Administration (OSHA) investigation data for fatal work injuries from 1984 through 1998 were reviewed with respect to type of event, employer characteristics, and apparent violations of existing child labor laws under the Fair Labor Standards Act (FLSA). We also examined whether the employer met exemption criteria for federal enforcement of child labor or OSHA regulations. RESULTS: The fatality rate for teenage construction workers age 19 and younger was 12.1 per 100,000 per year, slightly less than for adult workers. Teenage workers who were fatally injured were more likely than adults to have been employed at non-union construction firms (odds ratio (OR) = 4.96, $P < 0.05$), firms with fewer than 11 employees (OR = 1.72, $P < 0.05$), and their employers were more likely to have been cited by OSHA for safety violations (OR = 1.66, $P < 0.05$) than for firms which were investigated because of a fatality in an adult worker. Fatalities in teenagers were more likely to occur in special construction trades such as roofing. Among fatalities in workers less than 18 years of age, approximately one-half (49%) of the 76 fatal injuries were in apparent violation of existing child labor regulations. We estimated that in 41 of the 76 cases (54%) the employer's gross annual income exceeded the $500,000 threshold for federal enforcement of child labor laws. Only 28 of 76 cases (37%) were at construction firms with 11 or more employees, which are subject to routine OSHA inspections. CONCLUSIONS: Fatal injuries in teenage construction workers differed from those in adults in that they were more likely to be at small, non-union firms of which a substantial proportion were exempt from federal enforcement of child labor laws and from routine OSHA inspections. Safety programs for young construction workers should include small, non-union construction firms and those in special construction trades such as roofing. We did not identify specific areas for new regulation but the number of fatalities reviewed was small.

Vosbikian, M. M., et al. (2017). "The Impact of Safety Regulations on the Incidence of Upper-Extremity Power Saw Injuries in the United States." Journal of Hand Surgery 42(4): 296.e291-296.e210.

Purpose Over 50,000 power saw-related injuries occur annually in the United States. Numerous safety measures have been implemented to protect the users of these tools. This study was designed to determine which interventions, if any, have had a positive impact on the safety of the consumer or laborer. Methods We queried the National Electronic Injury Surveillance System database for hand and upper-extremity injuries attributed to power saws from 1997 to 2014. Demographic information including age, sex, date of injury, device, location, body part involved, diagnosis, and disposition was recorded. We performed statistical analysis using interrupted time series analysis to evaluate the incidence of injury with respect to specific safety guidelines as well as temporal trends including patients' age. Results An 18% increase in power saw–related injuries was noted from 1997 (44,877) to 2005 (75,037). From 2006 to 2015 an annual decrease of 5.8% was observed. This was correlated with regulations for power saw use by the Consumer Safety Product Commission (CPSC) and Underwriters Laboratories. Mean age of injured patients increased from 48.8 to 52.9 years whereas the proportion of subjects aged less than 50 years decreased from 52.8% to 41.9%. These trends were most pronounced after the 2006 CPSC regulations. Conclusions The incidence of power saw injuries increased from 1997 to 2005, with a subsequent decrease from 2006 to 2015. The guidelines for safer operation and improvements in equipment, mandated by the CPSC and Underwriters Laboratories, appeared to have been successful in precipitating a decrease in the incidence of power saw injuries to the upper extremity, particularly in the younger population. Clinical relevance The publication of safety regulations has been noted to have an association with a decreased incidence in power saw injuries. Based on this, clinicians should take an active role in their practice as well as in their professional societies to educate and counsel patients to prevent further injury.

Yang, L., et al. (2021). "Assessing disabling and non-disabling injuries and illnesses using accepted workers compensation claims data to prioritize industries of high risk for Oregon young workers." J Safety Res 77: 241-254.

INTRODUCTION: Young workers are especially vulnerable to occupational injuries and illnesses. There is a continued need to investigate injury burden among young workers across demographics and industry to inform targeted interventions. Workers compensation (WC) claims are important for quantifying work-related injuries and illnesses, however published studies have focused on disabling claims. This study extended previous research on Oregon young workers by including the most recent WC claims data to identify patterns of injury and high risk industries. METHODS: We obtained all accepted disabling claims (N = 13,360) and a significant portion of non-disabling claims (N = 24,660) on workers aged 24 years and under from 2013 to 2018. Claim count, rate and cost were calculated by year, age, gender, industry, and injury type. A prevention index (PI) method was used to rank industries in order to inform prevention efforts. RESULTS: Average annual disabling and non-disabling claim rates were 111.6 and 401.3 per 10,000 young workers. Workers aged 19-21 (disabling: 119.0 per 10,000 and non-disabling: 429.3) and 22-24 years (115.7 and 396.4) and male workers (145.3 and 509.0) had higher claim rates than workers aged 14-18 (80.6 and 297.0) and female workers (79.8 and 282.9). The most frequent injury types were "struck by/against"

(35.6%) and "work-related musculoskeletal disorders (WMSDs)" (19.5%). High risk industries included agriculture, construction, and manufacturing for both genders combined. For female young workers, the highest risk industry was healthcare. CONCLUSIONS: This study demonstrated the added value of non-disabling WC claims data. Using both disabling and non-disabling data and PI method, agriculture, construction, manufacturing and healthcare industries were identified as priority workplaces to prevent common and costly injuries among Oregon young workers. Practical Applications: While the industries identified are considered hazardous for all workers, findings in this study can guide targeted research and prevention efforts specific to young workers.

Yang, L., et al. (2020). "Work-related injuries and illnesses and their association with hour of work: Analysis of the Oregon construction industry in the US using workers' compensation accepted disabling claims, 2007-2013." J Occup Health 62(1): e12118.

OBJECTIVES: This study aimed to characterize injuries and illnesses among construction workers in the State of Oregon in the US and examine the association between injury frequency and severity with hour of work by using Workers' Compensation (WC) accepted disabling claims data in the construction industry from 2007 to 2013. METHODS: Injury frequency, rate, medical cost, and lost work days were analyzed by year, demographics, employment, injury nature, and temporal factors including hour of work. Multiple linear regression models were used to quantify adjusted associations between hour of work and medical cost and lost work days (indicating injury severity). RESULTS: There were a total of 12 222 disabling claims in the Oregon construction industry. The average annual injury rate was 2.21 per 100 workers. Both the count and rate of disabling claims decreased during the study period. Male workers and young workers had higher injury rates, while medical cost and lost work days increased for older workers. Injuries occurring at night were more severe. The distribution of claims frequency by hour of work was bimodal, with peaks in the 4th and 8th hour. Compared with the first hour of work, the 5th and 13th hours corresponded to significantly more severe injuries and illnesses. CONCLUSIONS: This study identified the burden and distribution of work-related injuries and illnesses in the Oregon construction industry. Continued intervention efforts should target certain subpopulations (eg, young workers) and certain working time periods (eg, mid- and end-shift) to protect construction workers' safety and health.

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