from Research to Reality

Liberty Mutual

Protective Eyewear in the Workplace

Examining Barriers to Use

Liberty Mutual Research Institute for Safety

Quarterly Review

Y. Ian Noy, Ph.D.
Vice President and Director

DEAR READERS,

Every day, approximately 2,000 US workers sustain a work-related eye injury that requires medical treatment, according to the National Institute for Occupational Safety and Health. This level has persisted for several years despite the existence of proven engineering and administrative controls for reducing eye injury exposures. The Research Institute has therefore focused its eye injury research on identifying factors that inhibit or prevent the use of effective interventions, in particular, protective eyewear. Our research will inform measures to promote protective eyewear use in the workplace and, ultimately, may help reduce the burden of occupational eye injuries.

This fall marked the tenth anniversary of the annual Liberty Mutual Workplace Safety Index (WSI). The first reliable ranking of the top 10 causes of disabling workplace injuries, the WSI has been instrumental in drawing attention to occupational injuries as a critical public health issue. It has also helped focus research efforts on the areas of greatest loss. On pages 10-11, we present the latest WSI findings and report on real growth trends for the leading injury causes over the 10-year period.

I hope you find this newsletter interesting and instructive. For further information about our latest Institute news, publications, and collaborative updates, we invite you to visit out our website (www.libertymutualgroup.com/researchinstitute). As always, we welcome your feedback.

IN THIS ISSUE...

2 Perspectives on Eye Injuries
Frequency, Costs, and Exposures

3 Seeing the Forest Through the Trees
CIE Study Gains New Insights Into Protective Eyewear Use in the Workplace

8 Eye Protection In the Workplace
Research-Based Tips on Policies, Safety Culture, and Overcoming Barriers to Use

10 News, Publications, and Conferences

Perspectives on Eye Injuries

Frequency, Costs, and Exposures

According to data presented at the 2009 American Public Health Association Annual Meeting, there were 212,000 eye injuries treated in emergency departments across the United States in 2007. The highest rates of injury occurred among younger workers, males, and construction industry workers.[1] Earlier data suggests that work-related eye injuries cost industry more than $300,000,000 per year in lost work time, medical expenses, and workers compensation[2] and account for approximately five percent of all workers compensation claims[3]. More importantly, such injuries can result in significant personal consequences, including permanent vision loss and potential loss of employment.

Most occupational eye injuries occur when the eye comes into contact with an object, such as debris or scrap materials or is exposed to substances, such as chemicals. Exposures to airborne metal or wood slivers, dust, cement chips, nails, or staples are common among construction laborers, automotive technicians, maintenance personnel, and production workers. Welders also face the risk of eye injury from flying debris, but with the added dangers of ultraviolet radiation and photochemical burns.

Workers whose occupations involve industrial chemical use, including janitors, cleaners, and production workers, can suffer painful and damaging chemical burns if chemicals come into contact with the eyes and are not promptly treated with proper eyewash procedures. Similarly, among health care workers, eye contact with infectious contaminants, such as blood splashes and respiratory droplets, can expose workers to diseases ranging from conjunctivitis to HIV.

Changes in processes, guarding, or other effective means, can often reduce hazard exposures; however, in some cases job reengineering is not possible. In these situations, the literature suggests that the best defense against eye injury and infection is personal protective eyewear (PPE). If selected and fitted properly, protective eyewear, such as goggles, face shields, or safety glasses, can help prevent eye injuries in even the most high-risk occupations. But studies show that even when eye protection is provided, workers don't always use it.

To better understand this problem, researchers at the Liberty Mutual Research Institute for Safety studied the factors influencing protective eyewear use among workers in high-risk industries. The articles in the following pages provide insights to help employers identify practical strategies for promoting and enforcing PPE use on the job.

[1]Jackson, L., "Work-Related Eye Injuries in the US," American Public Health Association 137th Annual Meeting and Expo, Philadelphia, PA, 2009. [2]U.S. Department of Labor, OSHA Fact Sheet 93-03. [3]Lombardi, et. al, "Welding-Related Occupational Eye Injuries: A Narrative Analysis," *Injury Prevention*, Vol. 11, 2005.

Industries with the highest number of non-fatal occupational eye injuries/illnesses involving days away from work in 2007[4]

Industry	Number of injuries
Manufacturing	8,150
Construction	5,200
Retail Trade	4,220
Accommodation and Food Services	2,240
Health Care and Social Assistance	2,030
Wholesale Trade	2,010
Transportation and Warehousing	1,920

[4]U.S. Department of Labor, Bureau of Labor Statistics, Table R2, 2009

Seeing the Forest Through the Trees

CIE Study Gains New Insights Into Protective Eyewear Use in the Workplace

Airborne particles, ultraviolet radiation, chemical splashes, and infectious diseases…what do all of these exposures have in common? They can result in serious eye injuries or illnesses and potential long-term consequences. As with all occupational hazards, reducing the exposures that can lead to eye injuries requires a comprehensive approach including hazard elimination as well as engineering and administrative controls. But when risks cannot be completely eliminated or "designed out", personal protective eyewear (PPE) offers an effective line of defense against many of the hazards that can lead to eye injuries. A study published in the American Journal of Preventive Medicine found that the rate of eye injury and lost work time can be reduced by at least 50 percent when PPE is worn[1]. Other estimates suggest that up to 90 percent of eye injuries can be prevented by using proper safety eyewear[2].

Despite the availability of PPE and its widely known protective value, the frequency of occupational eye injuries remains high throughout the industrialized world. This fact prompted Liberty Mutual researchers to further examine the issue of PPE use. "We originally considered conducting a study of risk factors contributing to traumatic, work-related eye injuries," explains Center for Injury Epidemiology (CIE) Senior Researcher David Lombardi, Ph.D. "But, after a review of the scientific literature, we determined that it was more important to study the protective factors related to eye injury prevention." The literature had left a critical question unanswered: Given that PPE is extremely effective in preventing eye injuries, why is there a high frequency of eye injuries year after year, as evidenced by workers compensation claims, the Bureau of Labor Statistics, and other data sources? The researchers theorized that workers might not be wearing PPE consistently or might not be wearing the right PPE for the job.

To better understand this phenomenon, CIE researchers refocused their investigation to examine the factors influencing, and potential barriers to, PPE use among workers. The study, published in *Accident Analysis and Prevention* (Vol. 41, July, 2009), centered on decision-making processes, risk perceptions, barriers to PPE use, and enforcement and reinforcement issues. "Our goal was to examine what factors influence workers' decisions to wear or not wear PPE and to use the information gained to better inform workplace eye injury prevention strategies," explains Lombardi.

Talking with Workers About PPE Use

With partners at the Harvard School of Public Health, CIE researchers developed a series of questions designed to elicit qualitative (descriptive) information related to factors potentially influencing PPE use. They administered a series of questions to seven focus

[1]Lipscomb, H.J., "Effectiveness of Intervention to Prevent Work-Related Eye injuries," *American Journal of Preventive Medicine*," Vol. 18, No. 4S, 2000.
[2]U.S. Eye Injury Registry Summary Report, 1998-2002.

groups over a two-week period. Six of the groups consisted of seven to nine workers who had potential exposure to eye hazards in their day-to-day jobs. The seventh group, comprised of supervisors, included additional questions specifically targeted to supervisory concerns such as positive reinforcement and enforcement of PPE policies. Together, the 51 focus group participants (36 male, 15 female) represented a broad cross-section of industries, including construction, production, installation, repair and maintenance, and health care. All participants had experience in their occupations and the majority were required to wear protective eyewear on their worksites and had received safety training at some point.

During each audio-taped, 120-minute focus group session, facilitators presented open-ended questions regarding perceptions of hazards and risks, physical and psychological barriers to protective eyewear use, external influences, and strategies to increase protective eyewear use. The facilitators probed and guided the discussion until each question had been addressed exhaustively. Participants were encouraged to express their opinions and were clearly instructed that there were no wrong answers.

To obtain quantitative data, facilitators noted the top eight to ten issues that emerged during each session. Each worker was then asked to anonymously rank issues by relative personal importance on a scale from 1 (most important) to 10 (least important). "We felt it was important to provide a quantitative measure to supplement the descriptive data and offset any potential conformity bias," explains Lombardi, noting that a limitation of focus groups is that they can sway in a particular direction because of peer pressure or dominant personalities.

Analyzing the Data

To analyze the large amount of descriptive data, researchers paired 14 hours of audio-tape transcription with detailed notes taken during each focus group session. Each individual quote was sorted and then all quotes were grouped by major themes. Once summarized, CIE researchers adapted their findings on factors influencing the use of PPE to a conceptual model derived from a 1999 study of factors affecting the use of respiratory protective equipment among hazardous waste workers (Salazar, et al.). Three primary domains were examined: perceptions of hazards and risks, barriers to PPE use, and enforcement and reinforcement (see below).

"The conceptual model enabled our researchers to sort the data into sought information and emergent themes," explains Lombardi. "This was important in helping us understand workers' decision-making processes, not only in terms of those factors we expected to find based on the literature, but also in terms of un-

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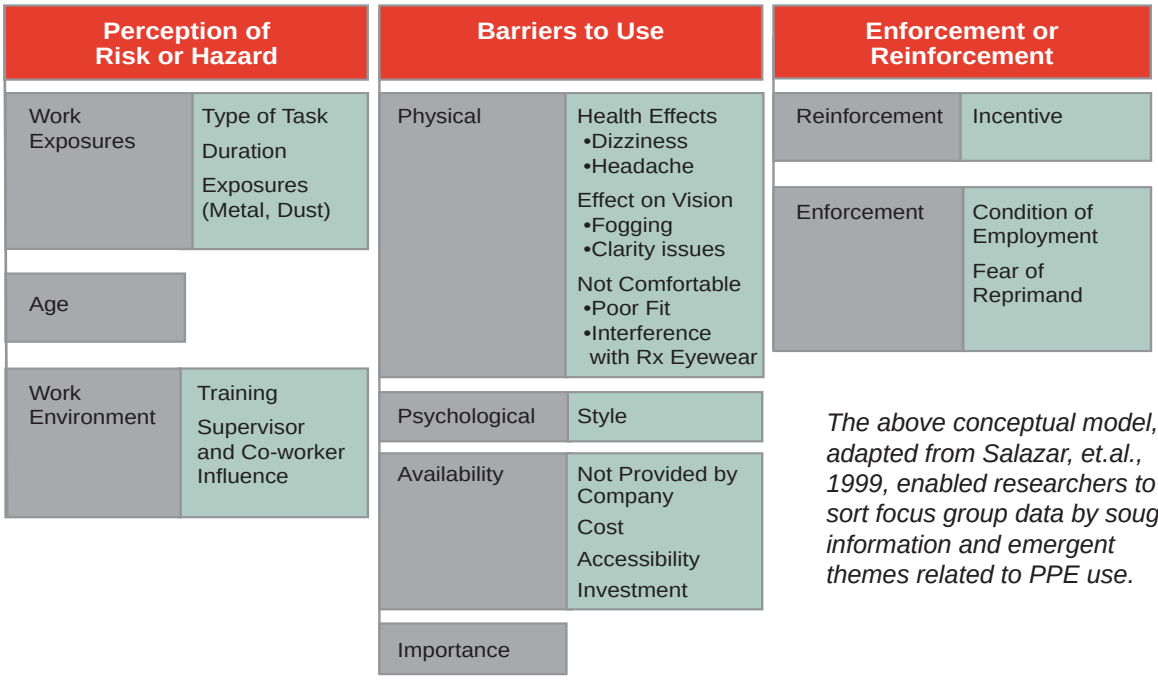
Conceptual Model of Decision-Making Process for Personal Protective Eyewear Use



The above conceptual model, adapted from Salazar, et.al., 1999, enabled researchers to sort focus group data by sought information and emergent themes related to PPE use.

expected or emerging factors that were raised by participants during the sessions."

New Insights Emerge

The focus group data revealed several interesting insights about the role of risk perception in workers' decisions to wear or not wear PPE. For example, most of the participants thought that mandatory PPE use and a strong safety culture, including training, increased their personal risk perceptions and resulted in greater protective eyewear use.

"Workers expressed that they were much more likely to understand the risks involved in the job when they were told at the outset that PPE is required. That heightened understanding of potential risk is very important," notes Lombardi. The data also reflected workers' conviction that safety training and PPE refresher courses can increase risk perception and influence PPE use. "These findings suggest that creating a safer work culture can impact workers' perception of the risks and the need to protect themselves."

"Workers definitely perceived a lower risk when tasks were brief, and as a result, they indicated that they were likely to perform such tasks without PPE."

David Lombardi, Ph.D.

When PPE use was optional, workers' perceptions of the risk involved in a given task were based on the nature of the task. Those who engaged in tasks such as welding, surgical procedures, chemical lab procedures, or machining and grinding reported a higher rate of PPE use than those performing tasks with lower perceived risks. Such tasks, by their nature, involve a larger volume of airborne particles or risk of burns and biological hazards and were therefore perceived as higher risk. One participant, a health care worker commenting on the obvious risk of blood spray or other bodily fluids contacting the eyes, stated, *"I would never even think about it (not wearing eye protection) in terms of helping with a surgery...."*

Worker perceptions were also shaped by task duration. For example, workers reported a lower rate of PPE use for tasks that were brief and non-repetitive. One worker stated, *"The last time I didn't wear them is just because it was a short task, I just had to grind a piece of metal down real quick and I said, 'I don't need glasses, it's only going to take 10 seconds'."* Lombardi notes, "Workers definitely perceived a lower risk when tasks were brief, and as a result, they indicated that they were likely to perform such tasks without PPE."

Age also emerged as an important factor influencing risk perception. Older and more experienced workers reported that they were more likely to wear PPE than their younger or less experienced counterparts. Older workers attributed this phenomenon to younger workers' lack of experience and feelings of invincibility. Younger workers suggested that they had not yet formed a habit of using PPE or did not realize its importance for certain tasks. One young worker noted, *"I started off being very forgetful putting goggles on, but a lot of the guys I work with are older, and they're always telling me, 'you got to wear your glasses, you got to wear your glasses'."*

Coworker and supervisor influence were also cited as factors which impacted workers' decisions to use or not use PPE. Participants noted that supervisors should provide ongoing positive feedback to encourage use.

Barriers to PPE Use

Several important issues emerged with regard to barriers to PPE use. The most frequently occurring complaints about PPE use were lack of comfort, poor fit, fogging, and scratching of eyewear. Style/fit, accessibility, and availability were also cited as important. Contributing to these barriers were environmental factors such as rain, cold, dirt, or grease, which can reduce visibility. Several focus group participants commented on the impact of distortion or clarity of protective eyewear as it relates to potential somatic effects, such as headaches, dizziness, or nausea. (See tables, below, and on page 7.)

Expanding on these findings, the individual-level polling data provided a direct quantitative measure of the relative importance of potential barriers to PPE use. One hundred percent of the focus group participants considered comfort and/or fit as very important in their decisions to wear or not wear PPE (average rank 1.7). Eighty-five percent of respondents suggested that poor accessibility/availability was a barrier, and 57 percent suggested that style and choice of PPE could be important barriers (average rank 4.8). "For the most part, our quantitative data supported what we found in our qualitative analysis of the focus group data, with just one exception – workers rated 'inappropriateness for task' as more important than the qualitative data would suggest," notes Lombardi.

Increasing PPE Use

Across all of the focus groups, participants suggested that ensuring better eyewear comfort and fit, and training (either by supervisors or videos) were the most effective ways to increase use. Six of the seven groups believed that use of enforcement or reinforcement strategies, and making eyewear more accessible would help encourage PPE use. Three of the groups surveyed cited antifogging, scratch resistance, and increased affordability as important ways to improve PPE use. Interestingly, style also factored in with several focus group participants expressing a preference for more popular iconic name brands over standard generic eyewear. "Vanity definitely crossed into the world of safety," says Lombardi.

The study findings point to several modifiable factors that may help increase PPE use among workers. For example, companies may increase PPE use through a safety culture that requires PPE use, reinforces its pol-

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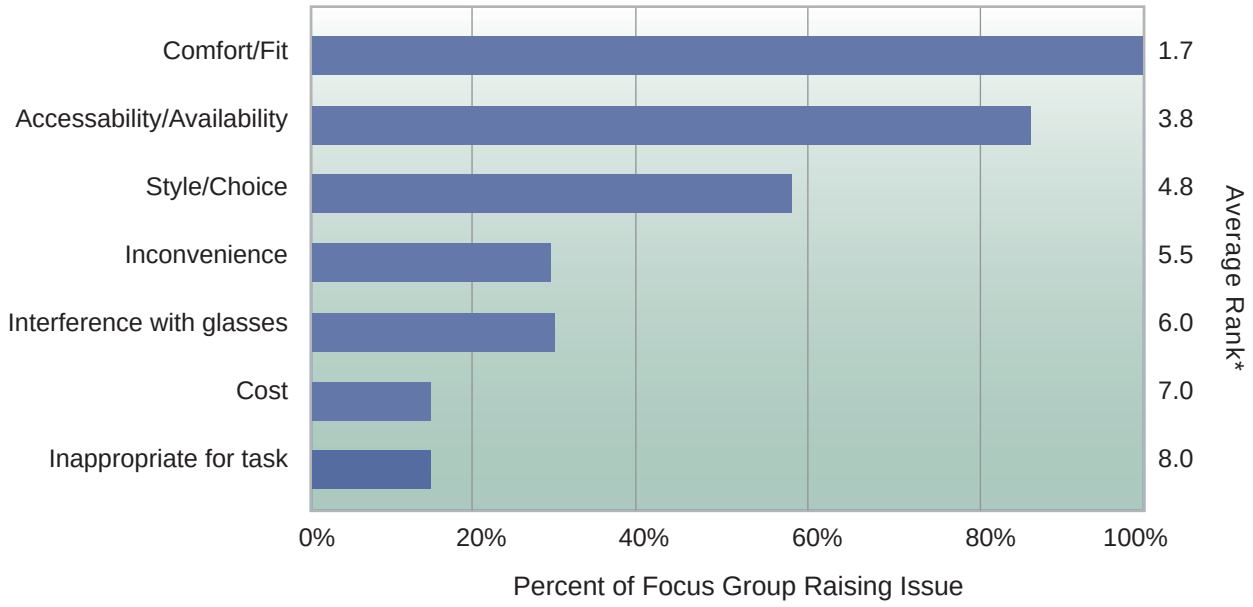
BARRIERS TO PERSONAL PROTECTIVE EYEWEAR USE

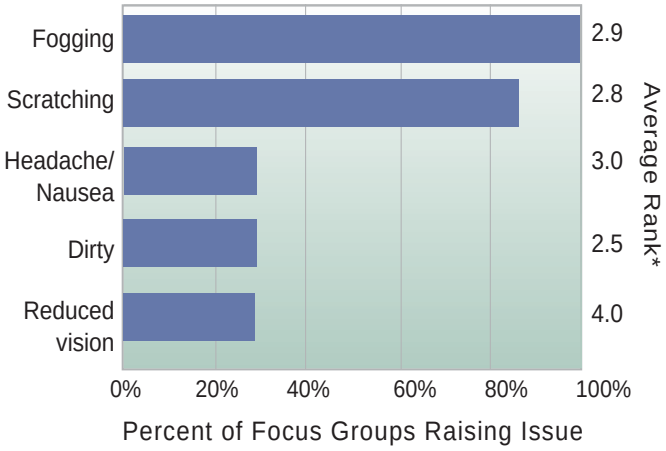


*Note: Average rank was calculated within each group, where each worker was asked to rank each theme in order of importance from 1, most important, to *n*, least important. For example, 1 to 8 if 8 themes were identified. Workers were blinded to others' responses.

icy with training and refresher courses, and instructs supervisors to promote PPE use in a constructive and positive way. In addition, companies can increase usage by finding ways to increase PPE accessibility. "The data showed that even when workers had safety glasses, if they weren't accessible when the hazardous task was at hand, they often would choose not to retrieve them and put them on," says Lombardi, noting that this problem is easily remedied by practical modifications, such as, providing straps and attachable carrying cases. Finally, the data suggests that companies should select high-quality eyewear that is comfortable, does not fog, scratch, or promote somatic effects such as dizziness.

"Overall, the findings of our study suggest that companies *can* impact a worker's decision whether to use or not use PPE," concludes Lombardi. "This is important because it shows that company policies and safety programs can be shaped in a way that can help reduce eye injuries." (See article, page 8.)

VISION-RELATED BARRIERS TO PPE USE



*See Note, page 6

Goggles or Safety Glasses?

Selecting Task-Appropriate Eyewear

When it comes to promoting PPE use, providing the wrong kind of protective eyewear may be little better than providing none at all. In fact, participants in the Research Institute's study of factors influencing the use of PPE identified "inappropriateness for task" as a significant barrier to PPE use. The type of eye protection an employee needs depends on the nature of the work, the materials handled, the processes used, and their associated hazards. And while PPE selection should always involve a thorough hazard identification process for the job, the following general guidelines apply:

Common Sources of Workplace Eye Injuries

U.S. Department of Labor, Bureau of Labor Statistics, Table R-26, 2009 (2007 data)

- ***Safety glasses*** offer protection against moderate impact hazards, such as those caused by airborne wood chips, particles, splinters, dirt, and sawdust. They should include side shields because particles or dust could enter the eye area from the side.
- ***Goggles*** help protect the eyes from chemical splashes and fine dust.
- ***Face shields*** protect the user from flying particles and sprays and should be worn with goggles to provide additional protection.
- ***Welders hoods***, ***sand blast helmets***, and certain types of ***respirators*** generally incorporate built-in eye protection. Safety glasses/goggles worn under these types of PPE can provide addition protection.

As with any personal protective equipment for workers, employers should choose safety eyewear that affords appropriate protection for the hazards of the task, complies with ANSI standards, and offers the best comfort and fit for the value.

Eye Protection in the Workplace

Research-Based Tips on Policies, Safety Culture, and Overcoming Barriers to Use

What can companies do to help protect workers from job-related eye injuries? Paul Myers, CSP, CPE, technical director of manufacturing technology for Liberty Mutual's Loss Control Advisory Services, recommends a broad-based approach that includes, but is not limited to, personal protective equipment. "It's vital that companies apply the full arsenal of risk-control strategies to address eye injury hazards," says Myers. "The first step is always to identify and assess the hazard and eliminate as many exposures as possible through process change and substitution, job redesign, and engineering controls. After that, a program involving properly selected protective eyewear, supported by appropriate administrative controls, can provide a highly effective way to help protect workers from eye injury exposures that can't be designed out or eliminated."

Promote Clear PPE Policies

Despite the proven effectiveness of personal protective eyewear (PPE) in safeguarding users from airborne debris, dust, chemicals, and other potential hazards, workers may not always use PPE. As noted in the Research Institute study results, risk perception plays a key role in a worker's decision to use or not use PPE, and perception is often shaped by the company's policies and safety culture. "Companies can't just make protective eyewear available and hope for the best; they need to make it a mandatory requirement, coupled with consistent supervisory and peer support," states Myers, noting that when PPE use is "clearly presented as a performance expectation," workers respond by using it. "It is also important to keep PPE policies clear and uncomplicated," notes Myers, explaining that a blanket policy requiring eyewear to be worn throughout the work site is often more effective than trying to legislate eye protection to specific work tasks and areas. "If the worker has to constantly think about whether eye protection is required in a particular area or for a particular task, and is continuously removing and replacing eyewear, it becomes more of a burden. But, if eye protection is required throughout the work

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> "A supervisor who demonstrates real concern for the individual worker, rather than just focusing on compliance, will be far more effective promoting proper PPE use."
>
> Paul Myers, CSP, CPE

site, everyone will understand the rules, and it will be a lot easier to maintain good habits."

Provide a Strong Safety Culture

In addition to clear policy, a strong safety culture can inspire good protective eyewear habits. "Strong safety culture begins at the top," says Myers, noting that support from top management is essential for all aspects of a company safety program. "Companies that try to hammer good safety practices into workers will be far less effective that those whose supervisors demonstrate concern for their workers and provide positive reinforcement for good safety practices." On this point, Myers' practical experience strongly coincides with the research finding that supervisors and co-workers can influence a worker's decision to use PPE. "A supervisor who demonstrates real concern for the individual worker, rather than just focusing on compliance, will be far more effective promoting proper PPE use. Instead of repeating 'wear your safety glasses' over and over, a statement like 'I'd hate to have to be the one to tell your family you lost an eye' shows concern for the worker," notes Myers. This more personal approach helps encourage an attitude of co-worker support and even positive peer pressure that can encourage PPE use.

An equally important facet of a strong safety culture, notes Myers, is that management must not only provide appropriate directive, but must also model good safety practices. "If a supervisor doesn't wear safety glasses at the appropriate times, then no one else will either. Even if the supervisor is just walking through the work site or making a brief stop into a high-risk area, he or she must comply with the rules, or no one else will take them seriously."

Overcome Barriers

Recognizing and addressing potential barriers to protective eyewear use can give a company the edge in promoting eye safety. After investing the time to select the best eyewear for the job in accordance with ANSI recommendations, managers should go the extra mile to address fit and comfort – ranked by Research Institute study participants as the number one barrier to PPE use. "Providing the right type of eye protection is a critical first step, but if it is uncomfortable and doesn't fit well, workers are likely to resist using it," explains Myers, who believes that one of the best ways to ensure that workers use the eyewear provided is to involve them in the selection process. "Once management has identified the right type and level of PPE required, they can invite a supplier on site and allow the workers to select their own eyewear that complies but is also comfortable. This kind of involvement in the process can yield great results."

Even with the right PPE provided, many workers choose to forgo wearing it if they are doing a quick task or a task that they don't do frequently. "Quick or infrequent tasks offer a major challenge because, as the research shows, they are often perceived as low risk. And, if workers don't perceive a consequence, or believe that the consequence is uncertain, they are more likely to take a risk." Myers suggests that one way to address this issue is to increase access to PPE. "If a worker goes over to grind a piece of metal – and it's only going to take a few minutes to do the job, he or she is not going to want to invest the extra time in finding eye protection," notes Myers. "But, if eyewear is situated in a way that requires workers to physically touch it before performing the task, they will be much more likely to put it on. It should practically be an interactive part of the process."

Easy access to PPE is also important on work sites where dust and debris or chemical exposures are constantly present. "If a good supply of protective eyewear is made available right outside an area where eyewear is required, it's much easier for employees and or visitors to do the right thing and wear appropriate eye protection," says Myers.

"Practical strategies to promote fit, comfort, and accessibility can help overcome some of the most common barriers to PPE use," notes Myers. "And, such strategies, combined with clear policies and a strong safety culture, can make a real difference in how PPE is perceived and used within an organization."

LIBERTY MUTUAL RELEASES 10TH ANNUAL WORKPLACE SAFETY INDEX

According to the the *2009 Liberty Mutual Workplace Safety Index* (WSI), the most disabling workplace injuries and illnesses in 2007 amounted to more than $52 billion dollars in direct U.S. workers compensation costs, averaging more than a billion dollars per week.

Celebrating a 10-year milestone, the annual WSI combines information from Liberty Mutual, the U.S. Bureau of Labor Statistics (BLS), and the National Academy of Social Insurance to identify the top causes of serious workplace injuries. Using injury event definitions developed by the BLS, researchers rank those that cause an employee to miss six or more days from work by total workers compensation costs. The latest WSI provides statistics for injuries occurring in 2007, the most recent year for which data are available.

In 2007, the top 10 categories produced 86.9 percent of the entire cost burden of disabling workplace injuries. *Overexertion* remained a very large burden, representing 24 percent of the total and bearing $12.7 billion of the total cost. The top five causes remain consistent with last year (*Overexertion*, *Fall on same level*, *Fall to lower level*, *Bodily motion*, and *Struck by object*), together accounting for 69 percent of the total burden. Each of these causes alone comprised over five percent of the total burden. The cost of the combined fall categories was $13.9 billion, which now exceeds the *Overexertion* category ($12.7 billion). When Liberty Mutual produced the first WSI in 1998, *Overexertion* ($10 billion in 1998) far exceeded the combined fall categories ($7.6 billion in 1998).

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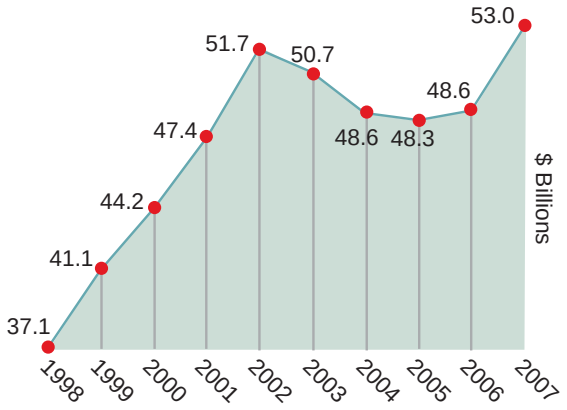
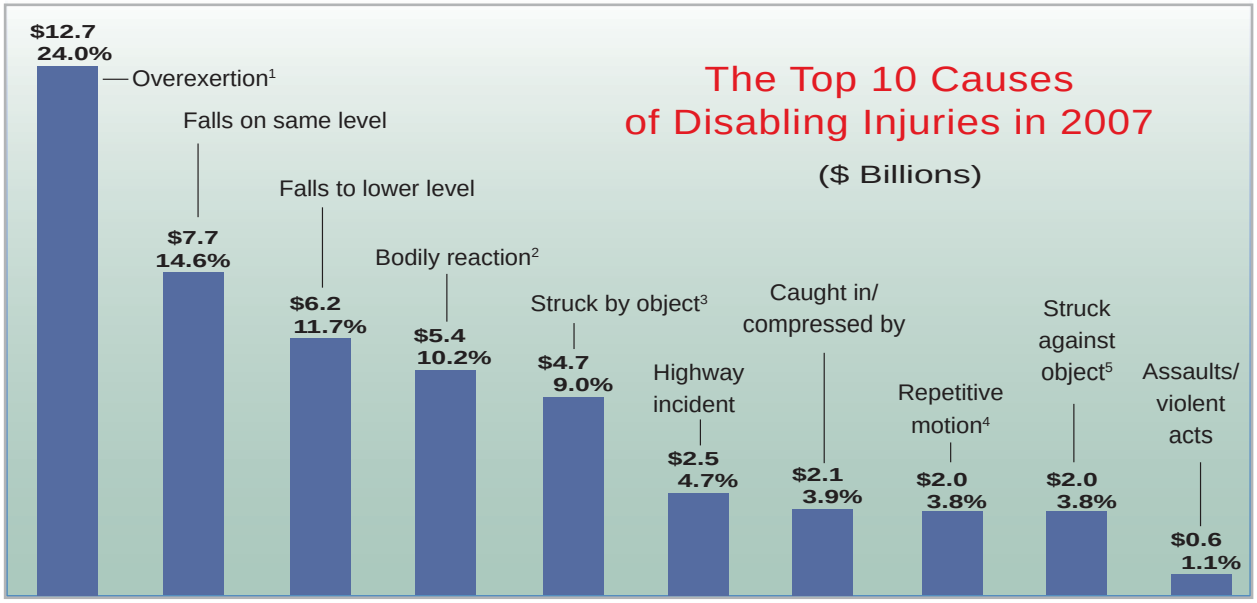
Liberty Mutual Workplace Safety Index – 1998-2007

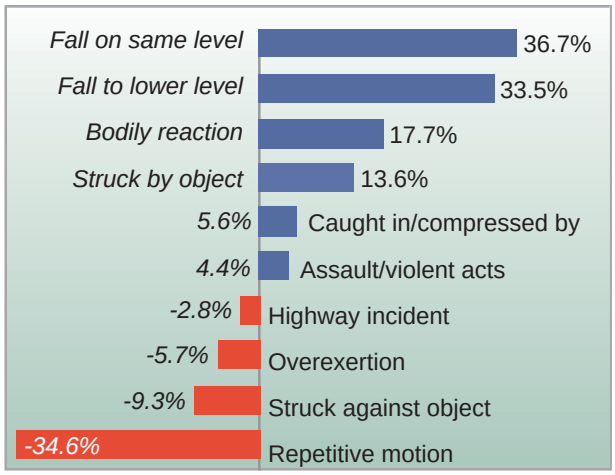




[1]Overexertion – Injuries caused from excessive lifting, pushing, pulling, holding, carrying, or throwing
[2]Bodily reaction – Injuries caused from slipping or tripping without falling
[3]Struck by object – Such as a tool falling on a worker from above
[4]Repetitive motion – Injuries due to repeated stress or strain
[5]Struck against object – Such as a worker walking into a door

While recent WSI reports showed a four-year cost decline, the period from 2006 to 2007 marked an 8.9 percent increase in the cost of the most disabling workplace injuries (from $48.6 billion in 2006 to $53.0 billion in 2007). Over the 10-year period from 1998 to 2007, these costs grew 42.8 percent, ($37.1 billion in 1998 to $53.0 billion in 2007). After adjusting for inflation, this increase over one year stands at 5.4 percent and 5.8 percent from 1998 to 2007. Based on real growth (table, right), the two fall categories increased the most. *Fall on same* level increased 37 percent and *Fall to lower level* was up 34 percent.

Please visit our website at www.libertymutualgroup.com/researchinstitute to download a pdf of this year's *Liberty Mutual Workplace Safety Index*.



Real Growth Trends Last Ten Years
(Percent change by category)

FELLOWSHIPS SPARK RESEARCH OPPORTUNITIES FOR STUDENTS TO BROADEN SAFETY KNOWLEDGE

The Liberty Mutual Research Institute and American Society of Safety Engineers Foundation (ASSEF) awarded two doctoral students research fellowships through a joint program that encourages safety research. The students, Adam Strang, M.S./A.T.C., of Miami University, and Carisa Harris-Adamson, M.S.P.T., C.I.E., of University of California Berkeley, spent six weeks collaborating on scientific investigations with Institute researchers.

Ms. Harris-Adamson (pictured left) collaborated with Research Scientist Jia-Hua (Jim) Lin, Ph.D., C.P.E., on a research project to evaluate the ergonomics of pallet jack handles. The investigation examines typical pallet jack operations and tests the ergonomic benefits of alternative engineering designs. The researchers designed and tested an alternative pallet jack handle that converts typical pulling operations with the load traveling behind the worker to a pushing operation with the load still traveling behind the operator. The study will allow researchers to better understand the physical exposures, such as pulling forces, awkward postures, and hand-handle interface, associated with pallet jack operations and help to identify ways to reduce such exposures through engineering design.

Currently, Ms. Harris-Adamson is working towards a Ph.D. in Environmental Health Sciences with a concentration in Ergonomics at University of California Berkeley. In addition to her studies, she also works at PreCare, Inc. in Sonoma, CA, where she is involved with various ergonomic projects. She earned her M.S. in Environmental Health Sciences at the University of California Berkeley and her M.S. of Physical Therapy at University of California San Francisco. She also obtained her M.A. in Kinesiology with a concentration in Applied Physiology from San Francisco State University and received her B.S. in Psychology from Tufts University.

Mr. Strang (pictured left) partnered with Research Scientist Angela DiDomenico, Ph.D., C.P.E., on an investigation to examine the relationship between age and postural control. The study aims to identify variable patterns that traditional measures typically do not detect. Specifically, the goal is to determine whether one nonlinear analysis (SampEn) might prove

useful for detecting age-related changes in the postural sway of working-age men. The researchers will compare the results obtained from SampEn to a set of more traditional postural sway measures. The findings may help to identify motor system changes that potentially influence worker stability, and ultimately, may help to broaden the scientific knowledge for predicting and preventing falls and fall-related injuries.

Mr. Strang is a licensed and certified athletic trainer. Presently, he pursuing a Ph.D. in Cognitive Psychology at Miami University, where he also received his M.S. in Exercise Science. He earned a B.S. in Athletic Training from Ohio State University.

Each year, the Research Institute and the ASSEF offer two research fellowships to encourage safety research activity and provide a forum for linking safety professionals, industry needs, and quality research programs. Fellows work with Institute researchers at the Hopkinton facility for four to six weeks.

For more information about the program, please visit www.libertymutualgroup.com/researchinstitute and follow the links to the ASSEF Safety Research Fellows under Collaborative Programs.

SAFETY CLIMATE PIONEER SHARES EXPERTISE AND COLLABORATES THROUGH VISITING SCHOLAR PROGRAM

One of the world's leading researchers in the area of safety climate, Professor Dov Zohar, Ph.D., (pictured left) of the Israel Institute of Technology, recently completed his tenure as the 2009 Liberty Mutual Visiting Scholar. Dr. Zohar is renowned as a pioneer in safety climate research, an area that addresses employees' shared perceptions of a company's safety policies, procedures, and practices, as well as the overall importance of safety at work.

Dr. Zohar arrived in March to collaborate with Research Scientists Yueng-hsiang (Emily) Huang, Ph.D., and Michelle M. Robertson, Ph.D., C.P.E., on an investigation of the impact of safety climate on mobile lone workers (workers whose job involves long periods of solitary driving, such as truck drivers and utility workers). The study will help researchers to better understand how organizational safety climate impacts safety outcomes for employees who work alone and will provide new knowledge to help improve the occupational safety for these types of workers. Although Zohar has completed his official tenure, he will continue a longer-term collaboration on the project with the Research Institute.

"It is quite a rare opportunity to be affiliated with an institute that focuses on safety research," says Zohar. "The most positive aspect of the experience was that I could focus completely on the research and not have the day-to-day distractions that are often present in an academic setting. I am grateful for the rewarding experience."

Dr. Zohar is a professor at the Faculty of Industrial Engineering and Management, Israel Institute of Technology. He earned his Ph.D. and M.Sc. degrees from the Department of Psychology, University of Maryland, and his B.A. from the Department of Psychology, Bar-Ilan University, Israel. He has held visiting appointments with the Gallup Leadership Institute (Canada), University of Nebraska, the Institute for Work and Health (Canada), University of Toronto, University of Calgary, and the University of Maryland.

An author of more than 50 scientific papers and five book chapters, Dr. Zohar presents his work widely. He published the original paper on safety climate, which defined the concept and offered a measurement scale that has become the standard in this field. In 2003, Dr. Zohar received the Best Safety Intervention Research Award from the Centers for Disease Control (CDC) and the National Institute for Occupational Safety and Health, and in 2008, he was awarded the Lifetime Career Achievement Award in Occupational Health Psychology from the American Psychological Association and CDC.

For more information on our Visiting Scholar Program, please visit our website at www.libertymutualgroup.com/researchinstitute and follow the links to our collaborative programs.

SLIPS, TRIPS, AND FALLS STUDY WINS 2009 BEST PAPER AWARD

"Evaluation of a Comprehensive Slip, Trip and Fall Prevention Programme for Hospital Employees" (*Ergonomics*, Vol. 51, No. 12, 2008), received the 2009 Liberty Mutual Best Paper Award. The paper derived from a 10-year collaborative research effort involving the National Institute for Occupational Safety and Health (NIOSH), BJC Healthcare, the Finnish Institute of Occupational Health, Johns Hopkins School of Public Health, the Liberty Mutual Research Institute for Safety, and the Washington University School of Medicine.

"We selected this year's winner for its merit in making a major contribution in its field," says Roger Haslam, Chairman of the Ergonomics Society Honours Committee and Coordinating Editor of Ergonomics. "The work represents a significant advancement for contemporary ergonomics and provides much needed evidence on the effectiveness of interventions to reduce the incidence of slips, trips, and falls."

To learn more, please visit the *About Us* section of our website, or, to read the full abstract of the 2009 Best Paper, go to www.informaworld.com.

ROBERTSON NAMED IEA FELLOW

Research Scientist Michelle M. Robertson, Ph.D., C.P.E., was recently recognized as a Fellow by the International Ergonomics Association (IEA). The Award recognizes an individual's extraordinary or sustained, superior accomplishments and outstanding theoretical or applied contributions to the field of ergonomics/human factors. Dr. Robertson accepted the award at the 17th World Congress on Ergonomics held in Beijing, China.

IEA president David Caple, CPE, congratulates Dr. Michelle Robertson on her recent appointment as an IEA fellow.

"The IEA is the premiere organization for ergonomics professionals from around the world," says Robertson. "It's an honor that they have recognized my achievements. This designation inspires me to continue to support IEA's mission to advance ergonomics and to help improve the safety and health of workers and other people around the world."

Dr. Robertson has been a member of the Liberty Mutual research staff since 1998. For more than 20 years, she has conducted applied research in ergonomics and systems management. Her research, primarily in office environments, focuses on work organization, job demands, organization interventions, and training program design and effectiveness. She has studied a variety of industries including telecommunications, aerospace, automobile, and computer manufacturing.

A board certified professional ergonomist, Robertson holds a Ph.D. in instructional technology, an M.S. in systems management from the University of Southern California, and a B.A. in human factors from the University of California, Santa Barbara. A member of the IEA for 27 years, she is also a member and Fellow of the Human Factors and Ergonomics Society and has served as secretary/treasurer and an executive council member. She has published more than 95 scientific papers and has presented her work worldwide.

CONFERENCES

Workers Compensation Research Group 2009 Fall Meeting: November 5-6, Hopkinton, MA

• The Association of Physical Therapy and Disability Duration Following Meniscectomy for Occupational Knee Injuries: Preliminary Results and Future Analytic Plans – B.S. Webster, B.S.P.T., P.A.-C. • What Patterns of Healthcare Utilization are Related to Better Return-to-Work Outcomes Following Fracture? – A.E. Young, Ph.D.

Work, Stress, and Health Conference 2009: Global Concerns and Approaches: November 5-8, San Juan, Puerto Rico

• Comparing Management vs. Employee Safety Perceptions and Safety Outcomes in U.S. Limited Service Restaurant Workers – Y.H. Huang, Ph.D.

137th American Public Health Association Annual Meeting and Exposition: November 7-11, Philadelphia, PA

• Floor Surface, Shoe Type, Floor Cleaning and Risk of Slipping in U.S. Limited-Service Restaurant Workers: Preliminary Results from a Prospective Cohort Study – S.K. Verma, M.B.B.A., M.P.H. • Factors Influencing Worker Use of Personal Protective Eyewear – D.A. Lombardi, Ph.D.

IEEE International Conference on Industrial Engineering and Engineering Management: December 8-11, Kowloon, Hong Kong

• Role of Floor Frictional Characteristics and Gender on Psychophysiological Responses during Dynamic Pushing – R.V. Maikala, Ph.D.

International Ergonomics Conference 2009 Humanizing Work and Work Environment: December 17-19, Kolkata, India

• Multidisciplinary Approaches to Reduce Slip and Fall Incidents - W.R. Chang, Ph.D.

PUBLICATIONS

Jackson, J.A., Mathiassen, S.E., and Dempsey, P.G., "Methodological Variance Associated with Normalization of Occupational Upper Trapezius EMG Using Submaximal Reference Contractions," *Journal of Electromyography and Kinesiology*, Vol. 19, No. 3, pp. 416-427, 2009

Li, K.W., Chang, W.R., and Chang, C.C., "Evaluation of Two Models of a Slipmeter," *Safety Science*, Vol. 47, pp. 1434-1439, 2009

Lesch, M.F., Rau, P., Zhao, Z., and Lin, C., "A Cross-Cultural Comparison of Perceived Hazard in Response to Warning Components and Labels: China vs. U.S." *Applied Ergonomics*, Vol. 40, No. 5, pp. 953-961, 2009

Maikala, R.V., Dempsey, P.G., Ciriello, V.M., and O'Brien, N.V., "Dynamic Pushing on Three Frictional Surfaces: Maximum Acceptable Forces, Cardiopulmonary, and Calf Muscle Metabolic Responses in Healthy Men," *Ergonomics*, Vol. 52, No. 6, pp.735-746, 2009

Wasiak, R., Young, A.E., Dunn, K.M., Côté, P., Gross, D., Heymans, M., and von Korff, M., "Back Pain Recurrence – An Evaluation of Existing Indicators and Direction for Future Research," *Spine*, Vol. 34, No. 9, pp. 970-977, 2009

Young, A.E., "Return-to-Work Experiences Prior to Receiving Vocational Services," *Disability and Rehabilitation*, Vol. 31, No. 24, pp. 2013–2022, 2009

Young, A.E., Cifuentes, M., Wasiak, R., and Webster, B., "Urban-Rural Differences in Work Disability Following Occupational Injury: Are They Related to Differences in Healthcare Utilization?" *Journal of Occupational and Environmental Medicine*, Vol. 51, No. 2, pp. 204-212, 2009

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