

Financial Decision Makers' Views on Safety

What SH&E professionals should know

By Yueng-Hsiang Huang, Tom B. Leamon, Theodore K. Courtney, Sarah DeArmond, Peter Y. Chen and Michael F. Blair

IN 2006, A TOTAL OF 5,840 FATAL occupational injuries occurred in private industry in the U.S. (BLS, 2008). In addition, 4.1 million nonfatal workplace injuries and illnesses were reported, which means that 4.4 nonfatal occupational injuries or illnesses were reported for every 100 full-time-equivalent workers in the U.S. Rosenman, Kalush, Reilly, et al. (2006) have suggested that these statistics are a cause for employer concern, especially in light of a recent study which indicated that the BLS's system for recording work-related injuries and illnesses under-

counts the total number of injuries associated with chronic or acute conditions.

Most SH&E professionals are very much aware of these statistics and endeavor to reduce the numbers of occupational fatalities, injuries and illnesses. Often, however, there are limits as to what SH&E professionals can do to positively impact occupational safety. For example, practitioners may not be in a position to ultimately determine what and how company resources are allocated to safety interventions. They may often have to find ways to convince

Yueng-Hsiang Huang, Ph.D., is a senior research scientist at Liberty Mutual Research Institute for Safety (LMRIS) in Hopkinton, MA. She holds a Ph.D. in Industrial/Organizational Psychology from Portland State University. She is a member of the Society for Industrial and Organizational Psychology, American Psychological Association, Society for Occupational Health Psychology, the ASSE Foundation Research Committee and the editorial board of Accident Analysis and Prevention.

Tom B. Leamon, Ph.D., is an adjunct professor of occupational safety at Harvard University and has directed major ergonomics and safety organizations in the glass, coal mining and insurance industries. He holds a Ph.D. in Industrial Engineering from the Institute of Technology, Cranfield. Leamon has published widely and is a Fellow of the Ergonomics Society, the Human Factors and Ergonomics Society and the Institute of Electrical Engineers.

Theodore K. Courtney, M.S., CSP, is director of the Center for Injury Epidemiology at LMRIS and an instructor on injury, safety and ergonomics at the Harvard School of Public Health in Boston. Recipient of the 2003 William Floyd Medal and the 2006 NORA Partnering Award for his work in occupational injury research, he holds a B.S. in Human Factors from Georgia Tech and an M.S. in Industrial and Operations Engineering from the University of Michigan. Courtney is a member of the editorial boards for Professional Safety and the Journal of Environmental and Occupational Hygiene. He is a member of ASSE's Greater Boston Chapter.

Sarah DeArmond, Ph.D., is an assistant professor of human resources management at the University of Wisconsin, Oshkosh. She holds a Ph.D. in Industrial/Organizational Psychology from Colorado State University. DeArmond was named the 2005 ASSE Foundation-Liberty Mutual Safety Research Fellow. She is a member of the Society for Occupational Health Psychology, Society for Industrial and Organizational Psychology, Academy of Management and American Psychological Association.

Peter Y. Chen, Ph.D., is a professor of psychology at Colorado State University and heads the occupational health psychology training program in the Mountain and Plains Education and Research Center funded by NIOSH. He holds a Ph.D. in Industrial/Organizational Psychology from the University of South Florida.

Michael F. Blair, M.M.S., is a technical consultant within the National Market Loss Prevention Department at Liberty Mutual Insurance Group. During his career, he has led the Workplace Safety and Occupational Disability Management group and conducted research at LMRIS. He holds an M.M.S. in Manufacturing Engineering from the University of Massachusetts, Lowell, and a B.S. in Industrial Technology from the University of Lowell. He is a member of the Human Factors and Ergonomics Society.

higher-level managers—who set priorities and control the budget—of the need to fund occupational safety efforts, and of the critical role their support can play in their company's occupational safety.

Research has supported the concept that a positive association exists between top management support and improved workplace safety and health outcomes (Cohen, 1977; Griffiths, 1985; Marsh, Davies, Phillips, et al., 1998). Griffiths (1985) found that top management commitment to safety and health was associated with reduced lost-time injuries in the industrial gas industry. Sawacha, Naoum and Fong (1999) found that top management's attitudes toward safety played a significant role in safety performance.

Despite these findings, research to assess the safety priorities and safety concerns of top-level executives/managers (such as corporate financial

decision makers) has been limited. For SH&E professionals, it can be anticipated that knowing something about top management's priorities and concerns would help to improve communication with these individuals.

This article is part of a larger study (DeArmond, Huang & Chen, 2007; Huang, Leamon, Courtney, et al., 2007) that attempted to address this issue by exploring corporate financial decision makers' perceptions of safety issues. The purpose of this article is to highlight results that identified corporate financial decision makers' perceived leading safety priorities, concerns and losses; their perceived financial impact of safety; and issues regarding safety programs in order to help SH&E professionals communicate more effectively with decision makers. The goal is to provide information that may help shape communications between SH&E professionals and financial managers.

The Survey

Participants & Procedure

This study focused on medium- to large-sized companies (100 employees or more), anticipating that they were more likely to have an individual dedicated to corporate finance. Survey questions were developed by the project team with additional contributions from research scientists, SH&E professionals and market research professionals. A pilot study was conducted with 11 financial decision makers to test the questionnaire and identify potential methods for increasing the response rate (Huang, et al., 2007). The questions have content validity as they were developed, verified and tested by various subject-matter experts.

Nine core questions were formulated to assess financial decision makers' perceptions toward workplace safety issues. A survey research/consulting firm was hired to conduct the telephone interviews using a computer-assisted telephone interviewing lab. Experienced telephone interviewers contacted the most senior executive or manager responsible for making decisions about property and casualty risk management or insurance-related services for their organizations (e.g., CFO, director of finance).

Survey Topics

Topic 1: Perceived Leading Safety Priorities, Concerns & Losses

Three questions were developed to explore financial decision makers' perceptions of the leading safety priorities, concerns and losses. Participants were asked about their companies' safety priorities for resource allocation for the upcoming year (Q1), leading cause of workers' compensation losses (Q2) and single greatest workplace safety concern (Q3).

The list of possible response options for a company's safety priorities (Q1) for the upcoming year were generated using data from the 2005 Liberty Mutual Workplace Safety Index (Liberty Mutual, 2007), which provides information about the most costly occupational injury events on an annual basis, and the event or exposure leading to injury or illness categories used by BLS (2004).

Topic 2: Perceived Financial Impact of Safety

Three questions were included to obtain insight into the respondents' perceptions of the financial impact of occupational safety. These questions asked about the ratio of direct costs (such as payments to medical providers and the injured employees) versus indirect costs (such as lost productivity and worker replacement costs) and what is the biggest cause of indirect costs (Q4), the ratio of dollars spent improving workplace safety versus dollars returned (Q5) and the impact of workplace accidents on company financial performance (Q6).

Topic 3: Issues Regarding Safety Programs

Three open-ended questions were developed to explore participants' perceptions of issues related to safety programs. These questions asked participants what they perceived as the top benefits of safety programs (Q7), the best single modification to improve safety within their companies (Q8) and whether they thought that safety engineers were necessary in their companies (Q9).

Survey Results

Telephone surveys were conducted with 231 corporate financial decision makers. This number represented about 20% of the total completed contacts. The average survey lasted 12 minutes. Among the respondents, 81% were male. In terms of job title, 49% were chief financial officers, 15% were controllers, 10% were vice presidents and 8% were directors of finance.

Using company information provided by the respondent, each company's major industry sector was identified. In accordance with the 2002 NAICS codes and titles, about 23% of the respondents were in manufacturing, 13% were in healthcare and social assistance, 10% were in the finance and insurance industry, 8% were in construction and 8% were in wholesale trade. Detailed demographic information about the sample is shown in the sidebar on p. 38.

Topic 1: Perceived Leading Safety Priorities, Concerns & Losses

The top safety priorities for future resource allocation and efforts named by the corporate financial decision makers in this sample were overexertion, repetitive motion and bodily reaction injuries. Table 1 (p. 39) presents the ratings on safety priorities for resource allocation for various injury causes.

When asked about the leading cause of workers' compensation losses (Table 2, p. 40), the most common response was overexertion (34.4%), followed by repetitive motion (13.5%) and bodily reaction (11.6%). A few participants (2.3%) reported that they had not had any losses/claims for some time.

For the single greatest workplace safety concern for their company in the coming 12 months (Table 3, p. 41), the most frequently reported were: 1) overexertion (20.3%); 2) repetitive motion (14.6%); 3) highway accidents (12.7%); 4) falling on the same level (9.9%); and 5) bodily reaction (5.7%).

Abstract: *Top-level managers determine high-level budgets, resource allocation and corporate priorities about safety-related issues, yet little research has been done regarding what they consider to be important. Often, SH&E professionals must try to convince decision makers to support safety programs without knowing much about the thought processes behind their decisions. This study involved a survey that explored how 231 senior financial executives or managers for U.S.-based companies with 100 or more employees perceive important workplace safety issues. This article highlights some results of that study.*

Descriptive Information of Respondents & Their Companies

Job Title

49.1%	Chief financial officer
15.2%	Controller
9.6%	Vice president
8.3%	Director of finance
3.5%	Chief operating officer
3.0%	Risk manager
11.4%	Other (e.g., treasurer, finance manager)

Industry Type

23.4%	Manufacturing
12.6%	Healthcare and social assistance
9.5%	Finance and insurance
7.8%	Construction
7.8%	Wholesale trade
7.4%	Educational services
6.9%	Retail trade
5.2%	Hospitality
19.4%	Other (4.3% or less each)

Number of Employees

43.7%	100 to 245 employees
25.5%	250 to 499 employees
13.4%	500 to 999 employees
4.8%	1,000 to 1,999 employees
12.6%	2,000 or more employees

Approximate Annual Revenue

10.4%	Less than \$10 million
19.7%	\$10 to \$24.9 million
37.3%	\$25 to \$74.9 million
15.5%	\$75 to \$199.9 million
10.9%	\$200 to \$499.9 million
3.1%	\$500 to \$999.9 million
3.1%	\$1 billion or more

Gender

81.4%	Male
18.6%	Female

Topic 2: Perceived Financial Impact of Safety

The average estimated ratio of direct costs to indirect costs associated with occupational injuries was \$2.12 with a standard deviation (*SD*) of 1.9. This means that for every dollar spent on direct costs, participants believed about \$2.12 would be spent on indirect costs. The median ratio was \$2:\$1 (Figure 1, p. 42). The biggest causes of indirect costs participants mentioned were: 1) workplace disruption, downtime, loss of productivity (41.4%); 2) worker replacement, training new employees (23.2%); and 3) workers' compensation, increased insurance premiums, attorney fees (16.7%).

Participants perceived that, on average, for every dollar spent improving workplace safety, about \$4.41 (*SD* = 12.0) would be returned. The median was \$2 (Figure 2, p. 42). For the question, "How would you characterize the impact of workplace accidents on your company's financial performance, using a scale of: 1 = below average impact, 2 = average impact; 3 = above average impact; 4 = well above average impact; 5 = one of the highest impact?", 43% of the respondents reported below average impact and 57% reported average and above (a score of 2 to 5). Among all participants, only 10.8% reported that workplace accidents have well above average or one of the highest impacts on their company compared to other factors.

Topic 3: Issues Regarding Safety Programs

The top benefits of an effective workplace safety program were perceived to be: 1) increased productivity (42.5%); 2) reduced costs (28.3%); 3) greater retention of employees (7.1%); and 4) better employee/company morale and greater job satisfaction among employees (5.8%).

The most preferred occupational safety intervention reported by participants centered around introducing more/better safety-focused training and programs (26.6%). No other intervention reported was named by more than 8% of the respondents. Among these interventions, in descending order, were safer/better/updated equipment and workspace, more safety management, more enforcement of policies and procedures, improvements made to

create a safer and cleaner environment, removal of hazards and additional personnel present at all times to monitor safety.

Twenty-seven percent of the respondents believed safety engineers were needed in their organizations. A greater percentage of respondents from the larger companies saw a need for safety engineers—50% of participants from companies with 1,000 employees and more agreed, while 22.3% of those from companies with 100 to 999 employees agreed.

Discussion

Data on financial decision makers' perceived leading safety priorities, concerns and losses for their companies were collected in this study. Participants' reported areas of safety priorities for organizational resources and efforts in the next 12 months that were consistent with their responses on their companies' past workers' compensation losses.

The three most commonly named areas for both were overexertion, repetitive motion and bodily reaction. This may demonstrate that these decision makers tend to allocate financial resources to areas associated with what they understand to be sources of major losses.

When the participants were asked to name their single greatest workplace concern, after citing overexertion and repetitive motion, highway accidents and falling on the same level were mentioned more often than bodily reaction. It may be understandable that these financial executives are concerned about highway accidents yet do not consider them a top priority for resources because many factors that affect highway safety are not directly controllable by their company.

It is curious that falling on the same level ranked higher in the question about their single greatest concern than it did in their top priorities for future resources. Perhaps these respondents recognize this as a great concern yet might not understand the actual losses from falls. According to the Liberty Mutual (2007) Workplace Safety Index, falls on the same level was the second-leading cause of workplace injury in 2005, the same year the survey data

were collected. Knowing this, SH&E professionals can explore whether their own financial executives' perceptions on losses and concerns coincide with data from other sources (e.g., OSHA/OSHA recordables, workers' compensation data, medical records, company safety records). Are their financial managers' perceptions consistent with company reality?

The results of this study demonstrate that the participants recognized that there are indirect costs in addition to the direct costs associated with occupational injuries and that these costs can be substantially larger than the direct costs. Further, it is clear that the participants believed that the money spent improving workplace safety would have significant returns. The average perceived return on safety investments was \$4.41 (*SD* = 12.0). This might suggest that corporate financial decision makers might encourage or be receptive to safety improvement interventions. Conversely, it is possible that it could suggest that these decision makers have an expectation of return on investment if they choose to direct resources toward a given issue. Nonetheless, the majority thought that workplace accidents had only an average impact on company financial performance compared to other factors.

Although research in this area is very limited, the findings of the current study are similar to those found in other sources. For example, in terms of management views on investment in workplace safety and health, one survey project (Liberty Mutual, 2001), which collected data from American business executives, reported that 95% of business executives believed that workplace safety has a pos-

itive impact on a company's financial performance. Of these executives, 61% believed that their companies received a return on investment of \$3 or more for each \$1 they invested in workplace safety.

ASSE (2002) has concluded that a direct, positive correlation exists between investment in SH&E and its subsequent return on investment. OSHA (2007) asserts from its own evidence that companies implementing effective safety and health programs can reduce injury and illness rates by 20% or more—and generate a return of \$4 to \$6 for every \$1 invested.

OSHA reported that employers investing in workplace safety and health can expect to reduce fatalities, injuries and illnesses. This will result in cost savings in various areas, such as lowering workers' compensation costs and medical expenses, avoiding OSHA penalties, and reducing costs to train replacement employees and conduct accident investigations. In addition, employers often find that changes made to improve workplace safety and health can produce significant improvements in their organization's productivity and financial performance.

The information from the current study presents a good starting point for SH&E professionals to approach their company financial decision makers to find out how they perceive company safety costs and priorities. After identifying their company's actual direct and indirect injury costs, the returns on safety investment and the impact of workplace accidents on the company's financial performance, SH&E professionals can compare the actual figures with their managers' perceptions and see how those compare with the survey data. Practitioners can then deter-

These results give SH&E professionals a good starting point from which to approach financial decision makers to find out how they perceive safety costs and priorities.

Table 1

Top Safety Priorities for Resource Allocation

Ranking of priorities for resource allocation	<i>N</i>	<i>M</i>	<i>SD</i>
1) Overexertion from lifting, pushing, pulling, holding, carrying or throwing an object	227	3.31	1.29
2) Repetitive motion (e.g., injuries due to repeated stress or strain)	228	3.18	1.16
3) Bodily reaction (e.g., injuries due to bending, climbing, slipping or tripping without falling)	229	3.16	1.23
4) Exposure to harmful substances or environment	223	2.63	1.46
5) Falling on the same level	228	2.62	1.31
6) Highway accidents	218	2.37	1.44
7) Being caught in or compressed by equipment or objects	217	2.34	1.42
8) Being struck by an object (e.g., a tool falling on a worker from above)	224	2.27	1.38
9) Workplace violence	227	2.26	1.30
10) Falling from heights	223	2.22	1.26
11) Striking against an object (e.g., employee walking into a door frame)	229	2.20	1.19
12) Contact with high/low temperature	214	1.94	1.17

Note. Number of respondents answering out of 231 participants (*N*), means (*M*) and standard deviation (*SD*) of 5-point Likert scale responses to Q1 regarding the top safety priorities for resource allocation. Respondents were asked to rate their choices with a scale ranging from 1 as below average to 5 as one of the highest.

Table 2

Responses Regarding Top Cause of WC Losses

Rank	Frequency	Percent	Valid percent
1) Overexertion	74	32.0	34.4
2) Repetitive motion	29	12.6	13.5
3) Bodily reaction	25	10.8	11.6
4) Falling on the same level	19	8.2	8.8
5) Highway accidents	11	4.8	5.1
6) Falling from heights	6	2.6	2.8
7) Being struck by an object	5	2.2	2.3
8) Being caught in or compressed by equipment or objects	5	2.2	2.3
9) Carelessness, not paying attention	5	2.2	2.3
10) Cuts, abrasions, lacerations	5	2.2	2.3
11) Back injuries	4	1.7	1.9
12) Exposure to harmful substances or environment	2	0.9	0.9
13) Employees not adhering to safety regulations/policies	2	0.9	0.9
14) Bites, scratches	2	0.9	0.9
15) Contact with high/low temperature	1	0.4	0.5
16) We have not had any losses/claims for a while	5	2.2	2.3
17) Fraudulent claims	4	1.7	1.9
18) Other (e.g., knee injury, cumulative trauma disorder)	11	4.8	5.1
Number of responses to item	215	93.1	100.0
Number of no response	16	6.9	
Total participants	231	100.0	

nize the importance of safety training and programs, it is also important that they understand the importance of other safety interventions. Research has shown the limited effectiveness of education and safety interventions to increase awareness in reducing various incidences of unsafe behavior (Connelly, Conaglen, Parsonson, et al., 1998).

In addition, Amick, Robertson, DeRango, et al. (2003) found that training alone did not reduce musculoskeletal symptoms among office workers, but average pain levels were reduced

While it is good that these decision makers recognize the importance of safety training and programs, it is also important that they understand the importance of other safety interventions.

mine whether these areas are consistent or whether discrepancies exist that need to be addressed.

Since financial decision makers usually focus on the financial impact of decisions, providing actual financial evidence of the impact of safety investment for their companies can aid SH&E professionals in their efforts to find ways to improve top-level managers' perceptions of the importance of workplace safety. It has been shown that safety professionals need to understand an organization's financial losses in order to help senior management understand the financial benefit the safety department provides (Behm, Veltri & Kleinsorge, 2004; LaBelle, 2000). To work more effectively with other financial and operations management personnel, SH&E professionals would benefit from becoming more familiar with the common language of business (Adams, 2002).

In terms of the best safety interventions, the modification respondents mentioned most often was to have more/better safety-focused training. Corporate financial decision makers might believe that training-related changes in workers would have the greatest impact on safety or they may think that safety training is less costly—and, therefore, better—than other modifications. This may also indicate that financial decision makers would more readily support intervention proposals related to safety training.

While it is good that these decision makers recog-

when training was provided in conjunction with supplying adjustable office furniture and equipment.

Training works better when coupled with a well-designed workplace and a high level of management commitment. Training is only one of several important organizational responses to safety concerns. Examples of others are good housekeeping, active safety auditing, active participation of workers in safety programs and decision making, and the application of engineering safety controls (Hunt & Habeck, 1993; Shannon, Walters, Lewchuck, et al., 1996; Shannon, Mayr & Haines, 1997). SH&E professionals need to explore whether their financial decision makers recognize the importance of these other factors documented in the literature and identify ways to bring these factors to their attention.

Results showed that about one-quarter of the financial decision makers surveyed recognized the need for safety engineers. It was also found that decision makers from larger companies were more likely to identify this need. The application of engineering safety controls is recognized within the SH&E profession as fundamental to ensuring occupational safety. Therefore, it is important for SH&E professionals to ensure that their financial managers are fully informed about the importance of safety engineers' roles within an organization.

Overall, the findings of this study showed that the financial decision makers of U.S. companies surveyed recognized the importance of occupational safety and the need for and benefits of occupational safety interventions. While their reported perceptions of safety may not necessarily be the same as those of the SH&E professional's own company,

Table 3

Responses About Top Workplace Safety Concern

Rank	Frequency	Percent	Valid percent
1) Overexertion	43	18.6	20.3
2) Repetitive motion	31	13.4	14.6
3) Highway accidents	27	11.7	12.7
4) Falling on the same level	21	9.1	9.9
5) Bodily reaction	12	5.2	5.7
6) Being caught in or compressed by equipment or objects	11	4.8	5.2
7) Exposure to harmful substances or environment	9	3.9	4.2
8) Falling from heights	8	3.5	3.8
9) Employee carelessness or lack of focus	7	3.0	3.3
10) Flu, disease, viruses, bacteria, infection	5	2.2	2.4
11) Creating a safe work environment	4	1.7	1.9
12) Cuts, abrasions, lacerations from needles, knives or sharp object	4	1.7	1.9
13) Striking against an object	3	1.3	1.4
14) Workplace violence	3	1.3	1.4
15) Safety education and training	3	1.3	1.4
16) Being struck by an object	2	0.9	0.9
17) Contact with high voltage/electricity	2	0.9	0.9
18) Contact with high/low temperature	1	0.4	0.5
19) All concerns are equally important	2	0.9	0.9
20) No concerns	3	1.3	1.4
21) Other	11	4.8	5.2
Number of responses to item	212	91.8	100.0
Number of no response	19	8.2	
Total participants	231	100.0	

knowing how financial executives in general perceive safety priorities, concerns and other safety issues creates an opportunity for expanding and enriching the dialogue between SH&E professionals and their financial decision makers.

Conclusion

Financial executives who were surveyed said that the top benefits of an effective workplace safety program were predominately financial in nature (e.g., increased productivity, reduced costs). This finding should act as a reminder to SH&E professionals about the perspective from which financial decision makers view safety programs. Awareness of this perspective may help practitioners to better communicate with their own organizations' financial decision makers. However, it also identifies an important challenge for SH&E professionals—the need to communicate all of the important benefits of effective safety programs to financial decision makers. ■

References

Adams, S. (2002, Aug.). Financial management concepts: Making the bottom-line case for safety. *Professional Safety*, 47(8), 23-26.

Amick, B.C., Robertson, M.M., DeRango, K., et al. (2003). Effect of office ergonomics intervention on reducing musculoskeletal symptoms. *Spine*, 28, 2706-2711.

ASSE. (2002). The return on investment in safety, health and environmental management programs [White paper]. Des Plaines, IL: Author. Retrieved Feb. 25, 2009, from http://www.asse.org/practicespecialties/bosc/bosc_article_6.php.

Behm, M., Veltri, A. & Kleinsorge, I. (2004, Apr.). The cost of

safety: Cost analysis model helps build business case for safety. *Professional Safety*, 49(4), 22-29.

Bureau of Labor Statistics (BLS). (2004). Event or exposure leading to injury or illness. Washington, DC: U.S. Department of Labor, Author. Retrieved Feb. 25, 2009, from <http://www.bls.gov/iif/oshdef.htm>.

BLS. (2008). *Census of fatal occupational injuries: Current and revised data*. Washington, DC: U.S. Department of Labor, Author. Retrieved from <http://www.bls.gov/iif/oshcfoil.htm>.

Cohen, A. (1977). Factors in successful occupational safety programs. *Journal of Safety Research*, 9, 168-178.

Connelly, M.L., Conaglen, H.M., Parsonson, B.S., et al. (1998). Child pedestrians' crossing gap thresholds. *Accident Analysis and Prevention*, 30, 443-453.

DeArmond, S., Huang, Y.H., & Chen, P.Y. (2007, March). How do we stack up? Corporate financial decision makers' perceptions of safety performance, safety programs and safety personnel. *Professional Safety*, 52(3), 28-34.

Griffiths, D.K. (1985). Safety injuries of management. *Ergonomics*, 28, 61-67.

Huang, Y.H., Leamon, T.B., Courtney, T.K., et al. (2007). Corporate financial decision makers' perceptions of workplace safety. *Accident Analysis and Prevention*, 39, 767-775.

Hunt, H.A. & Habeck, R.V. (1993). The Michigan disability prevention study. *Business Outlook*, 10(1).

LaBelle, J.E. (2000, April). What do accidents truly cost? *Professional Safety*, 45(4), 38-42.

Liberty Mutual. (2001). A majority of U.S. businesses report workplace safety delivers a return on investment [News Release]. Boston, MA: Author.

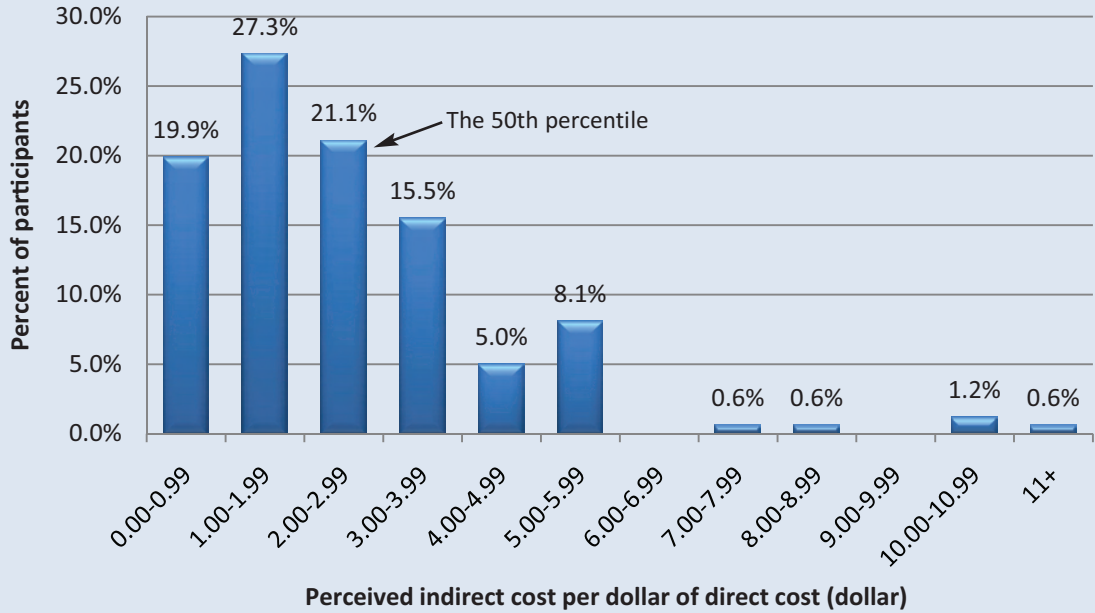
Liberty Mutual. (2007). 2005 Workplace Safety Index. Boston, MA: Author. Retrieved Feb. 25, 2009, from http://www.libertymutual.com/omapps/ContentServer?cid=1078447727400&page_name=CMIInternet/Document/ShowDoc&c=Document.

Marsh, T., Davies, R., Phillips, R.A., et al. (1998). The role of management commitment in determining the success of a behav-

Study participants recognized that there are indirect costs in addition to the direct costs associated with occupational injuries and that these costs can be substantially larger than the direct costs.

Figure 1

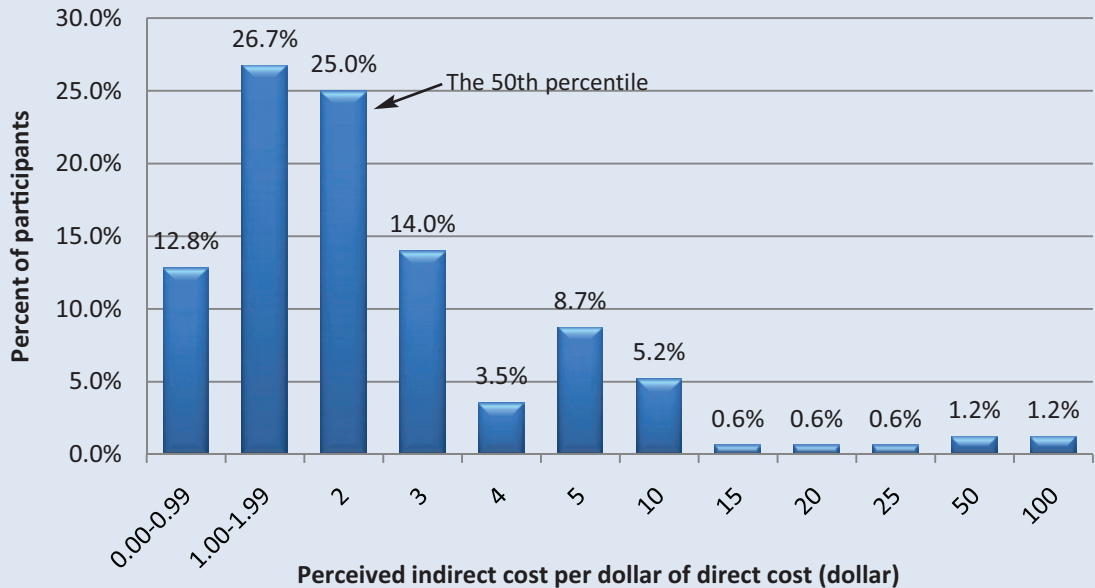
Perceived Ratio of Direct Cost vs. Indirect Cost



Note. The average estimation of the ratio of direct cost versus indirect cost was \$2.12 (SD = 1.9); the arrow indicates the median score (the 50th percentile) (\$2).

Figure 2

Perceived Dollar Return on Each Dollar Spent Improving Workplace Safety



Note. The average perceived return on safety investment was \$4.41 (SD = 12.0). The arrow indicates the median score (the 50th percentile) (\$2).

ioral safety intervention. *Journal of the Institution of Occupational Safety and Health*, 2(2), 45-56.

OSHA. (2007). Safety and Health Management Systems eTool: Module 1-Safety and Health Payoffs, Helpful Statistics. Washington, DC: U.S. Department of Labor, Author. Retrieved from <http://www.osha.gov/SLTC/etools/safetyhealth/helpfulstatistics.html>

Rosenman, K.D., Kalush, A., Reilly, M.J., et al. (2006). How much work-related injury and illness is missed by the current national surveillance system? *Journal of Occupational and Environmental Medicine*, 48(4), 357-365.

Sawacha, E., Naoum, S. & Fong, D. (1999). Factors affecting safety performance on construction sites. *International Journal of Project Management*, 17(5), 309-315.

Shannon, H.S., Mayr, J. & Haines, T. (1997). Overview of the relationship between organizational and workplace factors and injury rates. *Safety Science*, 26, 201-217.

Shannon, H.S., Walters, V., Lewchuck, W., et al. (1996). Workplace organizational correlates of lost-time accident rates in manufacturing. *American Journal of Industrial Medicine*, 29(3), 258-268.