



The Value of Vulnerability

Helping Workers Perceive Personal Risk

By Anna H.L. Floyd and H. Landis Floyd II

Many safety professionals have likely heard comments like these:
“How could this have happened? We have the best safety record in our division. We’ve never had a lost-time electrical injury at this plant. He is the most knowledgeable person in the crew. He has never had a recordable injury. I was not aware that my employees were exposed to a hazard with such severity. I don’t understand.”

—Plant manager commenting during an arc-flash injury investigation

“I’ve been in the business (electrical trade) for 25 years. Until today, I can honestly say that I’ve never understood the hazards I’ve worked with.”

—Electrician at the end of an 8-hour hazard awareness seminar

This arc-flash incident caused a lost-time injury that led to long-term disability. As the quote shows, the plant manager’s disbelief is entangled with his justification of the worker’s qualifications as the “most knowledgeable person in his crew.” In short, the manager does not understand how such a horrible event happened to a person whose knowledge of rules and regulations was so complete.

Almost as if in response to the questions posed by that plant manager, the second quote is from a 25-year veteran

electrician who was well versed in electrical safety regulations and various employers’ safety rules (which was what most of his safety training had addressed). However, he had no perception of how severe the harm could be. The electrician admitted he did not fully understand the hazards of electricity, yet he, his coworkers and employers viewed him as a qualified electrician. During a course on electrical hazards, he realized his avoidance of injury was sheer luck.

So, how can SH&E professionals improve worker training to increase workers’ understanding of their personal vulnerability, which ultimately affects their tactical adoption of safety protocols? ANSI/ASSE Z490.1-2009, *Criteria for Accepted Practices in Safety, Health and Environmental Training*, provides a framework based on best practices in planning, developing, delivering and assessing safety training.

Most safety professionals understand that needs assessments, content design and delivery methods affect training effectiveness. They also recognize the need to engage adult learners through techniques such as role-playing, group projects, guided learning, storytelling and peer coaching because adults learn differently than children and do not respond well to content-focused education (Fanning, 2011). Work culture is another key consideration (Cullen, 2011).

However, SH&E professionals must also recognize, as Lehmann, Haight and Michael (2009) conclude, that workplace safety training alone is not adequate enough to produce appropriate risk

IN BRIEF

• Safety training is most effective when it helps employees establish a personal sense of vulnerability or a heightened risk perception that consequently creates a positive shift in safety-related behaviors.

• This article combines psychology research findings about how an individual’s risk perceptions are formed and how those perceptions influence subsequent behavior with practical experience involving high-risk occupational hazards that have the potential to cause disabling injury or death.

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decision making among employees. Lehmann, et al. (2009), suggest that “more specialized (i.e., psychological or behavior-based) training is necessary for changing safety-related attitudes and behaviors” (p. 17). This article builds on those findings and focuses on how the human mind perceives risk and personal vulnerability.

Low-Frequency/High-Consequence Hazards & Risk Perceptions

To better understand why it is important to help workers’ adjust their risk perceptions, consider the subset of workplace hazards that lead to a relatively small percentage of non-fatal injuries, but have a significantly higher likelihood of causing disabling or fatal injuries. The injuries they produce are commonly referred to as low-frequency/high-consequence injuries. For example, compare the rates shown in Tables 1 and 2. Although exposure to the hazards may be routine or frequent, the low frequency of nonfatal injuries can create an illusion of control or immunity, as apparent in the earlier quotes.

Safety training that focuses solely on a worker’s perception of risk likelihood without a focus on risk susceptibility and severity (a mistake often made in risk perception assessments) is a disservice to workers. That is, a worker’s perception that s/he has a low likelihood of suffering a nonfatal electrical burn is accurate, yet among those who are involved in such an electrical incident, their likelihood of being killed is high. This discrepancy raises an important point about how people conceptualize risk.

What Constitutes Risk Perception?

Although training often aims to create hazard awareness (Lehmann, et al., 2009), awareness does not equate to risk perception. To fully understand risk perception, consider the dimensions of risk. Clemens and Simmons (1998, as cited in Lehmann, et al., 2009) propose a focus on the concepts of risk severity and probability. Lehmann, et al. (2009), propose a focus on the concepts of risk tolerance and risk perception.

The authors’ suggestion is taken from Brewer, Chapman, Gibbons, et al. (2007), and is based on the foundations of social psychology and health psychology. The authors posit that understanding risk must come out of three dimensions of personal perception: perceived likelihood, perceived susceptibility and perceived sever-

ity (Brewer, et al., 2007) of the hazard (Table 3, p. 34). These dimensions of risk may remain underdeveloped if training provides information about incident rates or degree of injury, yet does not help employees establish a personal connection to the statistics or images used in training.

Consider the following examples of how one



So, how can SH&E professionals improve worker training to increase workers’ understanding of their personal vulnerability?

Table 1

Comparing Select Nonfatal Occupational Injuries

Type of nonfatal injury	No. injuries (2010)
Total	1,191,100
Sprains, strains, tears	474,000
Musculoskeletal disorders	346,300
Falls on same level	182,400
Struck by object	138,530
Falls to lower level	73,520
Assault/violent act by person	40,310
Highway accidents	36,460
Assault/violent act by animal	7,160
Fires and explosions	3,000
Electrical shock and burn	1,890

Note. Data from “Nonfatal Occupational Injuries and Illnesses Requiring Days Away From Work, 2010,” [News release USDL-11-1612], by Bureau of Labor Statistics, 2011, Washington, DC: U.S. Department of Labor, Author.

Table 2

Ratio of Lost-Time Injuries to Fatalities

Event or exposure	Lost-time injury to fatality ratio
Fires and explosions	12
Contact with electricity	13
Transportation accidents	23
Assaults and violent acts	28
Fall to a lower level	104
Caught in, compressed or crushed	134
Struck by object	323
Falls on same level	2,056
Struck against object	8,414
Slips or trips without fall	12,593
Overexertion in lifting	14,033

Note. Adapted from “The Heinrich Triangle: Too Simplistic a Model for HSE Management in the 21st Century?” by M. Anderson and M. Denk, 2010, Presentation at Society of Petroleum Engineers International Conference on Health Safety and Environment in Oil and Gas Exploration and Production, Rio de Janeiro, Brazil, with electrical injury data from “Occupational Electrical Injuries in the U.S., 2003-2009,” by J.C. Cawley and B.C. Brenner, 2012, 2012 IEEE IAS Electrical Safety Workshop, Daytona Beach, FL.

could assess training effectiveness. This first example is from a follow-up quiz for an electrical safety training module delivered on a construction site:

What is the reason ground fault circuit interrupters (GFCIs) are required when using any electrically powered hand tool on the job site?

A) OSHA 1926 requires that the employer provide GFCI-protected outlets on construction sites.

B) National Electrical Code requires GFCI-protected outlets be installed on construction sites.

C) NFPA 70E, Standard for Electrical Safety in the Workplace, requires that all extensions cords and portable electrically powered tools be plugged into outlets having GFCI protection.

D) A GFCI will protect a worker, including myself, from instant death by electrocution due to a defective tool or cord.

None of these answers is technically incorrect. However, the first three choices reflect an understanding of what the rules and regulations require. Answer D reflects an understanding of risk and personal vulnerability.

The second example involves training on auditing the use of GFCIs on a construction site:

Which question provides better assurance that workers are complying with requirements to use GFCIs?

A) When observing workers using portable electric powered tools, check whether GFCIs are being used.

B) When observing workers using portable electrical tools, engage the workers and determine if they understand the purpose of GFCIs.

Dimensions of risk may remain underdeveloped if training provides information about incident rates or degree of injury, yet does not help employees establish a personal connection to the statistics or images used in training.

Again, neither answer is incorrect, but answer B is likely a better indicator of both the worker's commitment to always use a GFCI and the auditor's understanding that a worker's behavior when being observed does not necessarily mirror normal behavior. In these examples, answer D and answer B indicate that a worker has made a personal connection about why safety rules and procedures are in place.

Now, consider several theoretical models to illustrate why establishing a personal sense of vulnerability is an essential precursor to understanding and committing to follow safety rules and procedures.

Risk Perception as a Catalyst in Changing Behavior

Risk perceptions are known to predict subsequent behaviors, and the associations between perception and behavior have been studied in psychology for decades. Risk perception is situation specific. That is, a person may hold a high risk perception of being in a car crash while texting, but a low risk perception of getting cancer from smoking.

Typically, low risk perception (a belief that one has little or no chance of experiencing a negative event) is associated with failure to adopt precautionary behaviors, while high risk perceptions (a belief that one has a higher chance of experiencing a negative event) are associated with adoption of precautionary behaviors. This type of association has been seen in environments and behaviors ranging from unsafe traffic violations (Havârneanu & Havârneanu, 2012) and unsafe driving behaviors (Ryb, Dischinger, Kufera, et al., 2006); nurses' likelihood of vaccinating themselves against the H1N1 virus (Zhang, While & Norman, 2011); unsafe sexual behavior in populations at risk for HIV (Baah-Odoom & Riley, 2013; MacKellar, Valleroy, Secura, et al., 2007); and screening behaviors for cancer (Kim, Perez-Stable, Wong, et al., 2008).

A Look at Theory

Two classic models outline the relationship between risk perception and behavior: the health belief model (Becker & Maiman, 1975) and the theory of planned behavior, first developed by Ajzen (1985; 1991). Both are used extensively in health psychology to understand people's health behaviors.

According to the health belief model (Figure 1), factors that influence whether a person adopts a protective behavior include how susceptible they feel to a threat to their health, how severe they believe that threat to be, whether they believe that adopting a protective behavior will be beneficial, and whether the costs (e.g., time, financial, skill acquisition) associated with adopting the protective behavior are not so great as to be daunting.

The theory of planned behavior (Ajzen & Fishbein, 1980) describes the psychological, social and environmental factors that influence whether a person intends to change his/her behavior (Figure 2, p. 36). It outlines the factors that affect one's intention to change behavior (as intention must precede action).

According to this model, three main factors influence intention: 1) attitudes toward the action (i.e.,

Table 3
Three Dimensions of Risk Perception

Dimension of risk	Description of dimension	Sample items or questions for assessment
Perceived likelihood	Probability of being harmed by a hazard	Imagine that your PPE is unavailable over the next year. Given that you do not have the PPE to use, what would you say is the likelihood that you would get burned this year?
Perceived susceptibility	Individual's perception of vulnerability to a hazard	I am more likely to be burned than other workers in my field
Perceived severity	The degree of harm that a hazard would cause	If I were to be burned, I would be disabled or killed.

Note. Adapted from "Meta-Analysis of the Relationship Between Risk Perception and Health Behavior: The Example of Vaccination," by N.T. Brewer, G.B. Chapman, F.X. Gibbons, et al., 2007, *Health Psychology*, 26(2), pp. 136-145.

how one perceives and evaluates the possible outcomes of the action); 2) subjective norms regarding the action (i.e., what one's family and friends think of the action and how much value one places on those opinions); and 3) perceived behavioral control over the action (also called *self-efficacy*, or whether a person believes s/he can follow through with the action).

These theories illustrate why risk perception must be part of an individual's perspective before s/he can be influenced to adopt self-protective behavior. Two risk-related questions are important for both theories:

- 1) Does a person perceive him/herself to be at risk?
- 2) Does a person perceive that adopting a particular behavior will reduce that risk?

According to these models, if the answer to one or both questions is no, the individual is less likely to adopt protective behavior.

So how can SH&E professionals help workers develop a heightened perception of risk through safety training? The first step is to understand how those perceptions are formed.

How Do People Form Risk Perceptions?

People use two mental systems to judge the risk of experiencing an event, including an adverse event such as a workplace injury. One is an analytic system (logic-oriented, governed by conscious thought processes, long decision-making time frame). The other is an experiential system (affective, or feeling-based, governed by associative connections and vibes based on previous experiences, short decision-making time frame) (Slovic, Finucane, Peters, et al., 2004).

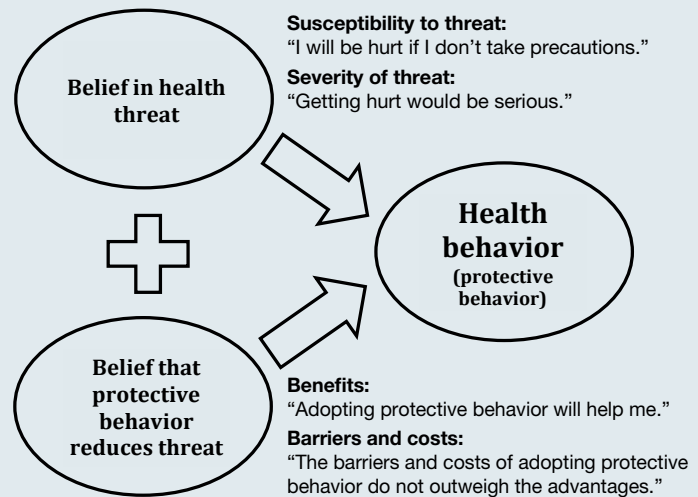
Most people rely primarily on the experiential, feeling-based system. People make so many decisions on a daily basis and they cannot make each one logically. For example, consider the potentially infinite number of factors one can consider when buying a car. If one were to logically weigh all variables, no decision would ever be made. Humans are particularly likely to use the experiential system when a decision-making process is complicated, when rushed or when mental resources are taxed (Slovic, et al., 2004). When tired, hungry or otherwise mentally preoccupied (that is, almost all the time) people use the experiential system.

Understanding Risk: Feelings as Input

What exactly is this *affect* that runs the experiential processing system? This term, from the field of psychology, refers to the experience of feelings or emotions. Feeling alert, determined and proud are examples of positive affect, while feeling scared, jittery and ashamed are examples of negative affect (Watson & Clark, 1994).

The experiential system people use to calculate risk relies heavily on past experience (Weinstein, 1989). Having a strong emotional experience associated with certain hazards has a profound impact on risk perception (Finucane, Alhakami, Slovic, et al., 2000). For example, a person who has been

Figure 1
Health Belief Model



on the scene when a coworker who did not follow proper PPE protocol died will associate noncompliance with feelings of being scared, sad and vulnerable. This person will need little convincing to be vigilant regarding safety.

It Could Be Me: Methods of Establishing Vulnerability

SH&E professionals can help workers establish a heightened sense of vulnerability in several ways. One effective way is to incorporate stories into training. Because workers operate affectively when developing their own risk perceptions and when making their own risk decisions, it makes sense to use methods that draw on affect to increase workers' perceptions of risk prior to safety training. This can occur in conjunction with more traditional methods (e.g., presenting statistics).

The Role of Stories

The experiences and opinions of others play a key role in how individuals perceive appropriate actions and behaviors. This is clearly illustrated in the models cited, specifically the subjective norms factor in the theory of planned behavior (Ajzen, 1985; 1991), as well as in the construct of Bandura's (1977) well-known social learning theory, which outlines how people learn vicariously through watching others.

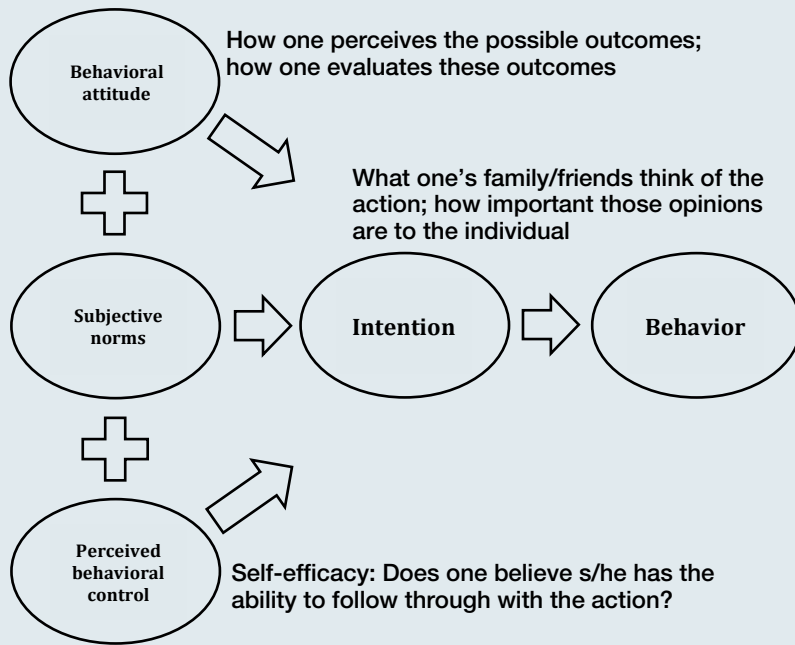
Sometimes, watching others can occur through the use of a narrative or story (Cullen, 2011). Researchers have extensively studied health messages presented in the form of a narrative to determine the effect of such messages on subsequent behaviors. Narratives can range from journalism to literature to testimonials (Kreuter, Green, Cappella, et al., 2007), and can depict real or fictional characters.

Of great importance to safety and health communication is the fact that the more similar people perceive themselves to be to a narrative character, the more likely they are to be persuaded by the narrative itself (Hinyard & Kreuter, 2007). Results are equivocal in whether statistical or narrative types of communication are more persuasive (Hinyard & Kreuter, 2007). With this in mind, it may be best to apply both strategies to a communication message.

The health belief model posits that factors that influence whether a person adopts a protective behavior include how susceptible they feel to a threat to their health, how severe they believe that threat to be, whether they believe that adopting a protective behavior will be beneficial, and whether the costs associated with adopting that behavior are not so great as to be daunting.

Figure 2

Theory of Planned Behavior



The theory of planned behavior says three main factors influence intention: 1) attitudes toward the action; 2) subjective norms regarding the action; and 3) perceived behavioral control.

Presenting Narratives

Stories about people affected by incidents that include photos, names and references to personable characteristics (e.g., family, hobbies) will persuade much more than simply presenting statistics. The more a worker can relate to a story's character, the more likely s/he is to be transported into and affected by that story (Hinyard & Kreuter, 2007), and the more likely s/he will be to think "that could be me" (Figure 3).

When possible, use stories in training materials to help workers establish the personal sense of vulnerability needed to achieve behavior change. In these stories, mention personable information that is generic enough to apply to many people. For example, consider these two hypothetical examples that might appear in a company newsletter:

1) "There are 1,890 electrical shock and burn injuries each year."

2) "Last Friday, one of our linemen was critically injured in an electric shock incident. His wife and their two children have spent the week visiting him in the hospital and would like to request that get-well cards be sent to the following address."

Which of these two examples will more likely persuade a worker to take appropriate safety measures? Most workers will be able to project themselves into the second scenario, making it more likely to prompt behavior change compared to the presentation of statistics only. Notice that the information provided is not too detailed because that would make the story exclusionary. For example, it simply states "two children" rather than "two daughters, ages 14 and 17."

Assessing Risk Perception Training

To assess risk perceptions, psychologists typically use a self-report questionnaire. These questionnaires are quite developed in certain areas (e.g., smoking and cancer; Weinstein, Marcus & Moser, 2005), and

some research conducted in these areas applies to assessing workers' perceptions of their own vulnerability (e.g., dermal exposure by Geer, Curbow, Anna, et al., 2006; Rundmo, 1996).

For example, the three dimensions of risk perceptions (Table 3) provides a sample questionnaire item for each dimension that could be used to assess risk perceptions related to electrical shocks and burns. Typically, these types of items would be part of a longer survey with additional related questions. Response options would be a Likert-type scale, with five answer options ranging from low likelihood to high likelihood, or from strongly disagree to strongly agree. Implementing such surveys at different times (e.g., a week before training, just after training, several weeks after training) and conducting basic statistical tests on the responses can indicate whether risk perceptions shifted as a result of the training, and whether these perceptions held several weeks after training.

Survey questions should assess workers' perceived likelihood of being harmed by the hazard, their perceived susceptibility or vulnerability to the hazard, and their perceptions about the degree of harm the hazard would cause. In reviewing the theoretical model, one can see how these concepts map onto the susceptibility to threat and perceived severity of threat elements (variables on the left-hand side of the figure) that predict intention and behavior.

Regarding validity, it is important when assessing risk perceptions to frame the items in the context that the worker is not taking self-protective action. To illustrate why this is important, consider the question, "What is the likelihood that you will receive an electric shock in an electrical incident this year?" A worker may respond with "low likelihood," but it is unknown whether this is because that worker truly sees no risk (a low risk perception), or because s/he always wears voltage-rated

Figure 3

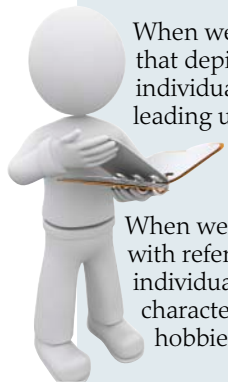
Response to Incident Reports

When we read stories that depict only the individual's actions leading up to an incident . . .

. . . we "blame the victim" to distance ourselves as a means of establishing a sense of personal control and to avoid recognizing the possibility that we could make the same mistake.

When we read stories with reference to the individual's personable characteristics (family, hobbies) . . .

. . . we now have a context to see the individual as a human being, which allows us to put "ourselves" in "their" shoes and recognize that we could make the same mistake.



gloves and other PPE. A better question to assess the perception of risk likelihood is, "Imagine that your PPE is unavailable over the next year. With no PPE to use, what would you say is the likelihood that you would get burned this year?"

Conclusion

Safety training is an essential component of hazard and risk management. However, it can consume resources and takes people out of their daily jobs, so SH&E professionals must make the best possible use of training time. Based on theoretical models of behavior change used in social and health psychology, SH&E professionals must help employees establish a personal sense of vulnerability so they can adopt self-protective behavior. The safety training literature suggests that training include stories (in addition to statistics) to help develop risk perceptions through experiential (feeling-based) cognitive processes. **PS**

References

- Anderson, M. & Denkl, M.** (2010). The Heinrich triangle: Too simplistic a model for HSE management in the 21st century? Presentation at Society of Petroleum Engineers International Conference on Health Safety and Environment in Oil and Gas Exploration and Production, Rio de Janeiro, Brazil.
- Ajzen, I.** (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl and J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). New York, NY: Heidelberg, Springer.
- Ajzen, I.** (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. & Fishbein, M.** (1980). *Understanding attitudes and predicting social behavior*. Upper Saddle River, NJ: Prentice-Hall.
- Baah-Odoom, D. & Riley, G.A.** (2013). The role HIV-related blame and stigmatization play on risk perception, self-efficacy and sexual behavior among students in Ghana. *IFE Psychologia*, 21(1), 284-303.
- Bandura, A.** (1977). *Social learning theory*. Upper Saddle River, NJ: Prentice-Hall.
- Becker, M.H. & Maiman, L.A.** (1975). Sociobehavioral determinants of compliance with health and medical care recommendations. *Medical Care*, 13(1), 10-24.
- Brewer, N.T., Chapman, G.B., Gibbons, F.X., et al.** (2007). Meta-analysis of the relationship between risk perception and health behavior: The example of vaccination. *Health Psychology*, 26(2), 136-145.
- Bureau of Labor Statistics (BLS).** (2011). Nonfatal occupational injuries and illnesses requiring days away from work, 2010 [News release USDL-11-1612]. Retrieved from www.bls.gov/news.release/archives/osh2_11092011.pdf
- Cawley, J.C. & Brenner, B.C.** (2012). Occupational electrical injuries in the U.S., 2003-2009. 2012 IEEE IAS Electrical Safety Workshop, Daytona Beach, FL.
- Clemens, P.L. & Simmons, R.J.** (1998). Safety system and risk management: A guide for engineering educators (NIOSH Publication No. 96-37768). Retrieved from www.cdc.gov/niosh/docs/96-37768/pdfs/96-37768.pdf
- Cullen, E.T.** (2011, March). Effective training: A case study from the oil and gas industry. *Professional Safety*, 56(3), 40-47.
- Fanning, F.E.** (2011, Aug.). Engaging learner techniques to make training stick. *Professional Safety*, 56(8), 42-48.
- Finucane, M.L., Alhakami, A., Slovic, P., et al.** (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13(1), 1-17.
- Floyd, A.H.L. & Floyd, H.L.** (2013, March). Cultural drift and the occlusion of electrical safety. Presented at the IEEE IAS Electrical Safety Workshop, Dallas, TX, USA.
- Geer, L.A., Curbow, B.A., Anna, D.H., et al.** (2006). Development of a questionnaire to assess worker knowledge, attitudes and perceptions underlying dermal exposure. *Scandinavian Journal of Work, Environment & Health*, 32(3), 209-218.
- Havârneanu, G.M. & Havârneanu, C.E.** (2012). When norms turn perverse: Contextual irrationality vs. rational traffic violations. *Transportation Research Part F: Traffic Psychology and Behavior*, 15(2), 144-151.
- Heinrich, H.W., Peterson, D. & Roos, N.** (1980). *Industrial accident prevention: A safety management approach*. New York, NY: McGraw Hill.
- Hinyard, L.J. & Kreuter, M.W.** (2007). Using narrative communication as a tool for health behavior change: A conceptual, theoretical and empirical overview. *Health Education & Behavior*, 34(5), 777-792.
- Kim, S.E., Pérez-Stable, E.J., Wong, S., et al.** (2008). Association between cancer risk perception and screening behavior among diverse women. *Archives of Internal Medicine*, 168(7), 728-734.
- Kreuter, M.W., Green, M.C., Cappella, J.N., et al.** (2007). Narrative communication in cancer prevention and control: A framework to guide research and application. *Annals of Behavioral Medicine*, 33(3), 221-235.
- Lehmann, C.C., Haight, J.M. & Michael, J.H.** (2009). Effects of safety training on risk tolerance: An examination of male workers in the surface mining industry. *Journal of SH&E Research*, 6(1). Retrieved from www.asse.org/academicsjournal/archive/vol6no1/spring09-feature03.pdf
- MacKellar, D.A., Valleroy, L.A., Secura, G.M., et al.** (2007). Perceptions of lifetime risk and actual risk for acquiring HIV among young men who have sex with men. *AIDS and Behavior*, 11(2), 263-270.
- Merli, C.M.** (2011, July). Effective training for adult learners. *Professional Safety*, 56(7) 49-57.
- Rudisill, C.** (2013). How do we handle new health risks? Risk perception, optimism and behaviors regarding the H1N1 virus. *Journal of Risk Research*, 16(8), 959-980.
- Rundmo, T.** (1996). Associations between risk perception and safety. *Safety Science*, 24(3), 1996.
- Ryb, G.E., Dischinger, P.C., Kufera, J.A., et al.** (2006). Risk perception and impulsivity: Association with risky behaviors and substance abuse disorders. *Accident Analysis & Prevention*, 38(3), 567-573.
- Slovic, P., Finucane, M.L., Peters, E., et al.** (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk and rationality. *Risk Analysis*, 24(2), 311-322.
- Watson, D. & Clark, L.A.** (1994). THE PANAS-X: Manual for the positive and negative affect schedule (expanded form). Retrieved from www.psychology.uiowa.edu/faculty/clark
- Weinstein, N.D.** (1989). Effects of personal experience on self-protective behavior. *Psychological Bulletin*, 105, 31-50.
- Weinstein, N.D., Marcus, S.E. & Moser, R.P.** (2005). Smokers' unrealistic optimism about their risk. *Tobacco Control*, 14, 55-59. doi:10.1136/tc.2004.008375
- Zhang, J., While, A.E. & Norman, I.J.** (2011). Nurses' knowledge and risk perception toward seasonal influenza and vaccination and their vaccination behaviors: A cross-sectional survey. *International Journal of Nursing Studies*, 48(10), 1281-1289.