

Utilizing Skill to Improve BEHAVIOR- BASED SAFETY

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IN MEDICINE, HUMAN ERROR reportedly contributes to more than 1 million injuries and between 44,000 and 98,000 deaths each year (Kohn, Corrigan & Donaldson, 2000). In occupational settings, workers' erroneous behaviors are getting increasing attention because these behaviors contribute to avoidable injuries and illnesses. Gravina, King and Austin (2019) argue that behavior-based interventions can yield positive results but often suffer from poor leadership support (Sulzer-Azaroff & Austin, 2000).

Behavior-based safety (BBS) programs attempt to reduce workers' critical behavior and ameliorate workers' safety and health at the workplace. In the early 1970s, BBS programs gained attention because they had a direct effect on incident prevention (Guo, Goh & Wong, 2018; Nunu, Kativhu & Moyo, 2018). Yeow and Goomas (2018) studied BBS program effectiveness. The researchers granted small incentives to participants so that underreporting to gain large incentive could be avoided. The study suffered from the Hawthorne effect, where workers only performed safely in the presence of researchers and stopped continuing safe performance once the researchers left the site. Similarly, the safety climate on a construction site in China improved after implementation of a BBS program, but deteriorated soon after the program was completed (Zhang & Fang, 2013). Therefore, the authors of that study suggest that a continuous BBS strategy should be implemented and followed in management practice. BBS is popular and useful, but it deals

with behavior that is more or less a symptom of internal perception; hence a behavioral safety program cannot be successful unless a change in internal perception takes place (Hopkins, 2006; Smith, 1999).

Due to the limitations, BBS should be implemented together within the psychosocial climate of an organization (DeJoy, 2005). The psychosocial climate is closely associated with person-based safety (PBS) in terms of utilizing person-based factors (e.g., emotion, tolerance, attitude, empowerment, ownership, interpersonal trust) to predict traditional safety terms such as *compliance* and *enforcement* (Geller, 2001). Few studies have attempted to correlate PBS and BBS components. In one such study, Bronkhorst (2015) demonstrated that worker behavior tends to become unsafe while working under demanding work pressure. The results of this study positively correlated coworker support with workers' safety behavior. Nevertheless, some workers remained unaffected in that situation. However, the coping mechanism behind such escape has not yet been identified. Another study by Lietão, McCarthy and Greiner (2018) attempted to examine the link between job demand, control, support and safety climate with health, well-being and safety. This study established that supporting work environment and greater scope to make decisions at work provides employees with an ideal work atmosphere.

To target a successful BBS program, the PBS component must be investigated. Since studies that attempt to investigate both BBS and PBS are rare, the authors attempted to identify a predictive factor of PBS that guarantees the success of BBS. The goal of this article is to identify a theoretical component of PBS that will help reduce workers' at-risk behavior and improve BBS at work.

Person-Based Safety

Psychology can be used to change unsafe and erroneous worker behavior with two approaches: BBS and PBS. The person-based approach claims that observable behavior is not enough to analyze the internal perception of people. BBS illustrates that behavior is motivated by its consequences and, thus, behavior can be changed by controlling the perception before a behavior is performed. Therefore, we need to assess

KEY TAKEAWAYS

- Behavior-based safety programs aim to improve worker safety and health by reducing erroneous behaviors. Behavior can be the outcome of internal beliefs, perceptions and attitudes often referred to as internal or person-based factors.
- This article discusses different theoretical models to recognize and evaluate different person-based internal factors. It aims to identify a predictive factor that will help to reduce workers' at-risk erroneous or critical behavior by reducing job stress and that will endorse behavioral safety as an outcome directly related to their tasks.
- The authors suggest that utilizing job-specific skills at work would enable workers to reduce negative outcomes of psychosocial factors and, therefore, guarantee execution of expected behavior.



people's attitudes, perception, feelings and intentions even before a behavior is performed. These internal parameters are difficult to analyze accurately because they are unobservable; however, internal factors can be modified using different work-based factors.

Models That Describe Worker Perception

Behavior can be objectively studied by observing people's activities. Behavior can be changed by identifying the conditions (antecedents) and consequences that precede and follow a behavior. The PBS approach applies information such as surveys, personal interviews and focus group discussions to discover how an individual reflects on his/her surroundings before carrying out a behavior. Different models can help us identify the psychosocial climate of workers as a group or as individuals. Some widely used models include the cognitive model (Sauter, Hurrell & Cooper, 1989), and emotion- and social-relations-based models such as demand/control (Karasek, 1979) and effort/reward (Siergist, 1996). The emotion- and social-relations-based models often correlate psychosocial well-being with poor health (Belkic, Landsbergis, Schnall et al., 2004; Bongers, Kremer & ter Laak, 2002; Langevin & Sherman, 2007). Psychosocial factors (e.g., low social support, low job control, high job demand) have been found to influence the behavior of workers in a negative way (Karasek & Theorell, 1990). It is challenging to control the effect because the hazards work mostly in an outside-in manner in people and influence covert behaviors (e.g., perception, thinking, understanding) that are impossible to observe.

Overt vs. Covert Behavior

Overt behaviors are observable while covert behaviors are any mental, social or physical actions that are not observable. The objective of BBS is to analyze the overt behavior to find out its difference from the targeted and expected behavior (Geller, 2001). There is no way to observe and correct the covert behavior (e.g., if a worker develops misconception and performs a faulty task); BBS will only identify the overt component of the behavior. Hence, the behavior we see is just a symptom that originated from its internal perception.

Effect of Psychosocial Job Components

Psychosocial job components (e.g., high demand, poor control, low social support, low self-esteem, poor relations with coworkers, worker beliefs and attitudes) can overwhelm workers by bringing in negative emotions. These negative emotions often cause job-related psychosocial stress, which can then lead to various poor health outcomes, including depression (Yu, Nakata, Gu et al., 2013). This can often lead to poor behavioral outcomes that reduce the safety climate or culture (Karasek

& Theorell, 1990). Choudhry and Fang (2008) established that worker involvement in unsafe behaviors can also be a result of their desire to be seen as a "tough guy" in addition to having safety awareness.

Some common person-based internal components are personality traits such as perfectionism, job burnout and impulsiveness. Lee, So, Min et al. (2018) identified that these personality traits have an effect on workers' safety-related behavior. That study verified that the safety behaviors of employees in a nuclear plant in South Korea were influenced by their personality traits ($p < .05$ for openness to experience, $p < .05$ for emotionality, $p < .05$ for honesty-humility). Similar studies analyzed the relationship between personality traits and safety behavior for drivers (Parr, Ross, McManus et al., 2016; Wishart, Somoray & Rowland, 2017). These studies emphasize the necessity of the integration of person-based and behavior-based components to achieve a total safety climate.

The first step of integration between BBS and PBS is to observe the overt behavior, then to understand how the internal person-based factors such as perception and emotion impact safety. One method is to perform a behavioral checklist on workers' critical behavior (Gilmore, Purdue & Wu, 2002). If a category of body positions is included in the checklist, the observer will determine which of the worker's activities did not fulfill the requirement as specified during the training sessions. After that, PBS attempts to address the internal issues by asking the worker what influenced the at-risk behavior. The internal issues explored are often similar to the psychosocial risk factors such as ability to control the workplace; ability to influence how work tasks should be done; social aspects or social environment; and work demand (Bergh, Leka & Zwetsloot, 2018).

How Psychosocial Factors Can Affect Safety

Studies by Sauter et al. (1989), and Karasek and Theorell (1990) establish that workers' level of "control of job" or independence of performing tasks in feasible way eventually reduces their negative emotion. While they do not focus on control, other studies explore interpersonal factors (e.g., personality traits, coping strategies) that can be categorized as control. Payne (2006) details that worker learning outcomes at work directly correlate with opportunities to update their skills. In the study, an individual's ability to continuously update and renew his/her skills (to finish a task) were shown to be essential to their employability.

The need to maintain control in one's job is an essential process in avoiding stress-induced illness. It is an important part of the cognitive model as well as the emotion- and social-relations-based models chosen for this article, which include demand/control, effort-reward and social support

models. If a worker enjoys an opportunity to carry out a task in his/her own way, s/he can change psychosocial stressors (Sauter et al., 1989). This ability will likely reduce or even eliminate stressors. Sauter et al. (1989) compares this concept to “keep[ing] out some noise by shutting a door.” A worker’s ability to cope with potentially harmful aspects of his/her job by relying on the support of coworkers, family and friends is one form of gaining control over work events (Karasek & Theorell, 1990). Both the cognitive and social support models show that job control can be achieved by gaining support from coworkers (Karasek & Theorell, 1990; Sauter et al., 1989).

The effort-reward model is another emotion-based model that agrees with the concept of control affecting occupational health. This notion views the worker as having control when his/her skills, job loyalty, hard work or other efforts are rewarded with a pay raise, promotion or some other perk. A worker who sets reward goals for any occupational constructive inputs has achieved control over potentially stressful job events (Siegrist, 1996).

These four models show that control over work events can inhibit negative emotion and perception in workers. This can be achieved by reminding oneself that a new job is just around the corner (cognitive model), by learning new ways to perform activities or cope with job stress (demand/control model), by relying on social support as a coping mechanism (cognitive and social support models), or by striving for a reward (effort-reward model). One common element in all of these models is that the need to maintain control in one’s job is an essential process for avoiding negative emotion and therefore unexpected behavior at work.

One of the cognitive model’s methods of gaining control over a negative work environment is also found in the emotion- and social-relations-based models. Both models suggest that a person can gain control over a harsh work environment using social support (Karasek & Theorell, 1990; Sauter et al., 1989). An example of this coping method is a person who is consistently under stress at a job and begins confiding in a coworker who turns out to be experiencing the same problems. This leads to other employees realizing they all are under job distress. Before long, several workers have bonded together to improve job conditions, allowing them to gain control in an otherwise helpless situation.

Payne (2006) concludes that employees who engage in continuing learning and training are often rewarded with “employment security, better jobs and improved pay.” However, not all workers were as motivated to jump into a competence reform of continuous learning. While younger workers in the study were motivated by these factors, older workers stated that improved pay would be the only factor, if any, that they would consider when deciding to engage in this concept. Nevertheless, the connection Payne observes is similar to that found by Siegrist (1996), whose study demonstrates that workers who set goals achieve higher levels of control over jobs that could otherwise be stressful. Both skills and training program components are pivotal factors in finishing a task. Training program components are subject to routine practice for restoration purposes. If implemented correctly, skill can be taught to workers and become a tool to cope with the unsafe components of a job. Therefore, this study poses a serious question

of whether utilizing skill could be a solution to reduce worker at-risk behavior.

Opportunity to Utilize Skills

Different models predict that utilizing one’s skills can reduce stress and ameliorate safety. The cognitive model suggests that having one’s potential realized when completing tasks is a way of possessing control (Sauter et al., 1989). This potential is made up of the worker knowledge and skills (Sauter et al., 1989). Encouraging workers to apply their talents or abilities on the job can be beneficial to both employees and employers. The demand/control model predicts that workers whose skills are frequently underutilized tend to be dissatisfied, bored or disengaged from their work (Karasek & Theorell, 1990). Based on these predictions, the authors conclude that allowing workers to use their own skills to complete tasks can reduce their negative perceptions and increase productivity.

Underutilization of skills is a common psychosocial workplace hazard that can result in health problems and even injury. Workers who are not allowed to frequently apply their individual abilities to perform work tasks lack control in their jobs. Underutilization of skills is one way that lacking control in a job can lead to unsafe outcomes. Pee and Lee

(2015) explain that skill variety is an essential factor that relates to control in the workplace. Skill variety is defined as a job’s degree of opportunity for employees to use their skills to carry out work tasks. Additionally, studies show that gender can exacerbate the outcomes caused by limited skill variety. According to Seto, Morimoto and Maruyama (2004), women who experience conflict when attempting to juggle work and family while also facing underutiliza-

tion of skills at work are more likely to experience symptoms of depression. They argue that people’s lack of opportunity to use their skills at work puts them at a high risk for depression. That study also reveals that commonly measured job-related psychosocial factors (e.g., bad relationships in the workplace, job insecurity, skill underutilization) have a strong correlation with symptoms of depression. A study by Hoshino, Amano, Suzuki et al. (2016) also reveals that participants’ underused skills correlated with depression. In that cross-sectional study, the same two questionnaires [NIOSH Generic Job Stress Questionnaire (for paid work) and NIOSH Generic Housekeeping Labor Stress Questionnaire (for housework)] were given to 35 women with depression and 35 women without depression. Logistic regression analyzed three psychosocial work-related factors that were likely causing the depressive symptoms in the depressed group. Underutilization of skills was the only work-related stressor that correlated with depression (Hoshino et al., 2016).

Contradictory Principle Prediction Between Models

The main contradiction between two types of models is with the effect a person can have on a negative work environment. While the cognitive model depicts a job’s environment as being unchangeable by the worker, the emotion- and social-relations-based models suggest that an individual can change the work environment itself in a positive way, thus preventing adverse health outcomes (Karasek & Theorell, 1990; Sauter et al.,

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1989). Examples of this are the demand/control model's depiction of a worker learning better ways to perform tasks, and the effort-reward model's method of increasing or improving job performance as motivation to increase compensation (Karasek & Theorell, 1990; Siegrist, 1996).

Although control is an essential component of both models, methods of applying this principle often vary. For example, the cognitive model predicts that a worker can gain control in a job by realizing that the stressors are too much for him/her to handle, then turning that stress into anticipation of finding a new job (Sauter et al., 1989). Whereas, the demand/control model suggests that a person can change a negative environment by learning new skills to bring to the job as a way of reducing stress (Karasek & Theorell, 1990).

Control Can Be a Workload Too

Mental workload is an important concept of the mechanisms involved in cognitive theory. According to Young and Stanton (2005), mental workload is the number of resources needed to meet task demands. The cognitive model suggests that some people have a lower tolerance for their work demands than others. Having a low threshold for work demands can cause psychological strain or overload, and can lead to adverse health outcomes (Stanton, 2004). The amount of control a person has over a job situation can serve as a prediction of whether s/he will experience psychological strain from it (Sauter et al., 1989). The model's principal way of gaining control is by reminding oneself that if the stress becomes too great, s/he can quit and find a new, less stressful job (Sauter et al., 1989).

This model can be applied to various areas of human health and behavior including mental exhaustion brought on by information overload, inability to successfully communicate with one's supervisor, memory problems and technological issues. One way that mechanisms of the cognitive model can be measured is by administering questionnaires to establish a person's degree of control, also known as decision latitude. The questionnaires can also reveal how much a person is dependent on cognitive and emotional processing at the job, and if mental overload is taking place. A person is said to have control when s/he can decide which goals should be met and how to reach them, as well the conditions involved. If the work environment does not allow the worker to decide these methods, then s/he lacks control and is therefore potentially exposed to harm. Decision latitude is established by an action sequence that determines how often a worker can make affect his/her actions, and thus the work environment. This action sequence consists of goal development and goal decision; plan development and plan decision; and execution of the action and use feedback (Sauter et al., 1989). Hence, using a BBS approach to reduce the at-risk behavior by using the demand/control model would hardly work, as the decision latitude will be determined by the amount of control one gains for the job actions.

Job Redesign to Increase Utilization of Skills

Not all employees need to bring their skills to their job to avoid negative perception. In fact, research on job redesign suggests that abruptly encouraging employees to learn more about their jobs could increase negative feeling about job (Karasek & Theorell, 1990). Studies have shown that workers with no plans to advance to a higher job level may lack confidence in their ability to learn and may experience stress at the

idea of being expected to provide more mental input (Karasek & Theorell, 1990). In agreement with Pee and Lee (2015), Ali and Zia-Ur-Rehman (2014) emphasize that skill variety should be an essential part of any job design. Given that skill brings control and skill utilization reduces negative feelings about the job, learning skills as a technical part of the job can play a role in enhancing the safety of jobs. Should a critical situation arise, workers can redeem their assets of range of knowledge and skill competency. Although infrequent, the requirements to perform these skills on the job is highly imperative to the safety need of the job. The authors argue that such skill should be optimally embedded in the training program so that the knowledge regarding utilization of those skills are highly retained in trainees' memories when performing job activities. For example, if safely backing up is a part of forklift operation, then forklift trainees must have the skill to back up the forklift as part of the training objective to successfully maneuver the forklift. Since some part of backing up a forklift would be a covert behavior, the trainer may put safety cones behind the forklift and can set the criteria as "no cones knocked down" while backing up. It means a pass for the activity of backing up a forklift would be given only when no cones are knocked down. Also, this must be treated as a lower skill on the skill hierarchy level, as it must be gained first before an operator will successfully maneuver other forklift operations.

Sanli and Canrahan (2018) explain that retention of skills in a multiday training program is dependent on several task factors such as task difficulty, type of skill and the specificity of training to the work domain. Factors related to an individual learner's capacity to retain the knowledge depended on the length of on-the-job exposure to specific skills. The results of that study strongly suggest that skill retention and its utilization would be imperative activators to trigger safe behaviors at expected levels.

Conclusion

Condition of work is pivotal in shaping the safety and health outcomes at the work environment. Sorenson, McLellan, Sabath et al. (2016) propose a model in which conditions of work (e.g., physical environment, organization of work, psychosocial factors, job demands) are the frame of focus for worker well-being, and it predicts injury or illness outcome as well as workers' proximal outcomes. Workers' proximal outcomes are safety and health behaviors, engagement in programs, beliefs, knowledge and skills. According to this model, poor conditions of work will result in workers' negative perception and vice versa. The authors agree with Sorenson et al. (2016) and add that poor working conditions trigger negative perception in workers, which is an antecedent to workers' negative behavior. Further, based on the authors' literature review, having an opportunity to utilize the skills would nullify any negative perception irrespective of the working conditions.

A worker's skill has the potential to reduce job-related stress and even make the job easier. It is accepted that most skills can be taught and learned. For this reason, as long as the skills are taught in a proper way according to the needs of the individual learning, workers will remember these skills and will likely use them at the jobsite. The key is to adapt the method of teaching to worker learning. This way, workers will be more inclined to pay attention and buy in to the process that the employer is hoping to administer. However, in some cases rearranging the job to the skill may not be the best solution. **PSJ**

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