

# ENCOURAGING SELF-PROTECTIVE EMPLOYEE BEHAVIOR: WHAT DO WE KNOW?

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## INTRODUCTION

How can employees be stopped from engaging in unsafe work practices? It is often easier to prevent employees from performing unsafe acts through manipulations of the work environment than through various training or motivational programs. Therefore, it is important that accident prevention programs seek to identify the reasons for the unsafe behavior and to redesign tasks and the work environment (e.g., tools, equipment, physical surroundings) in order to remove employees from sources of harm and to prevent situations from arising that would prompt them to perform unsafe acts. Unfortunately, in the mining industry the work environment is often innately hazardous, rapidly changing, and difficult to predict, making it very difficult, perhaps impossible, to fully protect the employee by environmental manipulations. Therefore, it is important that effective methods be identified for influencing mine employees to work safely.

Various strategies have been used to convince employees to avoid unsafe acts and/or adopt self-protective behaviors. The intent of this article is to provide guidance to mine operators concerning the use of four techniques for influencing mine employees to work safely: (1) employee surveys, (2) incentives, (3) fear communications, and (4) disciplinary actions.

The usual techniques for discouraging miners from performing unsafe acts appear to be limited to verbal warnings made during safety talks about the dangers of various unsafe acts and conditions, and in some cases, threats concerning disciplinary actions that might be taken if employees violate certain safety rules. However,

these techniques have some significant drawbacks. The effects of verbal warnings to avoid dangerous acts or conditions are often of short duration. After employees have heard these warnings a couple of times, further repetitions of the warning probably have little or no impact. Supervisors are often reluctant to use formal disciplinary actions because they wish to avoid interpersonal conflicts and various other undesirable responses. Also, due to the physical layout of many mining operations, it is impossible for supervisors to be able to closely monitor whether their employees are complying with the safety rules. This suggests that admonitions and the creation of regulations or policies that threaten miners with punishment for violating safety rules are not a totally sufficient answer. We need to examine other options as well.

## RESEARCH FINDINGS

### Employee Surveys

There is virtually unanimous agreement among safety experts that employees should be frequently consulted for ideas about improving their safety, and that they should be given a say in establishing new safety procedures and policies. Because they are the ones most familiar with their working environment, miners are in a good position to understand what types of situations arise that make it tempting to disregard safety rules. Therefore, mine employees should be asked to identify situations that are likely to tempt people to violate safety rules and to suggest what might be done to prevent these situations from occurring. This could be accomplished through interviews, questionnaires, or small group discussions.

Employee surveys often help to reveal aspects of equipment, work procedures, or policies that may be inadvertently encouraging employees to violate safety rules. Employees can often identify some simple and effective ways to change equipment, work procedures, or policies so that situations do not arise in which people are tempted to violate safety rules.

Empirical evidence. Several studies have attempted to identify organizational and safety program characteristics that differentiate between companies with good and poor safety records (Cohen and Cleveland, 1983; National Academy of Sciences, 1982; Simonds and Shafai-Sahrai, 1977; Smith, Cohen, Cohen, and Cleveland, 1978). A consistent finding of these studies is that good safety performance is more often found where there is an open and two-way communication system between labor and management and where management encourages employees to participate in the identification and control of hazards.

O'Green, Peters, and Cecala (1992) report on the impact of American Electric Power's (AEP) attempts to reduce back injuries among employees at their underground coal mining operations. The primary components of AEP's intervention included conducting a survey of the workforce and forming employee problem solving groups. The intervention began in 1990. In comparison to the number of back injuries reported in the years 1987, 1988 and 1989, there was not much change in 1990. However, a rather substantial reduction was observed in 1991. The average number of back injuries per year for 1987-89 was 71.3. The number of back injuries reported in 1991 was only 42, which represents a 41% reduction in back injuries. According to AEP officials, the number of back injuries among their miners has declined even further since 1991 (T. Sands, personal communication, April 18, 1995).

A study by the National Institute of Occupational Safety and Health (NIOSH) also found that there can be substantial safety benefits to increased employee participation (Lin and

Cohen, 1983). The study entailed using an employee-based system of hazard recognition, reporting, and problem solving at a community hospital. Over a 12-month period of evaluation, the hazard reporting rate was one report for every three full-time hospital workers, indicating substantial employee involvement. Although the bulk of this response occurred at the outset of the program, the reporting rate suggested a stable level of participation ranging from 5 to 10 new reports being filed each month from a work force numbering nearly 1,000. More than 80% of the employee suggestions for correcting reported hazards were in fact adopted during the 12-month monitoring phase of this demonstration. A comparison of the injury/illness rate during this period with the rate during the preceding 12-month period indicated a declining rate coincident with the introduction of most of the corrective measures.

Pasmore and Friedlander (1982) report on the results of an attempt to improve safety through increased employee involvement at a large plant where consumer electronic products were manufactured. The intervention included a survey of the work force and the formation of employee problem-solving groups. During the year prior to the intervention, 75 injuries had been reported. The number of injuries declined dramatically during the two year intervention, and remained at fewer than 20 injuries per year during the two years following the end of the intervention.

Conclusions. Aside from the studies cited above, there is not a great deal of empirical evidence concerning the effects of employee surveys on safety performance. However, the available evidence strongly suggests that employee surveys and problem solving groups are likely to yield some good ideas regarding the elimination of unsafe employee behaviors. Mine safety professionals who are interested in using interviews to learn more about what motivates unsafe behavior may want to review Bureau of Mines Information Circular 9300 (Peters and Randolph, 1992). This report documents how an interview technique was used to gain a better

understanding of why some coal miners go in by roof supports, and what can be done to prevent this dangerous behavior.

## Incentives

According to operant learning theory, behavior is a function of the person's environment and can be modified by rearranging the consequences of the behavior (Skinner, 1953). Behavior with positively reinforcing consequences (e.g., increased earnings or reductions in amount of effort required to do a task) tends to increase in frequency, whereas behavior with punishing consequences (e.g., disciplinary actions) tends to diminish in frequency.

How does this theory relate to safety practices? Sulzer-Azaroff (1982) argues that many unsafe employee practices probably persist because they are in some way naturally reinforced. The task may be completed faster, perhaps resulting in higher earnings or praise and admiration from peers or supervisors. Quick completion may also signal the end of a less preferred task, which in turn permits a shift to a more preferred activity such as going home, doing a different job, or break time. It is also reinforcing to accomplish a given task with less effort. For example, coal miners should set temporary roof supports (e.g., safety jacks or posts) if they need to work in areas where permanent forms of roof support have not yet been installed. Setting an adequate number of temporary supports may require a substantial amount of effort, and in certain circumstances some employees neglect to perform this precautionary action. A frequently cited reason for neglecting to set temporary supports is that the person is fatigued or in a hurry, and wishes to avoid expending the effort and time required to take this self-protective action.

There are also natural punishments for unsafe practices, such as accidents, injury, damage, disapproval from others or oneself ("It really isn't very smart of me to be doing this. One day it might catch up with me"). But the natural,

negative consequences may be weak, delayed, and infrequent. The likelihood of an accident occurring following a particular unsafe act may be very low.

Another problem with relying on the natural consequences of employees' behavior to keep them safe is that the performance of a safe work practice, rather than some unsafe alternative, often does not result in any type of meaningful positive reinforcement. What are the natural consequences of safe practices? Is it the absence of injury or damage? This is hardly an effective reinforcing event, since the absence of a rare event is apt to exert little influence. The absence of the damage or injury needs to be supplemented by tangible rewards such as money or prizes, or by others ("Good. You set posts to protect yourself from being harmed by a roof fall").

An analysis of consequential conditions of both safe and unsafe acts requires that a number of factors be considered: whether they are positive, aversive, or potentially very dangerous; whether they are immediate or delayed; whether they occur frequently or infrequently; and whether they are mild or intense. When natural conditions are such that an unsafe act regularly results in immediate, strong positive reinforcement and that any potential punishing events are irregular, delayed, and generally not very intense, people are apt to get hurt. Sulzer-Azaroff (1982) suggests that in cases where all or some of those conditions prevail, it is advisable to arrange consequences by design. This might be accomplished by making the safe practice more reinforcing by presenting powerful, positive consequences regularly and with minimal delay. Alternatively, an effective punishing approach would be regularly to present intense negative consequences immediately following unsafe acts. Or these two approaches could be combined. (The use of negative consequences is discussed in the section on disciplinary actions.)

Empirical evidence. A large number of studies have been performed on the use of

incentives, often in combination with feedback about safety performance, to increase employees' compliance with safety rules. Three reviews of the growing body of empirical evidence on the use of incentives have been published (McAfee and Winn, 1989; O'Hara, Johnson, and Beehr, 1985; Sulzer-Azaroff, 1982). All three have concluded that, when properly performed, this intervention is quite likely to bring about significant positive changes in compliance with safety rules.

The most recent review, by McAfee and Winn (1989), summarizes the findings of 24 studies that have examined the effectiveness of using positive reinforcement and feedback. All 24 studies found that incentives or feedback were successful in improving at least one measure of safety conditions or reducing accidents. McAfee cites only two studies in which at least one of the safety-related behaviors being monitored did not exhibit improvement (Cohen and Jensen, 1984; Hopkins, Conrad, Dangel, Fitch, Smith, and Anger, 1986). Hopkins et al. (1986) found that training and praise improved the respirator usage of only one of four sprayers in a gel-coating department. Apparently, respirator usage was disagreeable to the other three workers because of the discomfort and inconvenience involved. Similarly, Cohen and Jensen (1984) found that lift truck operators did not show improvement in 2 of 14 behaviors targeted for change. These exceptions suggest that, although incentives are often very effective, they are not a panacea.

One of the most critical self-protective behaviors for those who operate surface mine mobile equipment is the use of safety belts (Aldinger and Keran, 1994). Mine operators interested in promoting this behavior should review the work of Dr. E. Scott Geller. Geller, Rudd, Kalsher, Streff, and Lehman (1987) present the results of attempts to motivate safety belt use through employer-based incentive programs at seven different sites. They report that substantial increases in employees' safety belt use occurred at all 7 of the sites they studied. These increases ranged from 77 to 229 percent above the baseline levels of belt usage. Several

others have also reported very substantial short-term increases in safety belt use following the introduction of an incentive program (Kalsher, Geller, Clarke, and Lehman, 1989; Campbell, Hunter, and Gemming, 1983; Campbell, Hunter, Stewart, and Stutts, 1982; Elman and Killebrew, 1978; Horne and Terry, 1983; Spoonhour, 1981).

Conclusions. It appears that incentives can be effective in improving compliance with safety rules. A rather large number of successes have been reported in the literature. Safety incentive plans are relatively simple to operate. However, if they are not set up properly, they are apt to be ineffective. Cohen, Smith, and Anger (1979) note that the use of safety incentives can arouse increased worker and company interest in job safety. However, they caution that these incentive plans are *no substitute* for hazard control programs having well-established safety training, housekeeping, safety inspection, and reporting functions. Rather, the incentive approach is most effective when used to provide an added spur to an already well-designed hazard control program.

Recommendations. What does research on safety incentives suggest regarding their use to encourage self-protective employee behavior?

- (1) Find a baseline by looking at data from prior time periods, e.g., the preceding month.
- (2) Establish a specific criterion of success for earning the reward.
- (3) Give rewards for small but significant improvements in performance.
- (4) Rewards should be relatively small and should be given relatively often, e.g., monthly.
- (5) Use charts to give employees daily feedback on their progress toward achieving rewards.
- (6) Rewards might include: exchangeable tokens (e.g., trading stamps), ball caps, penknives, stickers, promotional items, public commendations, written commendations, certificates, stock in the company, money, a chance to win contests, and work-related privileges.
- (7) Supplement the incentive program with training. Explain why it is important to avoid the unsafe act, cite accident statistics, show how to

perform various tasks without exposing oneself to a hazard, etc.

One criticism of safety incentive programs is that they may encourage employees to fail to report relatively minor types of accidents and injuries in order to avoid losing all or a portion of the reward being offered. One approach to avoiding this potential outcome is to exclude incidents that would be easy to hide as a basis for earning or failing to earn rewards. These incidents usually consist of near misses and relatively minor types of accidents and injuries. Even though these types of incidents may produce little if any significant harm, it is important that they be reported so that actions can be taken to prevent similar occurrences which may cause great harm.

#### Fear Messages

A substantial amount of empirical research has been conducted on the effectiveness of fear messages as a means of encouraging self-protective behaviors. Leventhal's (1970) model of the effects of fear messages assumes that a highly threatening communication will produce multiple responses: a high level of fear, highly favorable attitudes toward protective acts, strong intentions to execute the acts, and a high probability that protective action will be taken. The model also suggests that the strength of this association will change with the passage of time. The changes will depend on the presence or absence of various factors that stimulate fear and the presence or absence of factors that encourage danger control.

Empirical evidence. The research evidence is quite clear in showing that fear communications can be effective in persuading people to modify their attitudes and intentions toward adopting some form of preventive act or treatment in order to avoid an unwanted outcome (Leventhal, 1970; Sutton, 1982). Leventhal (1970) cites over 20 empirical studies in which fear messages produced significant changes in attitudes toward taking various types of precautionary measures. However, only a few studies indicate that the fear

communication produced a statistically significant increase in adoption of the recommended preventive action. An even smaller number of studies have involved collecting data on actual behavioral changes as a result of fear communications over a sustained period of time. According to McGuire (1985), many researchers have failed to establish an empirical relationship between various types of attitudes and behaviors. Thus, one cannot assume that a change in reported attitude toward a hazard or a precautionary behavior will result in a behavior change. Workers who have a long-standing habit of performing unsafe acts often fail to modify their behavior after exposure to fear messages, and those who do, often revert to their old routine after a short period of time.

Cohen, Colligan, and Berger (1985) identify several factors other than the content of the message that also appear to have an important impact on the effectiveness of attempts to communicate warnings to employees. They categorize them as communicator, mode, and receiver factors.

*The communicator.* Cohen et al. (1985) argue that the source needs to be perceived as credible, knowledgeable, and someone whom employees can identify. In many cases, it is the first line foreman who best possesses these characteristics. There is, in fact, some evidence that the safety level of a work crew is directly related to the job safety attitudes of its supervisor (Crisera, Martin, and Prather, 1977; Vandenput, 1970). When the supervisor believes that job accidents are avoidable through exercising proper safeguards, his/her work crew is more likely to experience a low accident rate. On the other hand, when the supervisor accepts work accidents as an inevitable part of the job, his/her crew is more likely to have a poor safety record.

*Communication mode.* Cohen et al. (1985) note that the bulk of evidence suggests that the spoken word has more persuasive impact than the written one, and that informal face-to-face communication is superior to any media transmission. The greater effectiveness of face-

to-face communication is considered to stem from its feature of being two-way, eliciting greater activity from the receiver, and probably commanding more attention than would be the case for other media communication. Two-way communications appear to be more effective in gaining worker acceptance of safe job practices than one-way communications, which are considered more appropriate for presenting safety directives or warnings (Schlesinger, 1973).

*Receiver factors.* Group perceptions of mass communication have been shown to greatly pressure a member individual into message acceptance (McGuire, 1985). This finding suggests that social support can be a critical factor in gaining worker compliance with safe work practices. Cohen et al. (1979) suggest that if companies directed safety appeals to workers' families, it might help to increase the workers' safety consciousness. Likewise, Nelson (1988) argues that training programs oriented toward promoting safety belt use should include efforts not only to influence the target individual's attitudes about the use of safety belts, but also the attitudes of significant others, including family, peers, or co-workers whose attitudes, behaviors, and expectations reinforce safety belt use and, as a significant other, motivate the individual to comply.

*Internal versus external motivation.* When fear messages are successful at motivating self-protective employee behavior, they have an important advantage over the use of rewards and punishments imposed by other persons. Consider two employees, Al and Bill. Al's attitude toward wearing safety glasses is: "I will wear them because my boss wants me to, however, I really don't think anything bad would happen if I did not wear them." Through training, seeing someone else receive an eye injury, or experiencing a close call of his own, Bill's attitude has become: "I will wear safety glasses because I am afraid that my eyes are going to be seriously hurt." Bill's motivation to wear safety glasses comes from within, not from some external agent who punishes or rewards. This means that Bill is going to wear them

regardless of whether he is being offered a reward or threatened with punishment, regardless of whether anyone is watching, regardless of whether it would sometimes be more convenient to work without them, etc. On the other hand, Al's actions are influenced by many situational factors. Situations will arise in which he decides that there really is no good reason to wear safety glasses. If he is caught working without them and is in some way punished, he is apt to become frustrated and hostile toward his supervisor and management because he feels that he really didn't do anything wrong. In comparing internal with external control systems, the one that functions more effectively is clearly the former.

Conclusions. There is also a substantial amount of empirical evidence to suggest that fear communications can convince individuals that they *should* perform self-protective behavior. Unfortunately, many studies have found that this technique failed to motivate employees to actually adopt the desired behavior. These failures may reflect the fact that it is often difficult to change long-standing habits. Thus, fear messages may be more effective when used with new miners rather than miners who have already been performing their job long enough to form unsafe work habits. Fear messages may also be particularly appropriate when they pertain to behaviors that are very hazardous, but at the same time, could be viewed as innocuous by new employees, e.g., going in by roof supports.

Recommendations. What does research on fear communications suggest regarding their use to encourage self-protective employee behavior?

- (1) The message should attempt to evoke a high (versus low) level of fear--high fear of personal injury or death due to a particular type of accident and high fear of the consequences of one's death or disability on one's family.
- (2) The suggested preventive actions should be relatively detailed and specific. The message needs to show exactly what types of tasks are considered dangerous and how these tasks can be performed without making oneself vulnerable to an accident.
- (3) The preventive actions should be presented in

a block, rather than interspersed with information designed to elicit fear.

(4) It should be made clear that the suggested preventive actions are an effective deterrent to being harmed.

(5) The source of the communication should have high credibility.

(6) Face-to-face, two-way forms of communication should be employed (as well as other forms).

(7) Efforts should be made to promote acceptance of the message by significant others, e.g., co-workers, supervisors, family.

### Disciplinary Actions

Punishment is defined as the presentation of an aversive event or the removal of a positive event following a response, which decreases the probability of that response (Kazdin, 1975, pp. 33-34). For employees, the potential aversive consequences of performing an unsafe act include physical injury, various forms of disciplinary action, verbal expressions of disapproval from co-workers or supervisors, fear of experiencing an accident, etc.

Empirical evidence. Many companies combine safety training with the threat of disciplinary actions designed to encourage safe behaviors. However, little evidence exists regarding the extent to which organizations actually use these disciplinary procedures to improve safety or whether this approach is effective. Nevertheless, various State and Federal laws require companies to provide employees with safe and healthy working conditions, and it is likely that disciplinary action or at least the threat of disciplinary action is widely used as a way of discouraging unsafe acts.

While many articles have been written containing "how-to" tips concerning the best way to set up and use organizational disciplinary systems, the majority of these tips are not based on any solid research evidence. Sulzer-Azaroff (1982) reviewed the empirical evidence on the effectiveness of punishment to suppress or eliminate unsafe employee behavior. She cites a

few studies in which the use or threatened use of punishment brought about significant improvements in safety performance. However, she argues that most attempts to improve safety through the application of aversive consequences are not very effective because the reinforcement conditions are less than optimal. "The aversive consequences are too infrequent, intermittent, delayed, and often of mild intensity. If aversive consequences are to be used, then they can be applied far more effectively than is commonly the case." Unfortunately, the most effective application of aversive consequences requires monitoring individuals continuously in order to catch each unsafe act and apply aversive consequences. Obviously, in many work settings, it would be difficult and expensive to do this. Nevertheless, some interesting attempts have been made to improve safety through the use of aversive consequences.

Larson, Schnelle, Kirchner, Carr, Domash and Risely (1980) performed a study for the Nashville, TN, police department. The Nashville police department identified high accident rates and negligent use of police cars as a serious problem, and placed a tachograph in each police vehicle. A tachograph is a clock-driven recording device that provides a permanent record of vehicle speed, distance traveled, nonmovement, and other functions. Officers were threatened with dismissal for noncompliance with rules, regulations, and policies, including safe driving practices. In actuality, however, no disciplinary action occurred during the period of the study as a direct result of the tachograph program procedures. When the tachograph charts were inspected by the officers in the higher chains of command and feedback was delivered to drivers, there was a major, systematic reduction in speed, accidents, and injuries across different vehicular units. Vehicle repair costs were also substantially reduced, saving many thousands of dollars over a 1-1/2-year period.

Kalsher, et al. (1989) evaluated the use of a "disincentive" strategy for promoting safety belt use at a naval base. The base police issued

warning tickets to those who were not buckled. Before the intervention began, the baseline rate of safety belt use was 55%. However, by the end of the 3 week program, safety belt use had increased to 79%.

A few laboratory investigations have found that aversive consequences are an effective deterrent to the occurrence of simulated accidents (McKelvey, Engen, and Peck, 1973; Leslie and Adams, 1973; Rubinsky and Smith, 1973). For example, McKelvey (1973) performed a well-controlled laboratory study of the impact of a disincentive on rate of behaviors that were defined as "unsafe" by the experimenter. He investigated subjects' care in manipulating a power tool in a simulated working environment under various incentive conditions. Subjects operated a punch press that permitted accidents to occur and be recorded. These accidents were rendered harmless through the addition of special protective parts. It was found that in comparison with an hourly wage system, a piece-rate pay system resulted in significantly higher production, as well as a significantly higher rate of unsafe behaviors. However, in the experimental condition where subjects' equipment was shut down for 5 minutes after each instance of an unsafe act (depriving them of the opportunity to increase the number of pieces produced), the rate of unsafe acts was significantly lower. In fact, it was nearly identical to the accident rate for subjects working in the hourly pay condition.

This suggests that (a) economic penalty might be effective in reducing unsafe work behaviors and (b) production-based pay systems, unless provisions are made for penalizing unsafe behavior, may increase the rate of unsafe acts. Of course, additional research on this issue is needed before coming to any firm conclusions.

Arvey and Jones (1985) reviewed studies that have examined the influence of discipline on employees' compliance with various types of organizational rules. They report that (a) only a few studies have investigated the effects of punishment on behaviors that the organization

wished to suppress or eliminate, (b) the majority of these studies have been concerned with reducing employee absenteeism, and (c) the predominant finding is that punitive systems to control employee absenteeism are generally effective when these tactics are used in combination with a reward system of some type (Kempen and Hall, 1977; Kopelman and Schneller, 1981; Baum, 1978).

Conclusions. There appears to be little empirical research on the use of disciplinary actions or other aversive consequences to improve employee safety performance. Research suggests that aversive consequences can be effective in discouraging other types of undesired employee behaviors (e.g., absenteeism) when properly applied. However, with so little empirical evidence available, it is impossible to make any confident predictions about the effects of aversive consequences on safety-related behavior.

Although disciplinary actions may be effective in stopping an undesirable behavior, they sometimes result in other behaviors that are just as detrimental as the behavior being punished. Therefore, in most instances, it is probably not appropriate to view disciplinary actions as the best way to initially respond to unsafe employee behavior. However, disciplinary actions may be viewed as appropriate in situations where an employee or co-worker is at high risk of being seriously harmed if the employee's behavior is not changed quickly. In some cases, a better option may be to transfer those who persist in violating safety rules to a job in a more inherently safe environment.

Recommendations. Some recommendations concerning the use of negative consequences to motivate employee compliance with safety rules are listed below:

(1) Solicit input from representatives from the hourly work force in formulating policies about how to deal with people who violate safety requirements. Employees may be less likely to object to the use of disciplinary actions when



representatives from the work force have had an opportunity to help develop the policy and have voiced their support for it.

(2) An unambiguous policy on the organization's expectations concerning employee safety-related behavior is needed. This policy should (a) clearly delineate the conditions under which various negative sanctions will be applied, (b) explain why it is important to both the company and the employee that safety rules not be violated, and (c) be communicated to the work force on a regular basis.

(3) Supervisors should be trained in the proper procedures for correcting unsafe employee behavior. They should be shown role models interacting with employees who have violated a safety rule and should participate in role-playing exercises on how to handle these situations. It should be explained to supervisors how important it is to never ignore employees that violate safety rules.

(4) The disciplinary action should be applied fairly and consistently--consistent from situation to situation and from person to person.

## SELECTING STRATEGIES

Effectiveness. One important consideration in selecting a method to encourage self-protective behavior is its effectiveness in producing the desired behavior. The amount of evidence regarding the effectiveness of each strategy varies a great deal. The literature contains only a few studies regarding the effect of employee surveys on employee self-protective behavior. However, the limited evidence currently available strongly suggests that employee surveys can be very effective. There is a substantial amount of evidence to suggest that, when used appropriately, incentives can be quite effective in encouraging self-protective behavior. There is also a substantial amount of empirical evidence to suggest that fear communications can convince individuals that they *should* perform self-protective behavior. Although some studies have found that fear messages resulted in increased self-protective behavior, these studies are few in number. Several studies have reported that although a fear

communication produced changes in attitudes toward a self-protective behavior, it failed to produce any change in performance of the desired behavior. Although many organizations use the threat of disciplinary action as a means of discouraging unsafe employee behavior, almost no empirical research has been conducted to determine whether or not this is an effective deterrent.

Cost. Another important consideration in selecting a method to encourage self-protective behavior is the cost. The costs associated with soliciting input from the work force include the time and effort required to develop and administer interviews or questionnaires, compile the survey results, and hold meetings with employees to discuss the survey findings and their implications. The cost of using incentives can vary a great deal. In some cases, incentives such as verbal praise for performing the desired behaviors and charts presenting feedback on improvements in self-protective behaviors can be very effective. Yet, these forms of reward are quite inexpensive. However, Cohen, et al. (1979) argues that, if the self-protective behavior requires considerable effort, if employees are only mildly concerned about the aversive consequences, or if the unsafe work habits are well established, it may be necessary to use more costly rewards to motivate the desired behavior. The costs involved in this strategy include the cost of the rewards or privileges being offered as incentives, the time required to take periodic measurements of performance on the target behaviors or conditions, and the time required to provide feedback.

The costs associated with fear messages are often quite minimal if suitable training materials are available off-the-shelf. However, suitable fear communications may not be available if the hazard or self-protective behavior in question is unique to a specialized industry or industrial process. In such cases, it may be necessary to generate new materials, which can be rather costly--especially from the standpoint of a small employer.

The costs associated with using disciplinary action include: the time and resources needed to formulate the disciplinary action policy and communicate it to the work force; the costs associated with training supervisors; monitoring employee behavior; finding and training replacements for employees who are disciplined through suspension, termination, or transfer to a different job; and the costs associated with the reactions of those who believe they have been unfairly disciplined (sabotage, work slowdowns, grievances, absenteeism).

The best approach to encouraging employee self-protective behavior in a specific work setting depends on several factors in addition to effectiveness and cost. They include the nature of the work performed, social and physical aspects of the work environment, the availability of resources, and management and labor's attitudes and priorities. The following are some propositions concerning when it would be advisable to use each type of strategy:

- (1) Employee surveys: The larger the facility and/or the more difficult for employees or work groups to communicate with each other or with management about issues affecting safety, the more effective this strategy.
- (2) Incentives and disciplinary actions: The easier it is to reliably measure performance of the critical behaviors, the more effective these strategies.
- (3) Fear messages: The less intuitively obvious is the relationship between the behavior and the aversive outcome, the more effective this strategy. Fear communications are more effective with new employees. The more difficult it is to use external means to control employee behavior, the more important it is to use techniques (such as fear messages) to instill internal motivation to perform self-protective behaviors.

## REFERENCES

- Aldinger, J., & Keran, C. (1994) A review of accidents during surface mine mobile equipment operations. Proceedings of 25th Annual Institute on Mining Health, Safety and Research, Virginia Polytechnic Institute and State Univ., Blacksburg, VA, August 31, 1992, pp. 99-108.
- Arvey, R., & Jones, A. (1985). The use of discipline in organizational settings: A framework for future research. Research in Organizational Behavior, *7*, 367-408.
- Baum, J. (1978). Effectiveness of an attendance control policy in reducing chronic absenteeism. Personnel Psychology, *31*, 71-81.
- Campbell, B., Hunter, W., & Gemming, M. (1983, July). Seat belts pay off: A communitywide research/public service project designed to increase use of lap and shoulder belts (Interim Report). Chapel Hill: University of North Carolina Highway Safety Research Center.
- Campbell, B., Hunter, W., Stewart, J., & Stutts, J. (1982, October). Increasing safety belt use through an incentive program (Final report for Innovative Grant Project 4-A22 from the U.S. Department of Transportation). Chapel Hill: University of North Carolina Highway Safety Research Center.
- Cohen, A., & Cleveland, B. (1983, March). Safety program practices in record-holding plants. Professional Safety, 26-33.
- Cohen, A., Colligan, M., & Berger, P. (1985). Psychology in health risk messages for workers. Journal of Occupational Medicine, *27*, 543-551.
- Cohen, H., & Jensen, R. (1984). Measuring the effectiveness of an industrial lift truck safety training program. Journal of Safety Research, *15*, 125-135.
- Cohen, A., Smith, M., & Anger, W. (1979). Self-protective measures against workplace hazards. Journal of Safety Research, *11*, 121-131.
- Crisera, R., Martin, J., & Prather, K. (1977). Supervisory effects on worker safety in the roofing industry. Morgantown, WV: Management Science Company.
- Elman, D., & Killebrew, T. (1978). Incentives and seat belts: Changing a resistant behavior through extrinsic motivation. Journal of Applied Social Psychology, *8*, 72-83.
- Geller, E., Rudd, J., Kalsher, M., Streff, F., & Lehman, G. (1987). Employer-based programs to motivate safety belt use: A review of short-term and long-term effects. Journal of Safety Research, *18*, 1-17.

Hopkins, B., Conrad, R., Dangel, R., Fitch, H., Smith, M., & Anger, W. (1986). Behavioral technology for reducing occupational exposures to styrene. Journal of Applied Behavior Analysis, 19, 3-11.

Horne, T., & Terry, T. (1983). Seat belt sweepstakes-An incentive program. SAE Technical Paper Series (No. 834074). Warrendale, PA: Society of Automotive Engineers.

Janis, I. (1967). Effects of fear arousal on attitude change: Recent developments in theory and experimental research. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology, (Vol. 3, pp. 167-222). New York: Academic Press.

Kalsher, M., Geller, E., Clarke, S., & Lehman, G. (1989). Safety belt promotion on a naval base: A comparison of incentives vs. disincentives. Journal of Safety Research, 20, 103-113.

Kazdin, A. (1975). Behavior Modification in Applied Settings. Homewood, Ill.: Dorsey.

Kempen, R., & Hall, R. (1977). Reduction of industrial absenteeism: Results of a behavioral approach. Journal of Organizational Behavior Management, 1, 89-98.

Kopelman, R., & Schneller, G. (1981). A mixed-consequences system for reducing overtime and unscheduled absences. Journal of Organizational Behavior Management, 3, 17-28.

Larson, L., Schnelle, J., Kirchner, R., Carr, A., Domash, M., & Risely, T. (1980). Reduction of police vehicle accidents through mechanically aided supervision. Journal Applied Behavior Analysis, 13, 571-581.

Leslie, J., & Adams, S. (1973). Programmed safety through programmed learning. Human Factors, 15, 223-236.

Leventhal, H. (1970). Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology, (Vol. 5, pp. 119-186). New York: Academic Press.

Lin, L., & Cohen, H. (1983). Development and evaluation of an employee hazard reporting and management information system in a hospital. Final Report, Safety Sciences, San Diego, CA, NIOSH Contract 210-81-3102,

National Institute for Occupational Safety and Health, Morgantown, WV.

Loo, R. (1984). Correlates of reported attitude towards and use of seat belts. Accident Analysis and Prevention, 16, 417-421.

McAfee, R., & Winn, A. (1989). The use of incentives/feedback to enhance work place safety: A critique of the literature. Journal of Safety Research, 20, 7-19.

McGuire, W. (1985). Attitudes and attitude change. In G. Lindzey & E. Aronson (Eds.), Handbook of Social Psychology, (3rd ed., Vol. 2, pp. 233-314). New York: Random House.

McKelvey, R., Engen, T., & Peck, M. (1973). Performance efficiency and injury avoidance as a function of positive and negative incentives. Journal of Safety Research, 5, 90-96.

Moffit, P., & Nelson, G. (1986). Effects of varying levels of fear arousal on opinions regarding mandatory safety belt use laws. Unpublished manuscript, University of Northern Iowa.

National Academy of Sciences--National Research Council. (1982). Toward Safer Underground Coal Mines. NAS, 1982, 190 pp.

Nelson, G., & Moffit, P. (1988). Safety belt promotion: Theory and practice. Accident Analysis and Prevention, 20, 27-38.

O'Green, J., Peters, R., & Cecala, A. American Electric Power Fuel Supply's Ergonomic Approach to Reducing Back Injuries. Proceedings of 23rd Annual Institute on Coal Mine Safety Health and Research, Virginia Polytechnic Institute and State Univ., Blacksburg, VA, August 26, 1992, pp. 187-195.

O'Hara, K., Johnson, C., & Beehr, T. (1985). Organizational behavior management in the private sector: A review of empirical research and recommendations for further investigation. Academy of Management Review, 10, 848-864.

Pasmore, W., & Friedlander, F. (1982). An action-research program for increasing employee involvement in problem solving. Administrative Science Quarterly, 27(3), 343-362.

Peters, R., & Randolph, R. (1992). Miners' Views About Why People Go Under Unsupported Roof and How to Stop Them. USBM Information Circular No. 9300, 1992, 59 pp.

Rubinsky, S., & Smith, N. (1973). Safety training by accident simulation. Journal of Applied Psychology, 57, 63-73.

Schlesinger, L. (1973). Safety communications. In J. Widner (Ed.), Selected readings in safety (pp. 200-215). New York: Academy Press.

Shirmer, G. (1979). Behavioral motivation. Paper presented at the 67th National Safety Congress, Chicago.

Simonds, R., & Shafai-Sahrai, Y. (1977). Factors apparently affecting injury frequency in eleven matched pairs of companies. Journal of Safety Research, 9, 120-127.

Skinner, B. (1953). Science and Human Behavior. New York: MacMillan.

Sleet, D., & Geller, E. (1986). Do incentive programs for safety belt use work? Focal Points, 3, 1-2.

Smith, M., Cohen, H., Cohen, A., & Cleveland, R. (1978). Characteristics of successful safety programs. Journal of Safety Research, 10, 5-15.

Spoonhour, K. (1981, September-October). Company snap-it-up campaign achieves 90 percent belt use. Traffic Safety, pp. 18-19, 31-32.

Sulzer-Azaroff, B. (1982). Behavioral approaches to occupational health and safety. In L. Frederiksen (Ed.), Handbook of Organizational Behavior Management (pp. 505-538). New York: Wiley.

Sutton, S. (1982). Fear-arousing communications: A critical examination of theory and research. In J. Eiser (Ed.), Social Psychology and Behavioral Medicine (pp. 303-337). New York: Wiley.

Vandenput, M. (1970). Unsafe habits and social pressures. Psychologica Belgica, 10, 99-107.