Critical Success Factors for Behavior-Based Safety: A Study of Twenty Industry-wide Applications

Jason P. DePasquale and E. Scott Geller

One-on-one interviews and focus-group meetings were held at 20 organizations that had implemented a behavior-based safety (BBS) process in order to find reasons for program success/failures. A total of 31 focus groups gave 629 answers to six different questions. A content analysis of these responses uncovered critical information for understanding what employees are looking for in a BBS program. A perception survey administered to individual employees ($n = 701$) at these organizations measured a variety of variables identified in prior research to influence success in safety efforts. The survey data showed five variables to be significantly predictive of employee involvement in a BBS process: 1) perceptions that BBS training was effective; 2) trust in management abilities; 3) accountability for BBS through performance appraisals; 4) whether or not one had received education in BBS; and 5) tenure with the organization. Also, employees in organizations mandating employee participation in a BBS process ($n=8$ companies) reported significantly higher levels of: (a) involvement; (b) trust in management; (c) trust in coworkers; and (d) satisfaction with BBS training than did employees whose process was completely voluntary ($n = 12$ companies). In addition, employees in mandatory processes reported significantly greater frequency of giving and receiving positive behavior-based feedback. © 1999 National Safety Council and Elsevier Science Ltd

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INTRODUCTION

Occupational injuries due to at-risk work behavior remain a significant problem. On a daily basis, an estimated 16 workers are killed and 36,000 are injured (U.S. Department of Health and Human Services [DHHS], 1998). In addition to these sobering statistics are those that estimate manufacturing facilities annually incur an average of 101 lost workdays due to injuries per 100 employees

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(Leigh, 1995; Miller, 1997; National Institute for Occupational Safety Health [NIOSH], 1998; National Safety Council [NSC], 1998; U.S. Bureau of Labor Statistics [USBLS], 1997). In sum, approximately 250,000 potential productive years of life are lost each year in the United States because of premature death due to work-related injuries (Baker, Conroy, & Johnston, 1992).

Miller (1997) estimated that every year U.S. employers pay approximately $200 billion in direct costs associated with injuries that occur both on and off the job. Occupational injuries account for three-quarters of this total or nearly $155 billion annually. This amounts to over $1400 per work-related injury. The majority of these costs are in the form of insurance premiums for workers and their families, as well as workers' compensation for days lost from work (Miller, 1997). And to make matters worse, these estimates are likely gross under-estimations because of unreliable surveillance techniques and the fact that many injuries are not reported (Baker et al., 1992; The National Committee for Injury Prevention and Control [NCIPC], 1989).

In order to combat the ever-present threat of employee injury and associated losses, many organizations are implementing what is referred to as behavior-based safety (BBS). This approach to injury control has a number of advantages over more traditional approaches, including: (a) it can be administered by individuals with minimal professional training; (b) it can reach people in the setting where the problems occur (e.g., school, workplace, or community at large); and (c) the leaders in the settings can be taught the behavior-change techniques most likely to work under specific circumstances (e.g., Baer, Wolf, & Risley, 1968; Daniels, 1989). Research has also shown BBS to be cost effective, primarily because behavior-change interventions are straightforward and relatively easy to administer, and their impact can be regularly monitored by indigenous personnel (Daniels, 1989; Geller, 1996; Geller, Lehman, & Kalsher, 1989; Sulzer-Azaroff & De Santamaria, 1980).

Over the years, BBS has been applied frequently and successfully in various industrial settings. For example, research has demonstrated the cost-effectiveness of: (a) participative education to increase safety-belt use (Kello, Geller, Rice, & Bryant, 1988); (b) incentives/rewards to increase safety-belt use (Geller, 1984; Geller & Hahn 1984); (c) goal-setting and behavioral feedback to increase safety-belt use, turn-signal use, and complete intersection stopping (Ludwig &

Geller, 1991, 1997) and reduce driving speed (Van Houten & Nau, 1983); and (d) pledge-card commitment strategies to increase employees' use of safety belts (Geller, Rudd, Kalsher, Streff, & Lehman, 1987) and other personal protective equipment (Streff, Kalsher, & Geller, 1993).

Behavior-based safety starts by defining one or more critical behaviors to target. Then these behaviors are observed and recorded in particular work settings. When a relatively stable baseline measure of the frequency, duration, or rate of behavior is obtained, an intervention is implemented to change the behavior in beneficial directions. This intervention might involve removing environmental barriers, modifying a workstation, or adding antecedents or consequences to the situation to alter response probability. The frequency, duration, or rate of the target behavior is recorded during and after the intervention and compared to baseline measures of behavior to determine intervention impact (Daniels, 1989; Geller, 1996, 1998b).

Facilitating Employee Involvement in BBS

Although BBS methods are consistently effective at increasing the occurrence of safe behaviors, they can only work optimally if used throughout an organization. In other words, if employees do not "buy-in" to BBS principles, participate actively in observation and feedback sessions, and help to implement BBS intervention procedures, research describing the impact of this approach is academic (pun intended). Therefore, a primary objective of the current study was to identify organizational and interpersonal variables that inhibit or facilitate employee involvement in a BBS process. The research literature offered some guidance for our focus and for formulating hypotheses.

Providing adequate BBS training.

Learning experiences can be a potent source of stimulation. Training programs are learning experiences designed to produce desired cognitive and/or behavior change among participants. An employees' first exposure to a BBS process often occurs during a training session. As such, employee perceptions regarding the quality and relevance of BBS training received may have great potential for determining the frequency and quality of involvement in a BBS process. However, our literature review found no empirical investigations of the relationship between percep-

tions of a training process and subsequent involvement in a safety program.

Mandatory versus voluntary participation.

One obvious way to promote employee participation in a BBS process is to make such a process mandatory. In other words, some minimal level of participation in a BBS process could be a job requirement. A potential drawback of such a mandatory approach, however, is that employees may feel a diminished sense of personal control and engage in resistance behaviors (Geller, 1998a). For example, monitoring systems that produced constant vigilance of production behaviors (Grant, Higgins, & Irving, 1988) or management-set standards employees perceived as unreasonably high led to the occurrence of false reporting behaviors to beat the system (Dose & Klimoski, 1995). Research by Kelman (1958) suggests organizations limiting personal control increase the occurrence of defensive strategies, including the motivation to do only what is required and no more.

Other research has found beneficial effects of elevated levels of personal control. For example, organizational structures that provide employees greater discretion were shown to correlate positively with employee satisfaction, perceived quality of work life, and actual job performance (Hackman & Lawler, 1971; Sashkin, 1984). In contrast, a lack of control over organizational outcomes can lead to a state of learned helplessness (Seligman, 1975) and lowered effectiveness on the job. In this state, employees are said to possess "trained incapacity" (Dose & Klimoski, 1995).

The role of interpersonal trust.

Little research has examined the direct impact of interpersonal trust on performance outcomes (McAllister, 1995). However, researchers have long recognized trust as a hallmark of favorable relationships (Hart, 1988; Zand, 1972) and organizational performance (Granovetter, 1985). In fact, trust between individuals and groups within an organization is considered a critical ingredient in the long-term stability of the organization and the well-being of its members (Cook & Wall, 1980). In other words, it is generally agreed that high levels of interpersonal trust are beneficial for most organizational functioning.

Yamagishi and Cook (1993) investigated the impact of interpersonal trust on individual participation in exchange relationships. They found strong support for the notion that interpersonal trust increases an individuals's level of participation in a group situation. In fact, several other studies have shown a beneficial impact of interpersonal trust on the frequency and quality of group member interaction as well as participation in decision-making situations (e.g., Samuelson, Messick, Rutte, & Wilke, 1984;). The role of interpersonal trust may be particularly critical for successful BBS. An important BBS method involves employees in the observation of other employees' work behaviors. These observations are recorded systematically on a behavioral checklist and turned in for tracking and group feedback. If employees do not trust both the intentions and abilities of the behavioral observers, an observation and feedback process cannot work. In other words, if employees perceive the BBS process to be another method for management to monitor their behavior, or for coworkers to "rat" on each other, participation in the process will likely be minimal. As concluded by Geller (1998c), "Lack of interpersonal trust causes resistance to an observation and feedback process, and interpersonal trust is what's missing in a culture deemed unready for behavior-based safety" (p. 14).

Hypotheses

Based on our review of the literature related to the present research, we derived the following hypotheses.

Hypothesis 1. The quantity and quality of BBS training will influence the amount of employee involvement in a BBS process.

Hypothesis 2. Mandated participation in a BBS process will decrease personal involvement and satisfaction with a BBS process.

Hypothesis 3. Trust in management abilities and intentions will facilitate employee involvement in a BBS process.

Hypothesis 4. Trust in coworkers abilities and intentions will facilitate employees involvement in a BBS process.

METHODS

Subjects and Setting

Participation was solicited through survey research conducted in a professional safety journal, as well as through presentations and interactions at professional safety conferences and work-

shops. The participants were employees working at 20 different industrial sites. From these 20 organizations, 245 employees (221 males, 24 females) made up 31 different focus groups. About 80% of these participants were male, a male-to-female ratio that paralleled the workforce. All 20 of the sites visited were involved in an employee-driven BBS process that was in place for at least one year. Each BBS process included interpersonal observation and feedback with a checklist of specific safe and at-risk behaviors.

Measures

The culture survey administered in the current study used a combination of scales found in previous research, plus scales and items designed specifically for this investigation. Scale items were presented in a 7-point Likert format.

Interpersonal trust.

Interpersonal trust was measured with the 12-item scale developed by Cook and Wall (1980). The interpersonal trust scale accesses employee levels of trust with management intentions and ability, and coworker intentions and ability. Cronbach Alpha levels for the interpersonal trust scales have been documented at over 0.80.

Impulsivity.

Impulsivity is attributed to people who "act on the spur of the moment without being aware of any consequences or risk involved" (Clift, Wilkins, & Davidson, 1993, p. 404). Nine items from the Eysenck, Pearson, Easting, and Allsopp (1985) L7 scale were used to assess impulsivity. This shortened scale has been shown to have acceptable inter-item reliability estimates of 0.77 (Clift et al., 1993).

Involvement.

The involvement scale was designed specifically for the current investigation. The tree items that comprise the scale ask participants to rate their level of current and future involvement in the BBS process.

Perceptions of BBS training.

The perceptions of BBS training items were also constructed specifically for this study. These three items ask participants to rate the BBS training they received with regard to relevance, importance, and quality.

Single item scales.

A number of single-item measures asked respondents whether or not they had received BBS training, whether or not they had been trained to give behavior-based feedback, how often and how much they gave and received positive and negative feedback, and how satisfied they were with the BBS process.

Procedures

During scheduled site visits to all 20 participating organizations, data were collected by two researchers via two distinct methods: focus group discussions and perception surveys. One focus group involved only members of the safety steering committee, and the other involved a random selection of hourly employees. While this should have resulted in 40 focus-group sessions, nine of the sites visited did not have an intact safety committee. Therefore, a total of 31 focus groups were performed (20 with hourly employees and 11 with members of the safety committee). Focus groups ranged in size from 4 to 22.

The focus-group sessions lasted approximately 90 minutes, during which one of two researchers asked a series of six questions designed to solicit employees' opinions regarding the necessary ingredients for an effective employee-driven BBS process. All reactions to these questions were recorded simultaneously and independently on data collection sheets by both researchers.

After completing both focus groups, researchers left a perception survey with each organization. The contact person was instructed to get as many employees as possible to complete these surveys. When it was not possible to survey all employees, the contact person was asked to obtain a representative sample of every work area. When completed, the surveys were mailed to the research team for analysis.

RESULTS

The dimensions measured by the survey as well as their scale alpha levels are displayed in Table 1.

Focus Groups

Two steps were used to analyze information gathered during focus groups. First, researchers looked at the employee responses for all questions as recorded by both focus-group facilita-

Table 1. Variables Measured by the Perception Survey

Measure	Number of Items Comprising Scale	Alpha
Position (management vs. front-line)	1	—
Impulsivity (Clift, Wilkins, & Davidson, 1986)	9	0.78
Perception safety issues are included in performance appraisals	1	—
Trust in management intentions (Cook & Wall, 1980)	3	0.64
Trust in peer intentions (Cook & Wall, 1980)	3	0.80
Satisfaction with the BBS process	1	—
Amount of positive feedback given related to BBS process	1	—
Amount of positive feedback received related to BBS process	1	—
Amount of negative feedback given related to BBS process	1	—
Amount of negative feedback received related to BBS process	1	—
Whether or not trained to give feedback (Yes or No)	1	—
Tenure with the organization	1	—
Perceptions of BBS training	3	0.87
Trust in peer abilities (Cook & Wall, 1980)	3	0.63
Trust in management abilities (Cook & Wall, 1980)	3	0.75
Involvement in the BBS process	3	0.78
Whether or not educated in BBS (Yes or No)	1	—

tors. Only those responses that appeared on both of the data sheets were retained for analysis. Second, for the first five questions, each response was classified as a positive, negative, or neutral statement by two researchers. Neither researcher was aware of how the other was classifying any of the responses. Only if a statement was classified as positive, negative, or neutral by both researchers was it retained.

A total of 12 responses were eliminated as a result of this process. For questions 6–8, responses were categorized as a behavior-based factor, a person-based factor, or an environment-based factor. This classification was performed by two subject-matter experts. Consensus was reached on each item. Results of the content analysis for questions 1–8 can be found in the Appendix.

Perception Survey Results

Of the 756 perception surveys returned 701 were acceptable for analysis. These surveys were returned from 15 of the 20 participating organizations. The employees at four organizations failed to complete and return the surveys, and the surveys returned from another organization were completed incorrectly. Table 2 displays the intercorrelations for all variables measured by the perception survey.

Predicting involvement in the behavior-based process.

A forward entry regression analysis was performed to determine variables most predictive of involvement in the safety process. Employee involvement was determined for each employee by summing their 7-point Likert scale responses to the following three involvement-related items: 1) Up to this point I have been very active in this organization's behavior-based safety program; 2) I willingly attend and participate in most of the behavior-based safety related activities and meetings that occur in this organization; and 3) It is my intention to remain very active in this organization's behavior-based safety program.

As shown in Table 3, five variables contributed significantly to predicting self-reported levels of involvement, namely: (a) adequacy of the BBS training; (b) trust in management abilities; (c) extent that safety is used in performance appraisals; (d) whether or not the employee was educated in the BBS process; and (e) tenure with organization. These variables accounted for 41% of the variance in amount of self-reported involvement in the BBS process.

Voluntary vs. mandatory BBS

Table 4 depicts the results of planned comparison t-tests for the perception survey variables be-

Table 2. Intercorrelations for All Dependent Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Position	1.00	−.07	.17*	.15*	−.07	−.16*	−.06	−.05	.24**	−.07
2. Years with company		1.00	−.02	−.04	−.03	−.04	.06	.11	.09	.09
3. Educated in b-b safety			1.00	.54**	.08	.04	.11	.06	.39**	.07
4. Trained to observe				1.00	.09	.12	.09	.02	.46**	.07
5. Observations performed					1.00	.69**	.22**	.09	−.08	.22**
6. Frequency observed						1.00	.32**	.14	−.08	.35**
7. Frequency positive feedback received							1.00	.65**	.14	.78**
8. Frequency negative feedback received								1.00	.16*	.57**
9. Trained to give feedback									1.00	.17*
10. Frequency positive feedback given										1.00

Variable	11	12	13	14	15	16	17	18	19	20
11. Frequency negative feedback given	1.00	−.02	.04	.10	−.05	−.02	.10	.10	.09	−.11
12. BBS part of performance evaluations		1.00	−.01	.23**	.17*	.14*	.14*	.19**	.25**	.15
13. Impulsivity			1.00	−.17*	−.20**	−.22**	−.32**	−.17*	−.17*	−.16*
14. Perceptions of BBS training				1.00	.41**	.50**	.39**	.31**	.59**	.28**
15. Trust in management intent					1.00	.67**	.39**	.37**	.42**	.18**
16. Trust in management ability						1.00	.30**	.33**	.46**	.26**
17. Trust in peer intent							1.00	.65**	.30**	.24**
18. Trust in peer ability								1.00	.26**	.28**
19. Involvement in process									1.00	.28**
20. Process satisfaction										1.00

Variable	1	2	3	4	5	6	7	8	9	10
11. Frequency negative feedback given	.07	.02	−.08	−.04	.19**	.29**	.30**	.43**	.08	.60**
12. BBS part of performance evaluations	−.01	−.13	.02	−.01	.07	.03	−.06	−.02	−.03	−.04
13. Impulsivity	−.08	−.15*	−.08	−.07	−.04	−.05	−.08	−.02	−.09	−.07
14. Perceptions of BBS training	−.01	.10	.32**	.27**	.02	.09	.18*	.13	.25**	.20**
15. Trust in management intent	.30**	−.16*	.28**	.32**	−.02	−.10	.08	.03	.38**	.09
16. Trust in management ability	.15**	−.10	.31**	.31**	.00	−.03	.10	−.01	.37**	.11
17. Trust in peer intent	.03	−.01	.06	.06	−.13	−.05	.09	.00	.05	.14*
18. Trust in peer ability	.08	−.02	.09	.10	−.08	−.10	−.04	−.17*	−.04	−.07
19. Involvement in process	.06	.11	.40**	.33**	.09	.08	.17*	.14*	.31**	.22**
20. Process satisfaction	−.07	−.06	.16*	.08	−.03	−.02	.01	−.08	−.13	−.01

*$p < .05$; **$p < .01$.

Table 3. Predicting Employee Involvement in a BBS Process

Variable(s) Entered	R	R^2	Adjusted R^2	Std Error of the Estimate
1. Adequacy of BBS training	0.54	0.29	0.29	0.54
2. Trust in management abilities	0.59	0.35	0.34	0.51
3. Extent that BBS is used in performance appraisals	0.61	0.37	0.36	0.50
4. Whether or not educated in BBS	0.63	0.39	0.38	0.50
5. Tenure with organization	0.64	0.41	0.40	0.49

tween employees in a mandatory ($n = 273$) and employees in a voluntary ($n = 427$) BBS process. As shown in this table, employees in a mandatory BBS process showed higher scores on several questions related to BBS success than did employees in a voluntary BBS process. More specifically, employees in a mandatory process reported significantly higher rates for giving and receiving positive behavior-based feedback and significantly lower rates for receiving negative behavior-based feedback. In addition, employees in a mandatory BBS process demonstrated significantly greater levels of trust in management (both abilities and intentions), trust in coworkers (both abilities and intentions), and overall satisfaction with the BBS training received. Obviously, our hypothesis that voluntary participation in BBS would be superior to mandatory participation was not supported.

DISCUSSION

The tremendous improvements in safety and performance of companies who have implemented BBS processes has given this approach to safety management credibility and status (Geller, 1999). Unfortunately, little objective research has been performed to elucidate the organizational factors that can facilitate successful implementation of a BBS approach. Instead, many organizations are left to muddle through the unending case studies provided by safety consultants. Although such literature may be enlightening and informative to some degree, it does not adequately inform readers of the underlying behavioral (participation), interpersonal (trust), and organizational (management support) processes that lead to successful BBS implementation. The current empirical investigation is a first step in understanding what

Table 4. Voluntary versus Mandatory BBS Processes

Variable	Voluntary BBS Process	Mandatory BBS Process
1. Average frequency of observation made per employee per month	6.5	7.6
2. Average frequency of time observed per employee per month	4.0	6.6*
3. Average frequency positive feedback received per employee per month	1.8	3.6**
4. Average frequency negative feedback received per employee per month	0.6	0.6
5. Average frequency positive feedback given per employee per month	3.1	5.3*
6. Average frequency negative feedback given per employee per month	1.2	1.5
7. Degree of involvement	3.4	3.8*
8. Amount of satisfaction	3.1	3.3
9. Trust in management abilities	3.8	4.2*
10. Trust in management intentions	3.7	4.1*
11. Trust in peer abilities	3.4	3.7*
12. Trust in peer intentions	3.7	4.0*
13. Impulsivity	2.5	2.5
14. BBS is part of performance evaluations	3.3	3.4
15. Satisfaction with BBS Training	3.5	3.8*

*Significant at $p < .05$; **significant at $p < .01$.

factors are critical for successful implementation of BBS.

A primary method used in virtually every organization that has reduced injuries with BBS is observation and feedback. One of the first problems encountered by an organization is deciding if employee participation in the observation and feedback process should be mandatory or voluntary. The obvious concerns associated with making such a process mandatory is that it will lead to negative reactions from the employees due to reduced levels of choice or perceived control (Geller, 1998a,b). On the other hand, a voluntary observation and feedback process could lead to minimal employee participation.

The current research enabled us to compare organizations incorporating a voluntary observation and feedback process with organizations opting for mandatory interpersonal observation and feedback. Contrary to our research hypothesis, voluntary observation and feedback processes were not viewed any more favorably than were mandatory observation and feedback processes. In fact, the results for positive regard toward an observation and feedback process seemed to favor the mandatory approach. In addition, findings summarized in Table 4 indicate organizations taking the mandatory approach may experience benefits in a number of areas over organizations following an entirely voluntary approach.

At first these results seem to defy logic or common sense. However, upon closer examination of the mandatory approaches, such findings are not too surprising. First, although employees in a mandatory process had no choice in whether or not they participated, they usually had a good deal of choice regarding when and how they conducted observation and feedback sessions. For example, all of the organizations using a mandatory approach gave employees choice regarding how many times a month they should perform an observation. And all observations occurred with permission from the person being observed. Some of these organizations (37%) rotated observers on a monthly basis. Thus, it seems these organizations were able to circumvent reductions in employee perceptions of personal control by building employee choice into the BBS process.

Besides reporting higher levels of employee involvement, mandatory processes also demonstrated significantly higher levels of trust in management and trust in coworkers, a key ingredient for BBS success (as reported in most focus groups). Plus, the use of positive BBS feedback was reported more frequently for mandatory than voluntary programs. It's likely such results are due to the fact that mandatory programs lead to more overall involvement. And as involvement in the observation and feedback process increased, more employees increased their trust in the process and realized it was designed to benefit them. Moreover, they probably found out that participation did not lead to negative consequences such as being "ratted-out" by a coworker or receiving a reprimand from a supervisor.

More experience with interpersonal observation and feedback results in more trust in the intentions and abilities of coworkers, and then to more involvement. While these results should not be interpreted as a blanket endorsement for making BBS mandatory in all organizations, it does indicate that mandatory processes are not necessarily detrimental to employee satisfaction, trust, or perceptions of personal control. If instituted properly, mandatory processes can actually facilitate employee perceptions of personal control as well as increase a number of relationship-based variables beneficial to BBS success. Thus, it seems beneficial for management to set an expectation that everyone participate in the observation and feedback process they've been trained to implement. But management should then give plenty of leeway regarding how the process occurs, and offer ongoing support for the procedures customized by the line workers. Beyond the observation and feedback process, the current investigation offers insight regarding a number of additional issues relevant to BBS. These results are particularly important because they come from the perspective of line workers or operators. For instance, our data support the notion that employees generally understand management and supervisors are key determinants of the success or failure of a BBS process. While there was disagreement regarding the extent to which management and supervisors should be involved, everyone acknowledged that these individuals needed to demonstrate visible support of an interpersonal observation and feedback process.

When negative reactions about BBS were given, significant attention was given to perceptions of the BBS steering committee. In such cases, the steering committee was viewed as being out of touch with what is really needed to improve safety in the organization. It was also common to find that a large number of employees perceived safety committee members as simply

ingratiating individuals looking to get ahead. This emphasizes the need to select the right people to serve on the BBS steering committee, and to rotate membership at regular intervals.

The steering committee is responsible for driving an observation and feedback process, and negative perceptions of its members cannot be beneficial. Further research should investigate the type of involvement required by BBS steering committees from the beginning stages of BBS implementation to eventual institutionalization. For example, active and frequent involvement of a BBS steering committee is clearly needed to get a BBS process started, but it might be advantageous to fade out certain kinds of committee activity as BBS principles and procedures take hold throughout an organization. In other words, the role of the BBS steering committee needs to change as BBS processes mature. It is not clear, however, what roles should remain and how others should change.

Three of the questions asked of employees during focus groups were particularly informative regarding ways to implement and maintain a successful BBS process. Specifically, by asking employees: (a) how they would improve their BBS process; (b) what were the biggest obstacles to BBS success; and (c) what are the key ingredients to a BBS process, we learned useful perspectives from the line workers—the employees most directly responsible for BBS and the organization's safety record. Specifically, our content analysis of employees' answers to these questions revealed the following noteworthy issues.

First, although it may be impressive to collect a lot of behavioral data from behavioral observations, it is probably in an organization's best interest to start "small" with a simple behavioral checklist. Allow employees time to get used to an observation and feedback process before adding too much complexity. Second, it is imperative that trainers make clear BBS cannot be a vehicle for blaming individuals, or for delivering criticism of any kind. Third, interpersonal trust is essential, from the shop floor to the management boardroom. Trust was mentioned frequently not only as one of the critical factors for success, but also as one of the greatest barriers when it's not there.

As with interpersonal trust, employees expressed repeatedly the need for continued support from management. While monetary resources are essential, they are not sufficient. Visible recognition that management appreciates

the BBS methods is critical. One way to do this is to provide necessary time for employees to perform behavioral observations and analyze results. And if the outcome from a BBS process indicates a need for certain changes in environmental conditions or training procedures, management needs to follow through quickly and effectively.

Other critical success factors for BBS success were revealed through the multiple regression analysis. Most important in getting employee involvement was BBS training. These sessions usually represent employees' first exposure to BBS, and if they are not made relevant to the employees' work setting and circumstances, employees could actually leave a training session discouraged, confused, and unlikely to get actively involved. Research is needed to define the parameters of a BBS training session which facilitate subsequent employee participation. Individual characteristics of the trainer are probably relevant, as well as the structure and format of the training itself.

Our regression analysis showed that a number of other variables can also help to facilitate employee involvement in a BBS process. As expected from the focus group results, trust in management added significant predictive power to our regression equation. However, we found trust in management abilities and not intentions to be the crucial factor. Perhaps employees believe management is well intentioned when they start the safety process, but if management does not follow through with appropriate support, trust in ability is suspect. So trust in ability means management knows how to facilitate and support BBS. This explanation is consistent with the majority opinion from focus groups that visible management support is essential for a successful BBS process.

In conclusion, we offer a framework for understanding why some BBS processes succeed and other fail. Analogous to the way we analyzed the focus group discussions, we propose the BBS Safety Success Triad illustrated in Figure 1. The three sides of this triangle are dynamic and interactive. When one changes the others are influenced.

The BBS Safety Success Triad summarizes the discussion from 31 focus groups, as well as the analysis of 701 perception surveys (from 15 different organizations). On the person side of the triangle is interpersonal trust; on the environment side of the triangle is management support; and on the behavior side of the triangle is employee participation/involvement. Training is in

FIGURE 1 The behavior-based safety success triad.
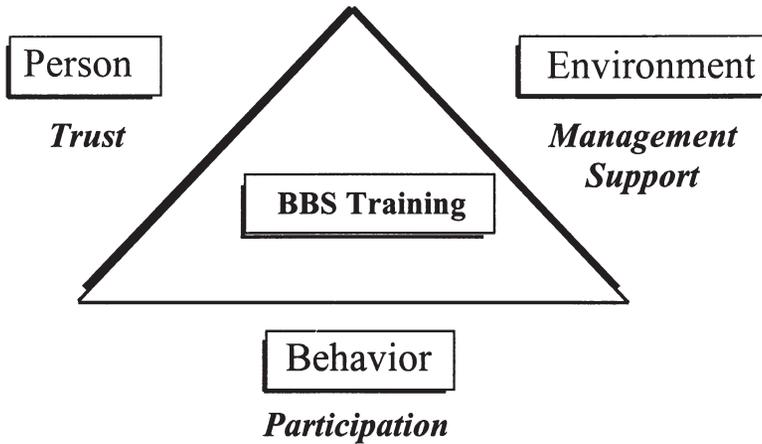
the middle of the triangle because of its critical role in facilitating all three sides of the Triad. During training all employees receive the principles, procedures, and tools of a BBS process, and management receives the rationale and the method for supporting BBS. Proper training convinces participants the process works and the people can implement it. This is necessary for self-efficacy (Bandura, 1997), a person state deemed necessary for any constructive long-term change among individuals in a work culture.

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Appendix Focus Group Questions and Results

Focus Group Question 1: How do you feel about the observation and feedback process used in your behavior-based safety process? (104 total responses—56 positive, 37 negative, 11 neutral)

Most frequent positive comments	Comments	Focus groups	Organizations
–It increases awareness of safe and at-risk behaviors.	17	15	14
–It facilitates positive attitudes.	8	6	5
–It increases accountability.	3	3	2
Most frequent negative comments	Comments	Focus groups	Organizations
–It is perceived that ulterior motives are driving the process (e.g., "It is done to blame the workers.").	15	9	8
–It is inconvenient.	9	8	6
–Participating employees are only interested in the overtime.	2	2	2

Focus Group Question 2: Is participation in the observation and feedback process mandatory or voluntary?

Organizations with a voluntary process $= 12$ Correlation between type of process and
Organizations with a mandatory process $= 8$ positive regard $= -0.304$

Focus Group Question 3: What role should management play in your behavior-based safety process? (50 total responses—23 positive, 15 negative, 12 neutral)

Most frequent positive comment	Comments	Focus groups	Organizations
–They should be involved, the more the better	6	6	6
Most frequent negative comment	Comments	Focus groups	Organizations
–The less they are involved the better	8	8	8

Focus Group Question 4: Do supervisors influence success of the behavior-based safety process?

–12 organizations had a position analogous to a front-line supervisor
–11 of those organizations (22 focus groups) commented that a behavior-based safety process will not succeed unless the front line supervisors support it

Focus Group Question 5: What are your perceptions of the behavior-based safety steering committee? (87 total responses—33 positive, 36 negative, 18 neutral)

Most frequent positive comments	Comments	Focus groups	Organizations
–I think they're doing a good job	9	9	8
–They are well intentioned and serious	7	7	7
Most frequent negative comments	Comments	Focus groups	Organizations
–They are "out of touch"—spend too much time in meetings	8	7	6
–They are "safety rats"	4	4	3
–The meetings are causing morale and production problems	4	3	3

Focus Group Question 6: How would you improve your behavior-based safety process?

Environment-based ($n = 72$)	Comments	Focus groups	Organizations
–Use more and better incentives	11	11	10
–Provide adequate training	11	9	6
–Increase quality of machines	9	7	6
–Simplify the checklist	6	6	6
Behavior-based ($n = 23$)			
–Increase employee participation	8	8	7
–Increase use of positive feedback	2	2	2
–Fire at-risk workers	2	2	2
Person-based ($n = 8$)			
–Have a positive attitude	8	8	6

(*Continued*)

Focus Group Question 7: What are the biggest obstacles your behavior-based safety process has faced?

Environment-based ($n = 67$)	Comments	Focus groups	Organizations
–Lack of management support	22	20	18
–Previous failed safety efforts	10	10	10
–Extra paperwork is aversive	6	6	6
Person-based ($n = 47$)			
–Lack of trust	12	12	12
–Discomfort with being observed	8	8	8
–Lack of buy-in to the process	5	5	5
Behavior-based ($n = 19$)			
–Lack of participation	5	4	4
–Poor communication	3	3	3
–Negative feedback used too frequently	3	2	2

Focus Group Question Number 8: What are the key ingredients for success in a behavior-based safety process?

Person-based ($n = 72$)	Comments	Focus groups	Organizations
–Trust	13	13	13
–Positive attitudes	5	5	5
–An open mind	5	5	4
Environment-based ($n = 53$)			
–Management support	18	18	18
–Proper training	5	5	5
–The process must be voluntary	4	4	4
Behavior-based ($n = 42$)			
–Employee participation	11	11	11
–Teamwork	6	6	6
–Open communication	5	5	4