Assessing th
SAFETY-F
LEADERSHIP E

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SAFETY PERFORMANCE has long been measured using lagging indicators such as total recordable incident rate (TRIR) that involve counting the number of injuries that occur over time. However, recent research has shown that these metrics suffer from severe limitations in terms of validity, reliability and relevance (Hallowell et al., 2021). For example, it is well established that recordable injuries are underreported in industries such as construction (Probst et al., 2008) and even over millions of worker hours, changes in TRIR are almost never predictive because the occurrence of injuries is rare, and the timing of an injury is almost entirely random (Salas, 2020). Despite these limitations, TRIR and other lagging safety indicators are still used to make critical business decisions such as comparing business units, evaluating manager performance, prequalifying contractors, tracking safety performance and evaluating the effectiveness of safety interventions (Hallowell et al., 2021).

Although reliance on lagging indicators is still extensive and ubiquitous, some organizations have begun to move beyond using only lagging indicators as measures of safety performance and have explored measuring safety system elements as an alternative. Put simply, safety practitioners have begun to measure what they do to keep people safe as a measure of safety. These metrics are often referred to as leading indicators (Alruqi & Hallowell, 2019) and are arguably preferred over lagging metrics because they can prompt action before injuries occur (Guo & Yiu, 2016; Hopkins, 2009; Lingard et al., 2017).

When safety activities are used as leading indicators of safety performance, they are usually measured by the frequency with which they are performed (e.g., the rate of prejob safety briefs or safety observations; Hinze et al., 2013). This rationale stems from the theory that a higher quantity of safety actions and activities correlates with a higher capacity to manage and mitigate risks of incidents. Research has shown that these quantitative

measures of a safety system correlate with future lagging indicators (Salas & Hallowell, 2016). However, measuring only the quantity of safety activities may promote a checking-the-box mentality to meet quotas and targets. The authors contend that the strength of a safety system is ultimately the product of the quality and quantity of the organizational activities performed to promote safety. Although measures of quantity are relatively easy to consistently measure and track, measures of quality are more challenging because measuring quality is inherently subjective and difficult to assess consistently and reliably.

The authors' objective was to create and demonstrate a process for creating valid, reliable quality-based measures of safety performance (i.e., quality-based safety leading indicators) that is built on a strong statistical and scientific foundation. Here, safety-focused leadership engagements were used as a case example because they have great potential to influence safety culture and are observable over short periods. Leadership engagements are the practice by which organizational leaders emotionally connect with employees to positively influence their commitment, motivation and well-being within the work environment (Nasomboon, 2014). Businesses require effective leaders to connect with employees not only to communicate and foster a positive organizational culture, but also to support the workplace performance (Amagoh, 2009; Kieu, 2010). Additionally, without a validated quality assessment strategy, a leadership engagement can be interpreted in many ways because observers may hold different values. Although different values and perspectives can be seen as an asset, the authors contend that the inconsistency would be a fatal detriment in terms of creating a valid, benchmarkable metric.

Importance of Leadership Engagements

Productive, meaningful interactions with leaders may improve employee engagement levels and increase commitment to the organization's safety mission. Since the turn of the century, engaging the workforce has been described as "one of the greatest challenges facing organizations" (Frank et al., 2004, p. 15). Engaging employees is important because it can increase motivation, enthusiasm, morale, pride and feelings of self-worth (Kahn, 1990; Schaufeli et al., 2002). As shown by Harter et al. (2002), who analyzed 7,939 business units across 36 organizations, higher engagement levels among employees positively correlated with improved productivity, job satisfaction, safety, commitment and bottom-line earnings. Conversely, disengaged employees can experience lack of motivation, job satisfaction, and physical and mental

KEY TAKEAWAYS

- Safety-focused leadership engagements are important because, if performed well, they can convey company priorities, demonstrate care and reinforce positive safety culture.
- A team of 11 safety experts representing the four construction industry sectors identified and prioritized the attributes of an effective leadership engagement.
- A scorecard was created to assess the quality of a leadership engagement, and the scorecard was shown to be reliable in independent validation.

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Wael Alruqi and Mike Quashne

well-being, which could cause them to burn out and experience cynicism (Christian et al., 2011; Maslach et al., 2001; Wildermuth & Pauken, 2008). To address the employee apathy within their work environments, academics and practitioners find leaders to be one of the strongest agents of positive change (Carrillo, 2010).

Conversations with employees are an avenue for leaders to communicate key values that reinforce the organization's culture (Griffin & Neal, 2000). In fact, research suggests that high-quality leadership interventions yield positive effects on the emotional, behavioral and social status of employees, which translates into improved work performance (Babcock-Roberon & Strickland, 2010). Effective leadership through action, influence, communication and persuasion sets the standard of workplace behavior and, therefore, represents a critical facet to the success of any enterprise (Beus et al., 2010).

Although research on the positive attributes of leadership is well established (Barling, 2014), the relative importance of the many attributes of effective leadership remains unstudied. Most peer-reviewed studies on safety leadership that involve empirical data have focused primarily on the role of on-site leadership (e.g., project managers, frontline supervisors, crew or team leads) and their impact on collectivism, compliance to rules and regulations, and overall performance (Conchie et al., 2013; Jiang et al., 2017). Moreover, most validated leadership performance survey instruments are designed to evaluate the personal qualities of a leader and their leadership styles, rather than the quality of an engagement between the leader and employees (Avolio & Bass, 2004).

The present study advances the body of knowledge by 1. documenting key positive attributes of leadership engagements available in literature; 2. brainstorming additional features that should be considered for safety-focused leadership engagements; 3. scoring the relative importance of each attribute with a panel of safety experts; and 4. organizing the results into a leadership safety engagement scorecard that enables consistent assessment of quality.

Safety-Focused Leadership Engagements

The term "leader" carries many meanings. Although employees such as supervisors, crew leaders or project/site managers

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can all be considered leaders depending on the context, the authors define a "leader" more narrowly as "a highly influential individual who is not involved on site for day-to-day operations." Additionally, the authors focused on engagement between a leader and employees where safety is the primary purpose and the topic of discussion. Within this scope and definition, the authors aimed to first identify and document the attributes of a strong leadership engagement found in literature.

A great deal of literature discusses safety leadership, primarily from a theoretical and philosophical perspective of showing care. For example, leaders are viewed as inspiring, caring and confident when they communicate safety as their ethical responsibility, demonstrate that safety should not be sacrificed for other competing business priorities (e.g., work pressure), and accept personal responsibility as the leader (Koestenbaum, 2002; Turner et al., 2002). Hence, successful engagements depend on the words leaders use and their manner of speaking because it is human nature to block information that causes cognitive dissonance (Berns et al., 2005). With preplanned and skilled dialogue, leaders can break through cultural and personal barriers to establish and foster a shared system of values and generate genuine buy-in from employees (Schein, 2010).

Researchers have recommended that leaders examine their own preconceived notions of safety and focus on aligning their overt and covert actions with the true purpose of their safety engagement (Schein, 2010). Even when an organization succeeds in establishing a positive safety culture, leaders play a crucial role in maintaining and consolidating that culture. Hence, what leaders pay attention to, react to, allocate resources for and acknowledge in their engagements with employees can form the foundation for their organization's safety culture. Through engagements, leaders can generate dialogue on recent safety successes or failures on site to promote shared analysis, problem-solving, learning and correct decision-making among employees (Weick, 2001).

Although most leaders claim they genuinely care about employees, they often lack the confidence and skill in expressing

that care when interacting with employees (Lloyd, 2020). Failure to express and demonstrate these values, despite sincere efforts, can lead to situations in which credibility and trust in leadership are broken (Carrillo, 2005). For example, if a leader tries to simply lecture employees, many of whom are the true subject-matter experts, it can decrease employee respect and buy-in and degrade the organization's safety culture (Daft & Weick, 1984). Only by establishing trust will employees believe that the leader not only will protect their cause but also cares about their well-being and respects their competence (Schoorman et al., 2007). Their perception of a leader's sincerity is just as important as the leader having genuine sincerity. This rudimentary yet important example shows the need for standardized and validated guidance for leaders on how to have high-quality engagements.

Research Methods

The authors' goal was to produce a scoring protocol for safety-focused leadership engagements that reflects the consensus of a panel of industry experts. Therefore, the authors adopted a multiphased focus group research protocol to address three fundamental questions:

1. What are the characteristics of a high-quality leadership engagement?

2. What is the relative importance of these characteristics?

3. What is the reliability of the scorecard to assess the quality of leadership engagement?

Focus groups typically involve a small group of certified experts who engage in discussion under the supervision of a moderator on a particular subject, and their collective beliefs and experiences are leveraged as data (Barbour & Kitzinger, 1998). In such group-based discussions, the moderator typically prompts conversations through open-ended questions and records individual opinions, points of consensus and disagreement, and group decisions. The focus group in this study was involved in reviewing, sharing, discussing, and prioritizing values and perceptions of subjective traits that cannot be empirically observed or measured until they are operationally defined. A focus group method was adopted because past studies have shown that participants become more candid in group-based settings than individual interviews (Guest et al., 2017) and the aggregation of expert opinions in an open forum allowed the authors to leverage the collective wisdom of the group (Hallowell & Gambatese, 2010a). The specific research steps (recruiting experts followed by three phases: identifying key attributes of excellent engagements, determining the relative importance of potential predictors and checking reliability) are described here.

Recruiting Experts

The focus group included 11 experts who were active members of the Construction Safety Research Alliance (CSRA). All participants were certified as experts in the field of construction safety because they met the minimum expertise criteria strictly defined by Hallowell and Gambatese (2010a). Collectively, the panel included representation from oil and gas, electric power generation, infrastructure and commercial building sectors. Additionally, the group had more than 100 years of collective experience in the industry (mean = 18.7 years) and more than 80 years of experience in safety and health (mean = 13.3 years). The minimum experience in the industry and in safety and health was 8 years and 6 years, respectively. The maximum experience in the industry and in safety and health was 33 years and 29 years, respectively.

FIGURE 1
LEADERSHIP ENGAGEMENT SCORECARD (FRONT)

CSRA CONSTRUCTION SAFETY RESEARCH ALLIANCE
LEADERSHIP ENGAGEMENT SCORECARD
Observer Perspective

Guidance on using this scorecard and rating a leadership engagement is provided on the reverse side.

	STATEMENT	WEIGHT	TRUE = 1 FALSE = 0	WEIGHTED SCORE
	EXAMPLE	2	0	2*0=0
1	The leader was prepared to be on the jobsite.	2		
2	The leader was paying attention during the engagement.	3		
3	The leader was not conducting a safety audit.	3		
4	The leader attempted to understand and learn the project and specific challenges faced by workers.	2		
5	The leader used names in the conversation.	3		
6	The leader learned something personal about the employees.	4		
7	The leader asked what motivates workers to be in this trade.	3		
8	The leader asked questions to understand the job.	4		
9	The leader showed employees how their job fits into the company's big picture.	3		
10	The leader made everyone feel like safety is more important than production.	3		
11	The leader asked what is needed to be safer and more effective.	5		
12	The leader asked questions to learn more about the most dangerous parts of the job.	5		
13	The leader asked questions to learn more about how the dangerous parts of the work will be controlled.	5		
14	The leader empowered the workers to share ideas for improvement.	5		
15	The leader confirmed that they understood the ideas and concerns that were shared.	3		
	TOTAL WEIGHTED SCORE (sum weighted scores for items 1 through 15)			

Maximum Score = 53

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Furthermore, 50% of panelists held a master's degree in civil engineering from an accredited institution in a field relevant to the study, and all panelists had served as members or as chair of a safety-and-health-related committee.

Phase 1: Identification of Key Attributes of Excellent Engagements

Following the literature review, the first major research step was to identify the attributes of a high-quality, safety-focused leadership engagement. The focus group was informed of the attributes that were previously validated in literature (e.g., Carasco-Saul et al., 2015; Denham, 2006; Vaughn et al., 2006), and then open brainstorming sessions were held in which the experts were asked to leverage their experience and identify additional attributes. In a round-robin session, each expert was asked to share an idea until all ideas were exhausted. This round-robin style of eliciting ideas was used to reduce initial group-related biases to obtain the greatest volume of ideas possible (Hallowell & Gambatese, 2010a). In the end, the team identified and defined 37 unique attributes.

Phase 2: Determining the Relative Importance of Potential Predictors

Building toward the authors' goal of creating and validating a scorecard, the next step was to prioritize and weight the attributes identified and defined in Phase 1. The purpose of the rating process was to achieve consensus among the experts on the panel regarding the final rating for each attribute. To decrease bias typically found in expert-opinion-based studies (Bhandari & Molenaar, 2020), the authors conducted three rounds of anonymous surveys. In each round, the experts individually rated the importance of each attribute on a scale of 1 to 5, where 1 represented "not at all critical" and 5 represented "highly critical." Between the rounds, the focus group moderator provided the median rating for each attribute and the degree of consensus (measured as the absolute deviation) and facilitated a discussion during which the experts could share their experience and opinions. The median was reported instead of the mean because it is less susceptible to potentially biased responses from outliers, as suggested by Judd et al. (2017), and Hallowell and Gambatese (2010a). Additionally, absolute deviation was reported instead of standard deviation because it reflects the level of dispersion from the median. Before the study began, the group set the target consensus to be an absolute deviation of less than one unit (i.e., an average of ±5% about the median) for each rating.

A total of 228 ratings were obtained from more than three iterative rounds of focus group surveys. To retain the most influential and positive characteristics of a leadership engagement, only the 15 attributes that achieved a consensus-based score of 2 or more on the Likert scale were retained for use in the scorecard (Figure 1). In other words, attributes with an average score reflecting "not critical" (less than 2) were not retained. The elegance of this scorecard is that observers simply need to observe an engagement and indicate whether they believe each attribute was present or absent. A final score for a given engagement can be obtained by simply summing the weights of the attributes observed as present or true (see Figures 1 and 2).

Phase 3: Reliability Check

Reliability is critical for the validity of any new metric, especially if it is used for benchmarking and is intended to be

FIGURE 2
LEADERSHIP ENGAGEMENT SCORECARD (BACK)

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TABLE 1
DEMOGRAPHICS OF EXTERNAL PANELS

	No. of experts	Mean years of experience
Panel 1	5	23.5
Panel 2	3	12.3

a quality-based leading indicator of performance. Therefore, the authors' next question was, when observing the same engagement, to what extent do different observers arrive at the same conclusion? That is, what is the reliability of this proposed scorecard?

To test reliability, the research team used the triangulation research methodology by assembling one internal and two external panels to test the scorecard using videos of actual engagements (Carter et al., 2014). The internal panel was comprised of the same experts who created the scorecard through their brainstorming and ratings. The two external panels were comprised of certified experts who were not involved in the creation of the scorecard. Table 1 shows the key demographic information for the participants that served in both the external panels. All experts on the external panels were safety managers and senior management across different sectors in the construction industries including oil and gas, utilities, and commercial construction. The selection of experts was performed following the method described by Hallowell and Gambatese (2010a). The rationale behind creating the two independent panels with comparable expertise was to control in-group biases and robustly examine the reliability of the scorecard for practical application.

Each panel was shown two unique leadership engagement videos and was asked to use the scorecard to rate the quality of the engagement. Both videos captured a routine engagement between a senior leader from management with a worker on a construction site. To control for any unintended confounding effects, neither the leaders nor the workers involved in the videos were privy to any details of the research presented in this study before the video was recorded.

Once the experts viewed the first video, they were asked to individually complete the leadership engagement scorecard. After the individual ratings were submitted to the facilitator, the aggregated results were revealed, and the inconsistencies were discussed. The process was repeated with the second video. As before, absolute deviation was used to determine the level of agreement among the panel and the target consensus was ±5%.

The results indicated that the reliability target was met by all three panels in both the first and second videos before any discussions were held. Although a larger field study would be needed to validate these findings, the above finding indicates that safety practitioners representing different sectors within the construction industry without prior training or calibration on using the leadership engagement scorecard can be expected to produce statistically similar conclusions. Additionally, to improve the clarity of the scorecard guidance (i.e., discretionary information provided to determine whether the attribute is present or true; Figure 2, p. 25), the external panels independently participated in moderated discussions to provide feedback on improving the language

that the internal panel used to create the final product. This research is intended to support a transition from lagging indicators to leading indicators that consider how well safety activities are performed.

Key Findings & Practical Guidance

This study provided the foundation for a framework for measuring and improving safety-focused leadership engagements. As the scorecards were created, the academic facilitators documented general themes in the expert panel discussions. These discussions provided deeper insight into what makes a leadership engagement excellent. Although 15 individual attributes were identified, discussed and weighted when creating the scorecard, six overarching themes were observed. These themes align with past literature on the importance of demonstrating care, robust and honest communication, and reinforcing positive behavior (Carrillo, 2005). A leader should consider these guiding principles to have a natural conversation that hits the right essential features of a high-quality leadership engagement. In the spirit of producing guidance that is consumable by an executive audience, the following recommendations are purposely concise.

1. Be genuine and understanding. An engagement should be used as an opportunity to listen and learn from employees to develop a better understanding of how they can be better supported. For example, to showcase a culture of unity, a leader must avoid being distracted during the engagement (e.g., multitasking), should dress appropriately for the site conditions, and should comply with all the rules and regulations that are imposed on the workers.

2. Demonstrate care. Leaders should take an interest in getting to know employees and seek to understand their personal and professional motivations and priorities. This understanding can allow leaders to tap into the pride that employees harbor toward their work.

3. Show humility. In most cases, leaders (as defined in this study) are not safety experts, nor are they typically experts in different crafts found on site. Therefore, leaders should ask questions to learn more about the work and acknowledge the skills and efforts of individual workers needed to successfully complete the work. By asking follow-up questions and giving workers an opportunity to describe the intricacies of their craft, leaders can provide meaningful implicit recognition that bolsters motivation and satisfaction.

4. Emphasize that safety is a priority. When leaders connect with employees on a personal level, they can implicitly and explicitly encourage employees to trust and share their ideas and concerns. A leader must verbalize the importance of safety over production targets.

5. Focus on what matters most. Workers know when a leader is visiting to perform a safety audit. Instead of reviewing the site for potential violations, the leader should ask questions to understand the hazards and conditions in the work environment that could result in serious injury or fatality. The leader can then explicitly ask how the employees plan to protect themselves and what the company could provide to make their jobs safer. It is highly recommended to not use safety-focused engagement as an opportunity to perform or appear to perform job evaluations. Its purpose is to forge lasting connections and seed values of shared culture.

6. Show appreciation and solicit feedback. The leader should ask for feedback and use active-listening skills by reflecting

on what was shared and summarizing the feedback. Active listening demonstrates commitment to the employees and reinforces trust.

In summary, the scorecard and associated guidance have been developed to provide leaders with the tools for excellent engagements. The authors' hypothesis, which will be tested in a subsequent study, is that the scores derived from using this scorecard will correlate with future performance. The proposed scorecard also provides an accurate way for leaders to track their performance, suggestions from the field and action items to improve on in the future.

Conclusion

Workers experience various stressors that can potentially affect the momentum of work and cause priorities to shift. These stressors may include weather, production schedule, material availability and even pandemics. In environments with such stressors, employee well-being and focus on safety become increasingly important. Past research has shown that leaders can play a vital role in managing these challenges and can help workers as they navigate conflicting priorities. Poor or no communication from leadership can heighten apathy, constrain growth, increase division and decimate safety culture. Conversely, leaders who have excellent engagements may boost morale, foster innovation, increase continuity and strengthen safety culture.

The leadership engagement scorecard and associated guidance presented in this article may support the assessment and improvement of the quality of safety-focused leadership engagement. The content shows leaders what a good safety-focused leadership engagement looks like and provides a framework for personal growth and continuous improvement.

Additionally, this study questions the conventional methods of safety measurement by helping organizations transition from lagging indicators such as TRIR to quality-based leading indicators. Although leading indicators are being used across industries, they are mostly quantitative in nature (e.g., measuring the frequency with which a safety activity is performed). Here, the authors take a different tactic by creating a reliable and internally valid method of scoring quality. The authors envision that organizations may jointly measure both the quality and quantity of safety activities to indicate the strength of a safety system.

Future researchers are encouraged to use the scorecard presented here to test the hypothesis that the quality of safety-focused leadership engagements is predictive of future performance. The statistical reliability of the scorecard suggests that it would serve as a potentially meaningful independent variable. **PSJ**

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