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The Role of Supervisory Support on Workers' Health and Safety Performance

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Abstract

Leadership is a critical component to an organization's embedded safety culture and influences the ways that health and safety is enacted on site. Empirical research has demonstrated that by improving leadership, safety outcomes are likely to improve as well. Worker perceptions are shaped through leader–employee interactions over time. However, few details are known about social support dimensions (i.e., emotional, informational, and tangible support) offered by supervisors and what kind of impact this communication has on miners' safety culture perceptions and performance. In order to study leadership communication in a high-risk environment, this study utilized pre- and post-interview data collected with 20 managers and 48 workers to identify positive and negative instances of social support and its implications on worker performance. Findings show that emotional support, although helpful in motivating miner compliance and proactivity, was harder to tailor and to be received as intended. Informational support not only had the largest impact on miners' behaviors but was also carried out by miners through support to their coworkers. Finally, tangible support in the form of supervisor assistance had a larger impact on worker behavior than offering incentives or other tangible rewards. By demonstrating the communication offered and desired within these three support dimensions – informational, emotional, and tangible – practitioners can see what is lacking in their organization and whether a shift is needed to balance supportive communication.

Introduction

Supervisory leadership is a critical component to the effective implementation of an organization's risk management processes. Specifically, supervisors serve as representatives of an organization and their actions are indicative of the organization's safety culture, serving as a frame of reference for guiding safe, compliant behaviors in the workplace (Eisenberger, Huntington, Hutchison, & Sowa, 1986; Mearns, Flin, Gordon, & Fleming, 1998; Petitta, Probst, Barbaranelli, & Ghezzi, 2017). Therefore, it is not surprising that by improving leadership subsequent safety outcomes are likely to improve as well (Zohar, 2002).

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Perceptions of management are shaped through unique leader–employee interactions over a period of time (Hofmann & Morgeson, 2004). However, understanding how supervisor–employee relationships operate in high-risk environments, specifically, is unclear (Denis, Langley, & Rouleau, 2010; Mirza & Isha, 2017). A starting point to recognize the idiosyncrasies of these relationships is by way of examining the communicative support offered by management and received by industry workers. Such an analysis would allow trends in how supervisory support in more dynamic work environments deviates from other occupational settings and as a result, what practices should be taken into account to improve organizational communication.

This paper starts with an introduction to supervisors' roles in high reliability organizations (HROs). After discussing leadership gaps in the mining industry, specifically, social support is discussed as a plausible framework to identify strengths and weaknesses in current leadership communication practices between supervisors and workers. To this end, pre- and post-interview data with 20 mine managers and 48 mine workers are used to study the communicative aspects of supervisor–employee interactions. Findings show aspects of emotional, informational, and tangible support that were perceived as more useful than others in contributing to workers' perceptions, motivation, and follow-through of safe work behavior.

Supervisors' contributions to HROs

An HRO paradigm is discussed as what organizations do to promote and ensure health and safety (H&S) at the workplace (Weick & Sutcliffe, 2011). Specifically, management must consistently engage in decision-making and communication to proactively identify possible hazards and leading indicators. Although research has shown that supervisors' specific managerial practices play a large role in employees' performance, studies of leadership and how it affects employee perceptions and performance remain understudied (Griffin, Parker, & Mason, 2010). Additionally, mining-specific research has argued that the industry as a whole needs to better learn from previous mistakes and current weaknesses through, in part, improving organizational safety routines and leadership (Madsen, 2009). This study focused on these calls to action by addressing supervisory leadership communication and its perceived reception among the mining workforce, and ways to improve supervisory–worker interactions as a means to support mine workers' H&S.

Supervisors' extrinsic safety motivation is defined as "the perceptions of supervisor enforcement of safety policies (i.e., enacted safety policy), including the extent to which supervisors provide praise for safety compliance and punish for non-compliance" (Probst & Estrada, 2010, p. 1440). Research has shown that supervisors' extrinsic motivation efforts have a substantial impact on workers' compliance and likelihood to experience injuries at work (Conchie, Moon, & Duncan, 2013). For example, if supervisors do not punish or reward the reporting of an incident, workers are less likely to participate in such actions (Neal & Griffin, 2006). Although safety rewards, enactment of policies, and knowledge sharing have been identified as processes supervisors use to extrinsically motivate worker compliance, the actual practices that make up each of these processes have not been studied. When it comes to improving workplace safety, leadership *styles* (e.g., transformational,

transactional) have been deemed either effective or ineffective, and have been promoted in a variety of sources (e.g., Kelloway & Barling, 2010). However, the context of these roles and interactions remains unknown (Porter & McLaughlin, 2006).

Specific to mining, this occupation has been a notoriously difficult environment in which to achieve organizational commitment as well as strong leadership (Mclaggan, Botha, & Bezuidenhout, 2013). Although leadership in the mining industry – or similar industries such as oil and gas or construction – has been studied in a broad sense (e.g., Gaertner, Newman, Shelly, Fisher, & Whitehead, 1985; O'Dea & Flin, 2001), there are overarching gaps that have yet to be answered. First, previous studies have focused on leadership style and not specifically leadership communication and implementation of the mine organization's safety culture and risk management system. As a result, implications for improving supervisory leadership have been ambiguous (O'Dea & Flin, 2001) and not been able to provide tangible information about effective leadership communication practices in the mining industry. Second, such studies both in and outside of mining have been undertaken from a quantitative perspective (e.g., Zohar, 2002; Zohar & Luria, 2010) and therefore, little is known about the "why" behind the data. As a result, more in-depth research has been recommended when studying leader–employee exchanges (e.g., Zohar & Luria, 2004).

The literature has also argued that, due to the aforementioned limitations, theoretical guidance and development and complementary research have evolved separately (Wayne, Shore, & Liden, 1997). Theoretical frameworks should be brought back into research around supervisor–worker exchanges in an effort to provide more focused interventions to improve H&S outcomes. Although several theoretical frameworks are available to study supervisory leadership in the mining industry, this study adopted a social support lens to frame the analysis. Although a well-established method, social support as a research framework has received little attention in occupational H&S literature. However, this framework has been deemed useful for the identification and development of social support interventions (Hogan, Linden, & Najarian, 2002) and should be explored in more high-risk environments.

In addition, the lack of supervisor support has been shown to be the strongest risk factor for workers (Hämming, 2017). However, the pragmatic nature of identifying and using support dimensions is something that has been unexplored in high-risk industries, such as mining, but could provide long-term benefits to the industry. For example, the National Mining Association (NMA, 2014) recommends broad leadership competencies to effectively implement a risk management system (i.e., accountability, communication, feedback, and recognition). However, the NMA does not provide examples of what these competencies look like in action nor how to decipher if enacted or perceived support has occurred. As a result, it is plausible to believe and investigate if and how perceived social support can be tailored in the mining industry to improve H&S outcomes.

Dimensions of social support

The importance of social support dates back to the 1970s, when it was identified as a protective health factor (Cassel, 1976). Shortly after, empirical investigations gained traction and causal links between support and health – including mental and physical – were

established (see House, Umberson, & Landis, 1988). Studies have shown that social support can act as a buffer, protect individuals from the negative effects of stress, reduce perceived job demands, and increase job satisfaction (Burke & Greenglass, 2001; Cohen & McKay, 1984; Johnson & Hall, 1988). Social support is broadly defined as the assistance and protection given to individuals (Shumaker & Brownell, 1984) and serves as the functional content of relationships (House, 1981).

Varying dimensions of social support have been identified in the literature, with subtle distinctions made among scholars including the following distinctions: (1) emotional, informational (also known as appraisal), and tangible (also known as practical) support; (2) informational (also termed instrumental) and emotional (also termed expressive) support; and (3) emotional and tangible support. Due to three common dimensions that often overlap in the research, this paper utilized all three overarching dimensions that were most commonly discussed and studied: emotional, informational, and tangible (Antonucci, 1985; Cutrona & Russell, 1990; Kaplan, Cassel, & Gore, 1977; Langford, Bowsher, Maloney, & Lillis, 1997; Rees & Hardy, 2000). Each of these support dimensions and their respective subtypes are discussed below with adapted examples (adapted from Cutrona & Suhr, 1992; Heaney & Israel, 2008; Rees & Hardy, 2000).

Emotional support—Emotional support is "The ability to turn to others for comfort and security during times of stress, leading the person to feel that he or she is cared for by others" (Cutrona & Russell, 1990, p. 322). Studies have shown that listening support and performance feedback from supervisors provides the opportunity to develop skill variety, a sense of autonomy, and improved worker engagement (Bakker & Demerouti, 2008; Schaufeli & Salanova, 2007). However, emotional support is usually more difficult for supervisors to match with their workforce and is heavily dependent on those receiving the support (House, 1981). Three subtypes of emotional support highlighted in the literature include (1) *Listening support* or listening without giving advice or being judgmental; (2) *Emotional comfort* or comforting workers and indicating that others care about their well-being; and (3) *Emotional challenge* or challenging workers to evaluate their own attitudes, values, and feelings.

Informational support—Cutrona and Russell (1990) define informational support as "Providing the individual with advice or guidance concerning possible solutions to a problem" (p. 322). Providing adequate, tailored informational support and feedback has been shown to foster learning, increase job competence, create a sense of belonging, and increase worker resilience (Bakker & Demerouti, 2007; Jennings & Britt, 2017), which is particularly important for industries that are in flux due to environmental and regulative constraints. There are three informational support subtypes identified in the literature: (1) *Reality confirmation* occurs when supervisors indicate that other coworkers are similar to them and see things the way they do; (2) *Task appreciation* occurs when supervisors acknowledge employees' efforts and express appreciation for their work; and (3) *Task challenge* occurs when supervisors challenge employees' way of thinking about their work in order to motivate and foster greater creativity and involvement in work.

Tangible support—Finally, tangible support entails any assistance or resources in which an individual is provided to help cope or perform (Cutrona & Russell, 1990). Some research describes tangible support as reciprocity in the workplace or leader–member exchange (Hofmann, Morgeson, & Gerras, 2003). In other words, employees are more likely to reciprocate safety obligations if they perceive that supervisors fulfill safety obligations as well. Providing job resources has been shown to facilitate a sense of worker dedication (Meijman & Mulder, 1998). Two subtypes of tangible support include (1) *Material assistance* or when supervisors (via the organization) provide employees with safety products and (2) *Personal assistance* or when supervisors give their time, skills, knowledge, or other expertise to help employees accomplish their tasks.

Study objectives

Organizational interventions to improve management styles have been discussed as a promising approach to improve safety climate and worker compliance (Parker, Axtell, & Turner, 2001). However, focusing on the importance and types of communication within these interventions has been absent. Although the role of workplace communication is often noted, research has not attempted to empirically demonstrate its impact on worker perceptions and performance. Accordingly, this paper fills a critical challenge in occupational H&S research by discussing empirically validated communication practices offered by members of mine management to their workforce. Based on interviews completed with mine workers and mine supervisors, this study seeks to understand the following questions: (1) What types of social support transpire more or less often at mine sites? (2) How are these support mechanisms (or lack thereof) perceived by workers? (3) What impact does adequately perceived social support have on worker performance (i.e., proactivity and compliance)?

Methods

The National Institute for Occupational Safety and Health (NIOSH) recently completed a series of longitudinal interventions at five mine sites that represented three companies with 48 workers and 20 supervisors (see Haas & Cecala, 2017). The primary purpose of these interventions was to help mine management use dust assessment technology as a risk communication tool to prompt and communicate about healthier behaviors with their workforce. However, the qualitative data collected within these interventions, which were originally coded inductively to answer the research questions for the intervention study, were used in a secondary analysis via a social support framework to provide insight into and improve leadership communication processes.

Secondary analysis is a common method in qualitative inquiry to independently and further contribute to a growing body of knowledge in a certain area (Glaser, 1963) and is particularly helpful when applying a new theoretical or conceptual focus (Heaton, 2008). In addition, this method was particularly useful because accessing mine workers and mine managers to obtain in-depth qualitative data can be difficult due to the environment, work demands, and sensitivity of safety culture within the occupation.

Recruitment, data collection, and analysis

The study obtained human subjects research approval from the NIOSH Institutional Review Board and Office of Management and Budget. Upon approval, a purposive sampling strategy was used to recruit and visit five mines, two times each, between April 2016 and September 2017. At each participating mine site, both workers and supervisors participated in a variety of data collection activities. This current analysis focused only on the qualitative data collected during each visit with workers and supervisors, discussed below.

Mine worker interviews—Theoretical frameworks were referenced to develop questions about mine workers' risk perceptions, susceptibility/severity, knowledge/motivation, and protective behaviors on the job. Workers were asked to discuss times when they are exposed to more risks on the job and what they do, if anything to minimize hazards. Workers were also asked to discuss communication on site including how often their supervisor talks with them about different site-specific risks, behaviors that can reduce these risks, and preferred communication methods. Short one-on-one interviews – between 15 and 35 minutes – depending on time constraints and openness of each participant, were conducted with 48 workers in designated office rooms to protect confidentiality.

On the follow-up interviews, workers were asked questions such as "What changes have you made to your work practices since you and your supervisor talked about [insert topic from previous interview]?"; "Explain the communication with your supervisor since I was here last"; and "Discuss your ability to communicate H&S concerns to your supervisor." Participants reported being loader operators, rail loaders, lab technicians, dry maintenance and clean-up, electricians, process operators, load truck operators, and bagging operators. Researchers took handwritten notes during each interview that were later typed. Using Times New Roman 10-point font, interviews ranged from two to eight pages, single spaced, with an average of 4.5 pages per interview.

Supervisor interviews and focus groups—Frontline supervisors and H&S managers participated in either a one-on-one interview or a focus group. In the case of management, depending on the size of the mine and availability of supervisors, sometimes a focus group was more convenient. One limitation of focus groups is that some participants can be influenced by others who are present and participate in the discussion, including withholding certain information (Krueger & Casey, 2000). Although this is always a possibility, in our case, none of the focus groups or discussions included a hierarchy of management. For example, an H&S manager and a plant manager have the same supervisor, who was not present during the discussion. In response, no one visually appeared to be uncomfortable discussing their opinions. If anything, the discussions that included more managers just facilitated additional comments, especially if the experience varied among participants.

Twenty participants (11 from the first mine, four, one, two, and two, respectively) discussed ways they engaged workers and encouraged execution of their H&S procedures. The same questions were asked during the interviews and focus groups, which lasted anywhere from 1 to 2 hours. Questions focused on common H&S elements (i.e., leadership development; accountability; knowledge, skills, and abilities development; culture enhancement; behavior

optimization; and risk management) and how they are enacted within the Health and Safety Management System (HSMS) (Yorio & Willmer, 2015). Examples of questions asked included “How do you typically communicate workers’ H&S responsibilities to them on the job?”; “How do you manage your workers’ performance on a daily basis?”; and “How do you go about identifying things that need improved around here?”. Researchers who facilitated the focus groups took handwritten notes, which were later typed, to capture participants’ opinions throughout the discussion. Using Times New Roman 10-point font, notes ranged from three to nine pages, single spaced, with an average of six pages per data collection session. The longer transcripts were more often focus groups whereas the notes that were shorter tended to be a one-on-one interview.

The same interview (or focus group) occurred with workers and supervisors during the first visit and follow-up visit 6 weeks later. The follow-up interview further assessed what communicative practices the supervisor provided during the intervention period, whether anything had changed, and what workers’ perceptions were of the support supervisors offered during this time period, including whether the workers changed any protective health practices in response to supervisory support.

Data analysis

The data were deductively analyzed (Patton, 2002) by the primary author using the three social support dimensions as an organizing framework. Each interview and focus group was coded, first for the social support dimension type and second for the support subtype. This coding process allowed a hierarchy of support dimensions and types to emerge from both supervisor and worker perspectives. This particular deductive analysis was chosen primarily because it helped expand upon and answer the current study’s initial research objectives about social support and how support types are perceived among workers. Also, according to best practices in secondary analysis of qualitative data, the latter analysis should be close to those of the primary research, while honing in on more specific frameworks to answer the research questions (Heaton, 2008). After initial coding was completed, it was necessary to further compare and process trace the two datasets to reveal any impact the social support types had on workers’ perceptions and performance over the 6-week intervention period.

The goal of process tracing is to better understand specific events, processes, and in some instances, causal claims (Collier, 2011). The current analysis studied the intervening causal mechanism, which were the changes, or evolvement of management’s social support practices, on worker H&S performance. When applying process tracing on the current dataset, it was important to look for saturation in patterns, sequences, traces, and accounts within the data (Beach, 2017) to inform any outcomes on supervisory communication practices. By coding the datasets in this collective, yet progressive format, patterns in both supervisors’ communicative practices and workers’ perceptions and responses emerged.

It is important that process tracing analyses are coupled with comparative methods to enable generalizations about causal processes and as a result, constant comparative methods are critical to use with any process tracing effort (Beach, 2017). Therefore, once the datasets were organized and traced around the categorizing framework of social support in both the pre- and the posttran-script notes, the examples underwent a constant-comparison analysis to

ensure that instances within the dataset were supporting each other (Glaser, 1965). This step of refining the trends within each support subtype and discovering patterns was particularly important for discerning examples that fit within each support subtype and how mining, as a high-risk environment, may require specific types of support.

After the analysis steps were completed, the primary researcher shared the analysis and coding with two researchers who participated in the original data collection and analysis for inter-rater reliability purposes. No discrepancies emerged that needed to be resolved. In some cases, additional discussions about the subtypes of social support and seeing that some examples could fit under more than one subtype occured. Although this data were used as a secondary analysis, the results still revealed a saturation of the data (Corbin & Strauss, 2008), rendering ample instances of each social support dimension and subtype.

Emotional support results

Listening support

Within the dimension of emotional support, listening support emerged often in the data as a subtype that supervisors offered to their employees and seems important in environments, such as mining, that change often and as a result need constant attention. Managers referenced the importance of listening, answering questions, and taking action not only to maintain the H&S of their employees but also to show that they care about their workforce. Many supervisors discussed making things visible to their workers through action. One supervisor said, “You have to avoid being all talk and no do. I’ve worked on that and learned to take notes when talking to a worker. I don’t have a good memory and easily forget something someone told me on site. But if I write it down on a post-it [note], I’ll find it and take care of it later.” Along these same lines, supervisors referenced the time required to adequately listen and respond to their employees. One supervisor said, “This job requires a 12-hour rather than an 8-hour day, if you really take the time to go out and be with the guys and talk to them.”

Workers discussed times when they expressed a concern to their supervisor and whether or not the concern was addressed. In general, if workers felt that responses to work orders or other concerns were addressed quickly, their supervisors genuinely heard their concerns and care about their well-being. For example, when talking about issues related to their contaminant exposures on site, one worker said that when it comes to things that involve their health, management is timely and “[they] don’t put stuff like that off.” Similarly, another worker said during his interview, “But in general things that are health-related get moved up on the list around here. They do value our health.” This feedback suggests that it is perhaps more important for supervisors to attend to issues related to the H&S of their workforce and other topics such as production, quality assurance, and customer service issues can be addressed a bit differently or at least not immediately.

However, listening support was not always perceived as attentive and helpful among hourly workers, especially if the above actions appreciated by workers were not addressed among supervisors. Mainly, there were several instances when workers referenced that supervisors do not listen or take action on H&S issues that they report. As one worker said, “You can

bring up issues but no changes are made." Similarly, some workers mentioned that their supervisor will say that there is nothing that they can do. For example, one worker said that, when he asked his supervisor why they can't fix the hole chute to prevent sand from running out, the managers' response was, "The chain of command makes it difficult to implement any changes." In this instance, the worker felt that his supervisors' response was an excuse and not necessarily a real reason as to why something could not be fixed on site. In many cases, workers who felt that their supervisors were unresponsive to reported H&S concerns showed low levels of involvement and motivation in H&S initiatives and rules on site.

Emotional comfort

Besides listening and taking action to visibly show support, unique instances of supervisors' emotional comfort emerged. Supervisors noted the value of emotional comfort if workers were upset about a new rule, process, or decision. Supervisors found that first, providing a logical rationale behind the new rule or procedure helped and second, if the rationale was primarily focused on protecting workers' health, the perspective and adaptability of workers improved. To illustrate, one site recently mandated new safety glasses with side shields to prevent silica from getting into workers' eyes. Even though eye injuries decreased, workers did not like the glasses. One supervisor said, "We found that we had to explain why we did this. It's not a punitive thing. We're doing it for their protection. Taking the time to explain that makes all the difference and we got their buy in."

Another manager took a similar approach when communicating about a site rule that was stricter than the regulatory standard. He said, "I've made a point to not just say what but rather I say why our own standard is stricter." Workers' recollection of these types of conversations was similar. One worker said, "I remember discussing our exposure levels in comparison to the standard exposure levels because we are under the standard for our own benefit." Providing dialogue that put the worker in a valued position was useful to many of the participating supervisors.

Emotional challenge

Emotional challenges were not referenced as often and when they were, often overlapped with (informational) task challenges as well. Supervisors discussed efforts to engage with workers who were more resistant to participating in H&S activities. They shared that it takes a keen awareness to effectively challenge workers' attitudes and H&S values. As one manager said, "We get those involved who are resistant to help rewrite programs. We need their input to get buy in. If they're resistant all the more reason to bring them in." However, in some cases, workers felt unsupported if their safety values were not validated by their supervisors. For example, one worker said, "There are a lot of negative people around here. So sometimes it's really hard to get a problem solved. If you talk about safety in meetings people don't want to hear it." Therefore, unless a supervisor makes an effort to not only challenge workers about their safety values but validate those values in some way, workers may feel less supported by management. However, in both emotional challenges and task challenges, described next, these engagement opportunities to further increase the knowledge and skill-base of workers appeared to be critical for workers to maintain a motivation to be aware of hazards on site and continuously monitor and reduce certain risks.

In this sense, constructing a more bottom-up approach in feedback and involvement could be helpful in some of these high-risk industries.

Informational support results

Task challenge

Within the dimension of informational support, task challenges were commonly used by supervisors and, in many cases, appreciated by workers. Workers often discussed opportunities offered by their supervisors to encourage proactivity. Workers' examples included being asked to mentor a newer worker, serve on an H&S committee, or participate in formal performance evaluations. Supervisors provided similar examples of creating opportunities to challenge and advance their workforce. One supervisor said, "Doing the monthly safety inspections with these guys [on the safety committee] has really helped develop their leadership skills. It helps teach them about small things to watch for and empowers them to make a difference."

In addition, supervisors discussed other types of task challenges that did not even involve them. Rather, some developed programs where workers could evaluate each other in the form of peer-to-peer interventions. Supervisors with such programs talked about these efforts with pride as a way to increase accountability. In addition, peer-to-peer interventions, specifically, were referenced as a critical program that leaders needed to develop and promote to ensure worker safety. Even participating workers said things like, "It's [peer-to-peer] is a good way to hold us accountable and find things we need to fix. So, we fill in things we need to fix and code them by red and green. It gives us a priority list." Although peer-based interventions may not seem critical in the everyday work environment, in one where dynamic and ongoing hazards are present, this form of bystander intervention is essential to better protect workers on the job. One example provided during the interviews was challenging a coworker if fall protection was not being worn when changing out a piece of equipment. Although it can take a while to setup, this protective equipment has and continues to save lives when worn. However, supervisors must have a strong system in place that promotes worker feedback and support.

Despite the positive perceptions of management about their abilities to provide task challenges, several workers expressed a desire to be challenged more on the job. It is important to distinguish that workers' dissatisfaction was with job- or task-specific knowledge, rather than with the site-wide opportunities emphasized by supervisors. As one worker said during his follow-up interview, "I still wish I knew more about the tasks we should be doing. I can do my job without being told, but having more information behind the tasks would be helpful." Similarly, some workers felt that they were not learning anything new that could better prepare them for work. In this sense, more job-specific tailoring of task challenges may be useful to engage and motivate workers.

Task appreciation

Task appreciation was an often-discussed tactic used by management to show appreciation for and continue to encourage workers' efforts on the job. Supervisors highlighted various

ways that they involved workers in new decisions that would affect their (the workers') jobs. One example included worker involvement in employee hiring processes. Another group of supervisors discussed a program where they walked around and observed workers to learn about task-specific barriers. This allowed supervisors to appreciate obstacles that workers might have to overcome from a piece of broken equipment to a lack of ventilation in a building. Supervisors said that this process allowed them to get to know each person on the crew, give them recognition, and make improvements.

In addition, if a rule or process changed, managers tried to involve employees in revisions to ensure clear language and expectations. As one manager explained, when metatarsal gloves became mandatory on their site, they let workers choose the best glove(s) for their particular job task, knowing that different tasks might require different levels of flexibility while still being protected. Workers noticed when these types of involvement and appreciation activities occurred. One worker said, "The supervisors don't do the job we do. So it is really about us making decisions together as a team and what's best for us. They let us do that." Although no workers referenced examples of this support subtype as a "leadership opportunity" as noted by supervisors, they did say that these opportunities were "something different" that can increase H&S knowledge while even boosting their end-of-year performance evaluations.

Reality confirmation

Although supervisors revealed fewer instances of reality confirmation, this support subtype played a larger role in worker feedback during the interviews. Workers recognized when their supervisors talked with them about hazards more in-depth, meaning that supervisors not only acknowledged a hazard or work-related barrier but also discussed mitigation strategies with them. To workers, this was an example of keeping H&S at the forefront and of the two groups having similar priorities. These interactions usually occurred during one-on-one conversations or with the crew during a pre-shift meeting. Participating workers said that they are more likely to bring up concerns during these types of "reality checks" with supervisors.

Additionally, any formal collaboration processes were considered valuable. For example, one supervisor said that bringing workers into the corrective action process helped improve hazard mitigation efforts. When workers are involved, "They see the value they add … They see how it works and follow and lead by example." Even if workers spoke more neutrally toward such programs, they referenced and noted the collaborative nature of working together. For example, one worker said, "We do corrective action reports, we make people aware of all the incidents and try to figure out the best plan to prevent or mitigate." However, varying perceptions of managers and supervisors were still evident, particularly when it came to feeling able to shut down a process on site out of an abundance of caution. Therefore, more effort is needed to ensure that both groups have similar realities of enacted processes on site.

Tangible support results

Personal assistance

Personal assistance as a tangible support subtype was common. Because supervisors cannot always provide monetary resources in the form of bonuses or awards, the allowance of their time to provide expertise and knowledge was something both groups discussed. Supervisors said that consistent check-ins with their employees established trust and prompted employees to come to them much sooner with questions or problems. One supervisor noted that he uses their standard of the week as an opportunity to initiate these types of conversations with workers. He stated, “Last week it was fire extinguishers, it gave me a chance to check for concerns.” Another supervisor indicated that engaging in routine check-ins “has helped people slow down and analyze the risks with what they’re doing.” Also, one supervisor said such involvement with his crew enabled them to come up with improvements to first aid certifications on site. Supervisors also acknowledged that this process takes time but that giving workers the tools, whether tangible or intangible, is important to build trust. One supervisor discussed monthly safety tours that the company started doing with its workforce to promote learning and hazard identification. One supervisor said, “We try to be tougher than they [Mine Safety and Health Administration] would be and we come up with all kinds of hazards or even what could be a citation to help them learn.”

The giving of supervisors’ time to instill knowledge in their workforce was a center point during discussions with almost all of the workers. Workers discussed the value in their supervisor providing personal assistance on the job and, specifically, that it influenced their future H&S actions. In response to personal assistance offered during the interventions, workers mentioned changing housekeeping practices and the ways they clean up dust-laden environments, how they use certain types of engineering controls and their increased levels of proactive behavior on the job. To illustrate, one worker said, “He [my supervisor’, asks how things are going all the time and goes over any results with me and how I might be affected.” It is clear that this type of support was valued by workers and taken as a sign that their H&S was valued more than productivity. For example, one worker said about his supervisor, “If we are going somewhere together he gives me a heads up if I need to bring my respirator to an area where it’s not required. He’s always looking out for me around here.”

Material assistance

Material assistance, or tangible resources, were primarily discussed by supervisors but less so by workers. Based on the feedback from supervisors, material assistance is offered to workers primarily in one of two ways: (1) job-specific training and task tools or (2) safety incentives and rewards. First, supervisors discussed extra training to enhance workers’ knowledge, skills, and abilities. A common example was task training for each piece of equipment that a worker may be using throughout the workday. Also, supervisors indicated that extra pre-shift checklists or other H&S checklists that are not mandated serve to further protect workers. For example, one group of supervisors updated their checklist at the completion of the researcher interventions and said, “We put specific things about dust in

H&S checklists for new people. It's something you forget about because you can't see it. Now workers are reminded and we can't forget either."

In some cases these forms or checklists to aid hazard identification were tied to an incentive. Almost all of the supervisors noted that if workers completed some type of near miss or hazard identification form and turned it in, then they were entered into a drawing for something like a $25 gift card to a restaurant, sporting goods store, or home repair shop. However, supervisors noted that they have to make sure the drawing process is consistent and fair (e.g., all entries are numbered with no name so favoritism cannot be argued). Other supervisors talked about catering awards to employees' hobbies. One supervisor said, "If they like hunting get them ear blockers. You have to do more than 'here's a coffee cup,' because it means so much more. Rewards on an individual basis are important." Despite supervisors focusing on this type of recognition for their workforce, they all noted that participation is fairly low in such activities. Additionally, no worker mentioned these types of support offered on site, indicating little to no impact on workers' H&S actions on the job.

Discussion

Common supervisory-support practices emerged in this secondary analysis of the data and help respond to claims that we still do not know what supervisor–employee communication looks like in high-risk environments (Denis et al., 2010; Mirza & Isha, 2017). Because the supervisor and worker data contained both the pre- and the post-time points, these data allowed an explanation and illustration of the link(s) between support types and workers' compliance, proactivity, and participation. As a result, aspects of social support that may be unique or more critical in high-risk industries, such as mining, were able to emerge. This discussion focuses on two main areas. First, the types of social support critical for workers to maintain personal H&S in high-risk environments included subtypes of informational support and personal assistance. Second, the subtypes of social support that is more amenable to encourage worker compliance on the job or worker proactivity on the job are discussed.

The immediate change in supervisor support that can occur at such dynamic work environments includes managers traversing the worksite more (i.e., management by walking around strategies). Moving forward, regardless of the support type being implemented, it is critical that managers assess whether behaviors that are intended to be supportive are indeed perceived that way. For example, if material assistance, such as incentives, are not garnering the participation and proactivity intended, then it might be more useful for management to walk around site more throughout the day to engage workers in hazard identification during one-on-one conversations. These "management by walking around" strategies have been shown to facilitate and increase active problem-solving as well as improve employee perceptions (Tucker & Singer, 2015), and can be adapted by mine management. These strategies should occur separate from scheduled meetings and breaks. This timing would ensure that workers are engaged in a job task and have the opportunity to ask questions of their supervisor while also allowing supervisors to engage in site-specific communication about relevant hazards on the job.

Ongoing need of informational support and assistance in dynamic work environments

The results also indicate that any type of informational support can have a positive, reciprocal impact on worker compliance, proactivity, and participation, behooving mine management to adopt these support subtypes. Of interest is the finding that workers appreciate being more engaged in knowledge-building activities specific to their job tasks in part because of their increased sense of safety on the job. In the case of informational support offered by supervisors, the results showed that workers often reciprocate these support efforts (i.e., task appreciation and task challenges) through helping coworkers with H&S efforts and actively participating in H&S activities. This was evident in the results when supervisors described efforts they use to involve workers in H&S activities and workers responding with positive sentiments of how their participation in such activities has made them more aware of and responsive to H&S hazards.

Within the pre- and post-intervention data, informational types of support and engagement from supervisors were shown to encourage worker motivation and compliance. Previous research supports this finding, as Battles, Dixon, Borotkanics, Rabin-Fastmen, and Kaplan (2006) argues that conscious and open conversations function as a sense of empowerment for workers. Specifically, workers believe that they can impact their environment by noticing and responding to smaller incidents in an effort to prevent larger problems (Battles et al. 2006). An added bonus of supervisors improving aspects of their informational support is a subsequent increased sense of job autonomy among the workforce, which has been shown to be critical for organizational H&S (Zohar & Luria, 2010).

Supervisors referenced ways to challenge and motivate workers including, “Tell them that you are trying to learn what they are doing. Ask them to help you identify potential hazards,” or “Try to catch people doing things right.” Workers appreciated these management by walking around strategies. For example, one worker said in his post-interview, “My supervisor actually came out when I was shoveling to ask questions and make sure I was doing it properly. He made comments about how I might shovel [differently]. It’s second nature to throw everything but you cause a lot of dust when you do that.” Workers appreciated this type of information and communication. As one worker said, “[Since the intervention] it’s been nice getting suggestions from my supervisor. A lot of his suggestions come from experience and he’s done the work too.” In this sense, receiving the attention and information from supervisors about a job task can have a positive impact on worker perceptions and performance. Therefore, supervisors should make sure to express appreciation to workers not necessarily through a monetary reward or incentive, but through personal interactions that also involve knowledge-building.

Although informational support was discussed by workers and supervisors, and despite the positive perceptions of management about their abilities to provide task challenges, several workers expressed a desire to be challenged more on the job. It is important to point out that workers’ dissatisfaction was more often with the knowledge they were gaining within their specific job role, rather than the site-wide opportunities discussed by supervisors. Therefore, tailoring challenges to workers’ specific job roles and responsibilities may encourage workers to step up more rather than using the same, broad opportunities for everyone.

Modifying the tangible support offered to match workers' needs

Offering support through personal assistance and various types of challenges encouraged workers to follow rules and participate in H&S. However, not all support subtypes had equal impact on workers' proactivity and compliance. A glaring difference within the tangible support dimension is that no workers discussed material assistance. Specifically, the participating workforce did not take advantage of incentives to improve safety reporting and as a result, this type of support from supervisors did not have much of an impact on workers' compliant behaviors, as revealed in the datasets. Research has argued that employees are less motivated to comply with safety rules if they are not rewarded for working in a safe manner (Hofmann & Morgeson, 2004). However, the current study results do not support this claim, with the exception of verbal accolades offered by the supervisor in response to a job being well done.

Several managers noted that participation in incentive activities is low and people probably just forget to fill out the related forms. However, since workers failed to mention these activities during the interviews, it appears to not be a primary motivator in workers' H&S actions. Therefore, maybe material assistance is not as important in motivating H&S as management thinks and rather, the presence and support from a supervisor in the form of personal assistance is more important. This could be a shift in how support is offered to workers in high-risk environments in the future. Although an incentives-based approach may be appreciated and work in a typical office environment where safety is not necessarily at stake, it appears that mine workers would prefer the face-to-face interaction and assistance. There is some research that supports this claim indicating that, as workers have an increased cognitive demand on the job, incentives can become a barrier to safety by encouraging cheating and shortcuts, squandering extrinsic motivation, and foster short-term thinking (Pink, 2011). In response, a variety of communicative, support methods are needed to establish a sense of compliance and proactivity on the job that include engaging and participating in activities with the workers instead of expecting them to fill out forms on their own and turn them in with little follow-up or follow through. Pink (2011) encourages supervisors to help workers accomplish mastery of tasks and garner a greater sense of purpose on the job. Personal assistance during the workday can help foster these two aspects.

Awareness of perceived emotional support

The supervisor and worker data provide insights into the various emotional support subtypes and workers' behaviors. Although not reciprocal as informational support was indicated to be, the emotional support – such as listening or providing attitude adjustments to workers – was something workers referenced when they said "yeah, he cares about me." In many ways, this interfacing role that the supervisor plays between the organization's safety climate and workers' experiences of how H&S policies are enacted is valuable in enhancing a worker's experiences on the job. In this sense, having an attentive supervisor who enforces policies but is willing to listen and to be adaptable can significantly improve the safety climate.

Notably, this support dimension and support subtypes are likely to be similar across work environments as the current results are not unique to mining or high-risk industries. Rather,

the results show that all workers, regardless of occupation, just want to know that their supervisors care about them and their well-being. Most managers in the current study acknowledged this, saying that each worker is different and brought up the importance of being aware of each person's needs to show that he or she is cared for and respected on site. One manager emphasized this aspect of emotional comfort when he said, "How you say something has a big impact. You want the visibly felt leadership. Don't automatically question an employee…Be genuinely interested in the conversation and always try to leave on a positive note." In this sense, the listening and subsequent action taken by management can have a large effect on workers' decisions on the job.

Limitations and conclusions

This paper showcased communicative examples within three support dimensions in addition to the impact that these practices can have on workers' H&S performance in a high-risk work environment. By demonstrating the communication offered and desired within these dimensions, practitioners are able to see what may be lacking in their current organization and whether a shift in organizational culture is needed to balance and encourage supportive communication and accompanying activities. Mainly, the results of this qualitative analysis and subsequent process tracing of the pre- and post-data helped to elucidate many strengths and weaknesses in the current social support mechanisms offered by management and that, for the most part, an increase in supervisor visibility and communication throughout the day could alleviate negative perceptions among the workforce.

Importantly, this study also has implications for using some dimensions of social support more or less frequently in high-risk environments. In other communication research, emotional support as a subtype has been deemed necessary and in some cases, statistically more important among injured athletes, cancer patients and survivors, and others such as those who have depression. However, in this context, various types of informational support as well as personal assistance were deemed more valuable among mine workers. These results may not be surprising when taken at face level, considering the difference in experiences and environments. However, knowing the specific types of support that work for this industry group is important because the mining industry remains important within domestic and international economies. Regardless of the commodity (e.g., coal, metals, minerals, etc.) and whether materials are extracted on the surface or underground, the working conditions are consistently acknowledged as physically demanding, and workers are exposed to numerous risks (Phakathi, 2017). Due to the numerous hazards present both underground and on the surface, research to understand ways to improve the H&S decisions made by workers remains important. In response, this research contributes to the body of knowledge around social support theory while adding a specific context that could improve leadership communication among other high-risk sectors.

Despite the utility of the current results, there are still limitations that need to be considered. Primarily, because this was a secondary analysis that expanded on an initial inquiry of supervisor communication, the social support framework was not at the center of the initial data collection. Although there was clear overlap in the social support dimensions and supervisor–worker communication, a more precise line of research inquiry should occur

with this explicit framework in mind to be able to say more about the results (Hinds, Vogel, & Clarke-Steffen, 1997). Collecting data with this framework in mind from the start may allow more examples for each support type to emerge that could not be provided from a process tracing perspective as in the current study. Along these same lines, if the study had been undertaken with this framework from the start, either a larger or smaller dataset may have been rendered. In addition, although process tracing is touted as a valued method for theory or model development, a follow-up empirical study that statistically tests the model developed within this paper would further benefit the research literature and eventual adoption of such support practices. Specifically, the use of Bayesian logic would be a useful approach as it is a common method used with process tracing (Schmitt & Beach, 2015). Finally, due to the current study sample, these study results cannot be generalized to the entire mining industry.

Despite these limitations, the results were able to take an existing communication theory, apply, and extend its use in the realm of occupational H&S, illustrating that the complexity of social support offered to workers on the job, and the negative consequences that unwanted or mismatched support can have on workers' motivation to engage in compliant and proactive behaviors. By focusing on these interpersonal interactions in the context of specific health issues, it was possible to delve deeper into the roles of how leaders – and how their communication – can impact workers' safety outcomes. As a result, frontline leaders can use these results to become more effective communicators while keeping a systems-focused visionary mindset.

References

Antonucci TC (1985). Social support: Theoretical advances, recent findings and pressing issues. In Sarason IG, & Sarason BR (Eds.), Social support: Theory, research and applications (pp. 21–37). Dordrecht: Springer.

Bakker AB, & Demerouti E (2007). The job demands-resources model: State of the art. Journal of Managerial Psychology, 22, 309–328. doi:10.1108/02683940710733115

Bakker AB, & Demerouti E (2008). Towards a model of work engagement. Career Development International, 13, 209–223. doi:10.1108/13620430810870476

Battles JB, Dixon NM, Borotkanics RJ, Rabin-Fastmen B, & Kaplan HS (2006). Sensemaking of patient safety risks and hazards. Health Services Research, 41(4p2), 1555–1575. [PubMed: 16898979]

Beach D (2017). Process-tracing methods in social science. Oxford Research Encyclopedia of Politics. Retrieved August 20, 2018, from http://politics.oxfordre.com/view/10.1093/acrefore/9780190228637.001.0001/acrefore-9780190228637-e-176?print=pdf

Burke RJ, & Greenglass ER (2001). Hospital restructuring and nursing staff well-being: The role of perceived hospital and union support. Anxiety, Stress and Coping, 14, 93–115.

Cassel J (1976). The contribution of the social environment to host resistance. American Journal of Epidemiology, 104, 107–123. doi:10.1093/oxfordjournals.aje.a112281 [PubMed: 782233]

Cohen S, & McKay G (1984). Social support, stress and the buffering hypothesis: A theoretical analysis. Handbook of Psychology and Health, 4, 253–267.

Collier D (2011). Understanding process tracing. Political Science and Politics, 44, 823–830. doi:10.1017/S1049096511001429

Conchie SM, Moon S, & Duncan M (2013). Supervisors' engagement in safety leadership: Factors that help and hinder. Safety Science, 51, 109–117. doi:10.1016/j.ssci.2012.05.020

Corbin JS, & Strauss AA (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory (3rd ed.). Thousand Oaks, CA: Sage Publications.

Cutrona CE, & Russell DW (1990). Type of social support and specific stress: Toward a theory of optimal matching. In Sarason BR, Sarason IG, & Pierce GR (Eds.), Wiley series on personality processes. Social support: An interactional view (pp. 319–366). Oxford, England: John Wiley & Sons.

Cutrona CE, & Suhr JA (1992). Controllability of stressful events and satisfaction with spouse support behaviors. Communication Research, 19, 154–174. doi:10.1177/009365092019002002

Denis JL, Langley A, & Rouleau L (2010). The practice of leadership in the messy world of organizations. Leadership, 6, 67–88. doi:10.1177/1742715009354233

Eisenberger R, Huntington R, Hutchison S, & Sowa D (1986). Perceived organizational support. Journal of Applied Psychology, 71, 500–507. doi:10.1037/0021-9010.71.3.500

Gaertner G, Newman P, Shelly P, Fisher GP, & Whitehead K (1985). Determining the effects of management practices on coal miners' safety. Human Engineering and Human Resources Management in Mining Proceedings, 82–94. Ann Arbor, MI: University of Michigan. Retrieved from https://www.amazon.com/Human-engineering-resources-management-mining/dp/B002X79NA6

Glaser BG (1963). Retreading research materials: The use of secondary analysis by the independent researcher. The American Behavioral Scientist, 6, 11–14. doi:10.1177/000276426300601003

Glaser BG (1965). The constant comparative method of qualitative analysis. Social Problems, 12, 436–445. doi:10.2307/798843

Griffin MA, Parker SK, & Mason CM (2010). Leader vision and the development of adaptive and proactive performance: A longitudinal study. Journal of Applied Psychology, 95, 174–182. doi:10.1037/a0017263

Haas EJ, & Cecala AB (2017). Quick fixes to improve workers' health: Results using engineering assessment technology. Mining Engineering, 69, 105–109. doi:10.19150/me.7622 [PubMed: 28867831]

Hämming O (2017). Health and well-being at work: The key role of supervisor support. SSM-Population Health, 3, 393–402. doi:10.1016/j.ssmph.2017.04.002 [PubMed: 29349232]

Heaney CA, & Israel BA (2008). Social networks and social support. In Glanz K, Rimer BK, & Viswanath K (Eds.), Health behavior and health education: Theory, research, and practice (pp. 189–210). San Francisco, CA, US: Jossey-Bass.

Heaton J (2008). Secondary analysis of qualitative data: an overview. Historical Social Research, 33(3), 33–45.

Hinds PS, Vogel RJ, & Clarke-Steffen L (1997). The possibilities and pitfalls of doing a secondary analysis of a qualitative data set. Qualitative Health Research, 7, 408–424. doi:10.1177/104973239700700306

Hofmann DA, & Morgeson FP (2004). The role of leadership in safety. In Barling J & Frone MR (Eds.), The psychology of workplace safety (pp. 159–180). Washington, DC, US: American Psychological Association.

Hofmann DA, Morgeson FP, & Gerras SJ (2003). Climate as a moderator of the relationship between leader-member exchange and content specific citizenship: Safety climate as an exemplar. Journal of Applied Psychology, 88, 170–178. doi:10.1037/0021-9010.88.1.170

Hogan BE, Linden W, & Najarian B (2002). Social support interventions: Do they work? Clinical Psychology Review, 22, 381–440. doi:10.1016/S0272-7358(01)00102-7

House JS (1981). Work stress and social support. Reading, MA: Addison-Wesley.

House JS, Umberson D, & Landis KR (1988). Structures and processes of social support. Annual Review of Sociology, 14, 293–318. doi:10.1146/annurev.so.14.080188.001453

Jennings KS, & Britt TW (2017). Enhancing the resilience of employees through the provision of emotional, informational and instrumental support. In Crane MF (Ed.), Managing for resilience (pp. 102–116). New York, NY: Routledge.

Johnson JV, & Hall EM (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. American Journal of Public Health, 78, 1336–1342. doi:10.2105/AJPH.78.10.1336 [PubMed: 3421392]

Kaplan BH, Cassel JC, & Gore S (1977). Social support and health. Medical Care, 15, 47–58. doi:10.1097/00005650-197705001-00006 [PubMed: 853781]

Kelloway EK, & Barling J (2010). Leadership development as an intervention in occupational health psychology. Work & Stress, 24, 260–279. doi:10.1080/02678373.2010.518441

Krueger RA, & Casey MA (2000). Overview of focus groups. In Krueger RA and Casey MA (Eds.), Focus groups: A practical guide for applied research (pp. 3–19). New Delhi, India: Sage Publications.

Langford CPH, Bowsher J, Maloney JP, & Lillis PP (1997). Social support: A conceptual analysis. Journal of Advanced Nursing, 25, 95–100. doi:10.1046/j.1365-2648.1997.1997025095.x [PubMed: 9004016]

Madsen PM (2009). These lives will not be lost in vain: Organizational learning from disaster in U.S. coal mining. Organization Science, 20, 861–875. doi:10.1287/orsc.1080.0396

Mclaggan E, Botha CT, & Bezuidenhout A (2013). Leadership style and organizational commitment in the mining industry in Mpumalanga. SA Journal of Human Resource Management, 11, 1–9. doi:10.4102/sajhrm.v11i1.483

Mearns K, Flin R, Gordon R, & Fleming M (1998). Measuring safety climate on offshore installations. Work & Stress, 12, 238–254. doi:10.1080/02678379808256864

Meijman TF, & Mulder G (1998). Psychological aspects of workload. In Drenth PJ, Thierry H, & de Wolff CJ (Eds.), Handbook of work and organizational psychology (pp. 5–33). Erlbaum, Hove: Psychology Press.

Mirza MZ, & Isha ASN (2017). Context matters: A research agenda to move beyond conventional leadership-safety relationship. Safety Science, 98, 167–173. doi:10.1016/j.ssci.2017.06.013

National Mining Association (2014). CORESafety framework handbook. Retrieved from http://www.coresafety.org/coresafety-framework/handbook/ on December 27, 2018.

Neal A, & Griffin MA (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. Journal of Applied Psychology, 91, 946–953. doi:10.1037/0021-9010.91.4.946

O'Dea A, & Flin R (2001). Site managers and safety leadership in the offshore oil and gas industry. Safety Science, 37, 39–57. doi:10.1016/S0925-7535(00)00049-7

Parker SK, Axtell CM, & Turner N (2001). Designing a safer workplace: Importance of job autonomy, communication quality, and supportive supervisors. Journal of Occupational Health Psychology, 6, 211–228. doi:10.1037/1076-8998.6.3.211 [PubMed: 11482633]

Patton MQ (2002). Qualitative research and evaluation methods (3rd ed.). Thousand Oaks, CA: Sage.

Petitta L, Probst TM, Barbaranelli C, & Ghezzi V (2017). Disentangling the roles of safety climate and safety culture: Multi-level effects on the relationship between supervisor enforcement and safety compliance. Accident Analysis & Prevention, 99, 77–89. doi:10.1016/j.aap.2016.11.012 [PubMed: 27883895]

Phakathi ST (2017). Production, safety and teamwork in a deep-level mining workplace: Perspectives from the rock-face. Bingley, UK: Emerald Publishing Limited.

Pink DH (2011). Drive: The surprising truth about what motivates us. New York, NY: Riverhead Group Penguin Publishing.

Porter LW, & McLaughlin GB (2006). Leadership and the organizational context: Like the weather? The Leadership Quarterly, 17, 559–576. doi:10.1016/j.leaqua.2006.10.002

Probst TM, & Estrada AX (2010). Accident under-reporting among employees: Testing the moderating influence of psychological safety climate and supervisor enforcement of safety practices. Accident Analysis & Prevention, 42, 1438–1444. doi:10.1016/j.aap.2009.06.027 [PubMed: 20538099]

Rees T, & Hardy L (2000). An investigation of the social support experiences of high-level sports performers. The Sport Psychologist, 14, 327–347. doi:10.1123/tsp.14.4.327

Schaufeli WB, & Salanova M (2007). Efficacy or inefficacy, that's the question: Burnout and work engagement, and their relationships with efficacy beliefs. Anxiety, Stress, and Coping, 20, 177–196. doi:10.1080/10615800701217878

Schmitt J, & Beach D (2015). The contribution of process tracing to theory-based evaluations of complex aid instruments. Evaluation, 21, 429–447. doi:10.1177/1356389015607739

Shumaker SA, & Brownell A (1984). Toward a theory of social support: Closing conceptual gaps. Journal of Social Issues, 40, 11–36. doi:10.1111/josi.1984.40.issue-4

Tucker AL, & Singer SJ (2015). The effectiveness of management-by-walking-around: A randomized field study. Production and Operations Management, 24(2), 253–271.

Wayne SJ, Shore LM, & Liden RC (1997). Perceived organizational support and leader-member exchange: A social exchange perspective. Academy of Management Journal, 40, 82–111.

Weick KE, & Sutcliffe KM (2011). Managing the unexpected: Resilient performance in an age of uncertainty (Vol. 8). San Francisco, CA: Jossey Bass Willey and Sons.

Yorio PL, & Willmer DR (2015). Explorations in pursuit of a risk-based health and safety management system. Society for mining, metallurgy, and exploration annual meeting, Denver, CO.

Zohar D (2002). Modifying supervisory practices to improve subunit safety: A leadership-based intervention model. Journal of Applied Psychology, 87, 156–163. doi:10.1037/0021-9010.87.1.156

Zohar D, & Luria G (2004). Climate as a social-cognitive construction of supervisory safety practices: Scripts as proxy of behavior patterns. Journal of Applied Psychology, 89(2), 322. doi:10.1037/0021-9010.89.2.322

Zohar D, & Luria G (2010). Group leaders as gatekeepers: Testing safety climate variations across levels of analysis. Applied Psychology, 59, 647–673. doi:10.1111/apps.2010.59.issue-4