1.4. Leadership and Corporate safety

1.4. Leadership and Corporate safety

In this chapter, we looked at how leadership and leadership qualities influence safety engagement. Leadership is the activity of leading a group of people or the ability to do this; and it involves a clear vision, sharing of that vision, providing information, knowledge, and methods to realize the vision, and coordinating the interests of all stakeholders through creativity. There are many and varied definitions of leadership. In an effort to summarize the qualities of a leader, Winston and Patterson (2006, p. 7-8) proposed a definition of a servant leader as follows:

- One or more people;
- Selects, trains, and influences followers;
- Conveys a prophetic vision of the future which resonates with followers;
- Is ethical, and seeks the greater good;
- Finds common values without destroying individualism;
- Allows followers to be innovative and grow within the organization; and
- Demonstrates humility, concern for others, discipline, and mercy; seeks peace and organizational improvement; and focuses on employee wellbeing and organizational goals.

"Leadership style is the manner and approach of providing direction, implementing plans, and motivating people. As seen by the employees, it includes the total pattern of explicit and implicit actions performed by their leader (Newstrom & Davis, 1993)" (Clark, 2015). The following leadership styles are identified by Clark (2015):

- Authoritarian or autocratic (tells employees without their input)
- Participative or democratic (includes employees, maintains final decision making)
- Delegative or laissez-fair/free rein (allows employees to make decisions but maintains responsibility for decisions).

Leadership styles appear on a continuum (autocratic/directive-democratic/participative-laissez-faire/delegative) and can be used depending on the situation (Defining Leadership, 2013). The qualities of a good leader are awareness, decisiveness, empathy, accountability, confidence, optimism, honesty, focus, and inspiration (Economy, 2014).

The questions guiding our scoping review are:

1. What is the influence of leadership on safety engagement of miners?
2. How do different leadership qualities and styles influence safety engagement of miners?

Method

A scoping search of the literature was undertaken using the following key words:

1. Miners (Miners OR Workers OR Employees OR "mining industry" OR "mining community" OR "resource extraction") and
2. Leadership (leader* OR admin* OR authority OR manage* OR direct* OR influenc*) and
3. Safety engagement ("Risk taking behavio" or "Safety behavio" or Safety or "High risk behavio" or "Safety engagement" or "Safety rule violation" or "Accident proneness" or "Risk perception"

or "Perception of safety" or "Safety device" or "Accident prone" or "Workplace safety" or "Work safety" or "Risk tolerance")

A second scoping search of the literature was undertaken for the following key words:

1. Miners (miners or mining or "resource extraction" or industry) and
2. Leadership qualities ("leadership qualities" or "leadership style" or "transformational leadership" or leaders or lead* or managers) and
3. Safety engagement ("risk taking behavior/behaviour" or "safety behavior/behaviour" or safety or "high risk behavior/behaviour" or "safety engagement" or "safety rule violation" or "accident proneness" or "risk perception" or "perception of safety" or "safety devices" or "workplace safety" or "work safety" or "risk tolerance" or "industrial accidents" or "occupational health" or "occupational safety").

Search Strategy. From this search, we selected articles based on the inclusion/exclusion criteria. The inclusion and exclusion criteria were kept broad in that we did not specify the types of research methods to be included or excluded in order to capture as many research articles on the topic as possible. In our search, we collected articles that were pertinent to this topic area. The broad inclusion and exclusion criteria allowed us to explore the literature in this area more completely, see Table 1.

Table 1 Leadership and Leadership Qualities Inclusion/Exclusion Critera

Inclusion Criteria	Exclusion Criteria
• Articles with key terms in the title or abstract	• Editorials
• Peer reviewed	• Commentaries
• Within 5 years	• Book reviews
• English language articles	
• Must be related to **safety leadership**	

Screening Strategy. The articles were checked for inclusion by two team members. The inclusion process was iterative in that the included/excluded articles were reviewed again for inclusion as the themes were developing. The team had final approval of the included articles. Those not applicable to the scoping review were excluded.

Results

A brief summary of each article including its location, population studied, main issue addressed, comparison group, and primary outcomes is provided in Appendix G. Table 2 is an overview of the scope of the review and articles identified.

Table 2. Leadership and Leadership Qualities Databases and Articles Selected

Database	No of articles found from search	Articles Selected for Review	Final article selection
Engineering Village	0	381	54
CBCA Business	4		
CINAHL	104		
Medline	10		
Academic Search Complete	20		
ABI Inform	10		

Embase	35
U of S Search (Misc)	8
Scopus	4
Nursing and Allied health	1
Web of Science	8
Proquest Education Journals	1
Eric	0
PsycInfo	176

Description of Included Articles. Table 3 provides an overview of the types of publications, country of publication, and populations studied.

Table 3. Leadership and Leadership Styles: Populations, Country of Research, and Type of Study

Type of Publications	Country of Researchers	Populations Studied
Quantitative studies • Exploratory cross-sectional design (1) • Pre-post intervention study (1) • Observational study (1) • Case controlled trial (1) • Randomized survey study (1) • Longitudinal survey study (2) • Cross sectional surveys (17) • Case study survey (11) • Secondary analysis of data (4) Qualitative Studies • Focus groups and interviews (3) • Case studies (2) • Mixed methods (2) Other • Articles (4) • Program evaluation (2) • Theoretical papers (3) • Reports (1)	North America (11) Europe (11) Middle East (7) Africa (5) Asia (5) Australia (4) South America (1)	Mining Industry (10) Construction Industry (8) General Organizational (7) Oil and Gas Industry (6) Transportation industry (5) Production facilities (3) Nuclear power plants (3) Health care industry (3) Telecommunications (2) Military (1)

Description of Identified Factors. In order to make it easier to describe the results of the scoping review, the articles were divided into six categories: organizational climate, management practices, relationships, employee factors, training and regulation, and leadership styles.

Organizational Climate. Nine articles were found which related to organizational climate and safety engagement. In a research study examining the level of safety in African organizations, Akpan (2011) found improving performance in organizations is directly related to employee health and safety, and that management should be responsible for maintaining effective health and safety programs. Casey and Krauss (2013) studied the pattern of relationships that exist between South African miner's perceptions of safety support, safety communication, and error management; and the effects of these perceptions on the miners' engagement in safety behaviors, and their experience of safety incidents. They found that an organizational error management climate predicted both supervisor and co-worker safety support, supervisor safety support did not predict workers' safety behaviors, and coworker safety support and safety communication had a stronger relationship to safety performance than did supervisor safety

support and upwards safety communication. Kines et al. (2010) researched the effect of an intervention meant to improve supervisors' safety communication, and they found improved safety communication and safety compliance. Kines et al. determined coaching supervisors to include safety in their daily exchanges with employees resulted in an increased level of safety.

In a secondary analysis of mining health and safety data, Page (2009) found companies with more corporate resources are more successful dealing with unexpected emergencies, thus larger mines with high numbers of personnel have a better safety record than smaller mines. The author found companies with a diverse workforce experienced a short term decrease in safety due to differing educational backgrounds. Salminen, Gyekye and Ojajarvi (2013) surveyed workers from a variety of industries including mining, in an effort to determine whether individual factors or organizational factors were better predictors of accident frequency. Salminen et al. found both individual and organizational factors contribute to safety which in turn leads to a lesser number of accidents. Workers with a high degree of organizational citizenship behaviors and perceived organizational support were found to have greater job satisfaction, more safety-oriented behavior, and less frequency accidents reported (Salminen et al., 2013). Overall, the strongest predictor of safety behavior was found to be the workers' perception that they were supported by the organization (Salminen et al, 2013).

Wu, Chang, Shu, Chen, and Wang (2011) explored the role between safety leadership and safety climate. They found safety leadership positively impacted safety climate and was positively related to safety performance. They also found safety climate mediated the effect of safety leadership on safety performance. Conchie, Moon, and Duncan (2013) addressed factors giving rise to safety leadership behaviors through focus groups with 69 supervisors in the UK construction industry. They reported hindering factors to safety leadership were role overload, production demands, formal procedures, and workforce characteristics. They also reported factors which promoted safety leadership behaviors were perceived autonomy and social support from the organization and the employees. Conchie et al. (2013) highlighted the need for improved supervisor training and a support network for supervisors. In a longitudinal study of organizational change, Lofquist, Greve, and Olssen (2011) found no change in incident and accident reporting despite the stressors on the employees. They stated employees' perceptions of safety depended on individual perceptions of leadership commitment to safety. Lofquist et al. developed a model showing the influence of leadership commitment to safety on attitudes towards and perceptions of safety.

In a review of Korean and Japanese gas plants, Yoon et al. (2011) found inspections were missed or rushed due to a lack of resources allocated to the monitoring system and the pressure for production. They also found some people within the industry felt it required too much time and effort to use therefore was an actual risk to safety.

Management Practices. Eight articles were identified related to management practices. Khdair, Shamsudin, and Subramanim (2011) developed a conceptual framework depicting the relationship between management practices, leadership behavior, and safety performance. They proposed both management practices and leadership behavior have a direct relationship with safety performance. In a cross section survey study with 548 railway employees, Kath, Marks, and Ranney (2010) found the

dominant predictor of safety was perceived management attitudes towards safety with job demands and leadership-member exchange following closely. They called for upward safety communication to enhance safety climate rather than pressure to improve productivity.

A literature review conducted by Guha, Thakur, & Biswas (2013) examined workers' safety perceptions, managers' safety perceptions, and cultural attitudes towards safety for both the worker and the manager. The authors suggested the awareness and belief of the workers have no significant correlations with the cultural dimensions; thus the workers have no safety related cultural ties and would be logical in accepting safety prescriptions. Guha et al. noted workers' sensitivity to safety awareness is positively correlated with operational practices of managers; therefore, enhanced safety training to managers would increase safety awareness among the managers which in turn would increase the safety awareness to workers. Bahn (2013b) described the influence of supervisors in safety culture. She argued for formal supervisory training, and she stated supervisors set the standard for safety levels on the worksite. Bahn (2013b) suggested frontline supervisors are not well trained, and she called for increased safety training at this level.

In case studies of oil and gas industry companies, Maslen and Hopkins (2014) found incentives influence behaviors and decisions of managers, and they should be used as motivation in both the financial and business performance and safety, otherwise safety will be compromised. Luria and Morag (2012) researched safety management by walking around (SMBWA) and identifying hazards in the workplace. They found an increase in safety interactions between management and employees, and improvement in participative leadership. Luria and Morag described an improvement in organizational learning as well when an information technology was combined with SMBWA. They also reported the safety tours were eventually taken over by employees without management present with positive results.

In a survey of copper mine workers, Probst and Graso (2013) found workers were under-reporting accidents and illness because of pressure for production. They stated underreporting is an issue for both workers and management, and it has implications for leadership and occupational health and safety. Hagevoort, Douphrate, and Reynolds (2013) reviewed research on health and safety leadership and managerial practices on modern dairy farms and found when leaders promoted safety, organizations experienced improved safety records and positive safety outcomes. In positive safety climates, employee safety behavior will improve as supervisor leadership practices increase.

Relationships. Six studies were related to relationship aspects of safety engagement. Newman, Lewis, and Watson (2012) examined the exchange of safety information within the supervisor-driver relationship with 105 community nurses and 22 supervisors. They found the quality of the supervisor-driver exchange relationship impacted the safe driving performance and the exchange of safety information. In a survey study of long-haul drivers, Zohar, Huang, Lee, and Robertson (2014) found the quality of dispatcher leadership and work ownership predicted safety climate perceptions, and positive safety climate perceptions led to better safety behavior. In a study of trust between leaders and subordinates to safety, Luria (2010) surveyed 105 soldiers in three army brigades. He found trust was negatively related to injury and positively related to safety climate. He also reported safety climate mediated the relationship between trust and injury rates. Therefore, Luria espoused social relationships

(trust in a leader) is related to safety outcomes and safety climate.

In a survey study with managers, shift bosses, and miners, van Rensburg, Barkhuizen, and Stanz (2012) found mining leadership scored higher in safety mindset, climate, culture, trust, caring support, safety intent, ownership, and physical work environment than the miners. They recommended upper management form a closer relationship with shift bosses in order to communicate safety issues down to the mining employees. Carrillo (2011) discussed refocusing attention away from management control towards management learning from what the organization is already doing. She called for leadership to pay attention to relationships, specifically to how leaders are relating to employees and how the organization is managing those relationships. Dahl and Olsen (2013) surveyed workers employed on offshore platforms operating on the Norwegian Continental Shelf and found that leadership involvement in daily work operations has a significant positive influence on the level of safety compliance. These findings indicate that safety improvements should focus on leadership involvement in work operations. Having a leader directly involved in the safety planning and work operations can improve the level of safety compliance amongst employees.

Employee Factors. Three articles were related to employee factors in safety engagement. An intensive 10-year study of 5850 injured workers from nine Serbian coal mines found ways to increase safety at work and lower the number of injuries by looking at the number and type of injuries, degree and severity of the injuries, age of the injured worker, location of the injury, time of the injury, and the educational background of the injured worker (Stojadinovic et al., 2012). Stojadinovic et al. (2012) found the following interventions for employees were needed: a longer training period, a simple "warning campaign" to increase awareness, more safety control in the morning, and avoidance of overlapping or unnecessary crowding in the work area. The concept of hazardous working conditions was studied by Li, Jiang, Yao, and Li (2013). They set about to assess the effectiveness of the job demands-resources model in explaining the relationship of job demands and resources with safety outcomes such as workplace injuries and near-misses. These authors collected self-reported data from 670 crude oil production workers from three sub-companies of a major oilfield company in China. The results of a structural equation analysis indicated that job demands (psychological and physical) and job resources (decision latitude, supervisor support and coworker support) could affect emotional exhaustion and safety.

As a result of increasing worker injuries in a Zimbabwean mine, Chimamise et al. (2013) undertook to identify the causes of injury, as well as strategies to reduce risk. Using a case-control design, workers who had been injured at the workplace were coupled with worker who had not been injured in the same time frame. Responses to questionnaires revealed that the majority of severe occupational injuries occurred during the night shift. There were also increased injuries reported when shift length extended past 8 hours. Of particular concern was the increased prevalence of severe injury that occurred as a result of workers having production quotas that had to be obtained on each shift. Chimamise et al. (2013) found that "targets make workers focus on production and meeting the targets so much that they may disregard precautionary measures and put themselves at increased risk …" (p. 3). Recommendations made to decrease risk of injury included management setting more realistic targets for workers and offering a more worker-centered approach to increase worker motivation such as a performance awards (Chimamise

et al., 2013)

   Training and Regulation. Four articles were identified which were related to the implementation of training or regulation may improve safety engagement. One article related to safety training. Bahn (2013a) developed two training sessions comprised of a cross section of mine employees including general employees, contractors, and managers/supervisors: The first training session involved participants identifying workplace hazards, and the second session involved the same participants developing strategies to address the identified hazards. Bahn (2013a) found the length of time working in the mine did not predetermine an ability to identify hazards, and many employees from all the groups were unable to identify any strategies to control the list of emerging hazards. While there was evidence of increased attention being paid to potential risks in the period immediately following the training sessions, employees/ supervisors began slipping back to original work habits over time (Bahn, 2013a). As a result, Bahn (2013a) recommended that additional, repeated training in both hazard identification and management was needed for all staff, both employees and supervisors.

   Three articles related to how regulation may encourage safety engagement. In 2014, the Mine Health Safety Association (MHSA) reported on mine sites that were chronic safety rule violators resulting in safety incidents. The reports contained information from six months before to six months after a "pattern of violations (POV)," aligned with the Mine Safety and Health Act (MSHA) (1977), was issued. The MHSA determined there to be a dramatic decrease in serious and severe violations (62%) and total violations (38%), and issuing the POVs has established and fostered reform that has had a positive and significant effect on the safety, health, and wellbeing of the employees. Griffin and Hu (2013) found monitoring might be positively associated with safety participation if the leader encourages employees to learn from their mistakes and errors at the same time. They stated safety leadership may be perceived as an external source that can regulate employees' safety behavior. They found support for safety monitoring being associated with higher safety compliance. The effect of safety monitoring is moderated by the degree to which leaders also promote safety-related learning, such that safety monitoring can have a positive effect on safety participation when the leader structures a learning-oriented environment (Griffin & Hu, 2013). In a study conducted at a construction project in Nigeria, Agwu and Emeti (2013) determined reduced accident/injury rates and increased organizational productivity is to a large extent dependent on the implementation of a participatory hazard management system. The study was based on the fundamental cybernetic principle that those directly affected by workplace hazards should be primarily responsible for managing and controlling them. Agwu and Emeti recommended, "regular site safety audits to identify/eliminate sub-causes of accident, regular staff training to improve their hazard identification skills, formation of health and safety committee to identify/eliminate potential hazards at the task level and making hazard identification/reporting everyone's responsibility could be easily applied to multiple work sites including mines and mining."

   Leadership Styles. Twenty-four articles were found related to leadership styles or skills. Two main categories identified were empowering leadership and transformational leadership. Other leadership skills and styles were also identified. Six articles were identified which related to empowering leadership and safety engagement. In a qualitative study interviewing personnel involved in the rescue of Chilean

miners, Rashid, Edmondson, and Leonard (2013) found the leaders in the mining rescue controlled and empowered the rescuers by envisioning the rescue, enrolling a diverse group of skilled people, excluding unhelpful people, and engaging in the execution of the rescue. They reported the leadership continually analyzed the situation and the environment as things changed, created a psychologically safe environment for innovation, and never laid blame. In a survey study of Malay, Chinese, and Indian health and safety officers in Malaysia, Tong, Rasiah, Tong, and Lai (2015) found leaders empowering behaviors inspired safety officers' commitment to safety. They stated when officers perceived support, they were more motivated to work together towards safe workplaces. Tong et al. related leadership empowerment to relations-oriented behavior, and they felt it was important for leaders to promote empowerment behavior. Torner (2011) discussed the central role trust plays in organizational safety. She suggested mutual trust and a strong climate promotes workers' motivation to behave safely. Torner felt a leadership style that empowers workers and promotes participation will help to move organizational safety intentions into safe behaviors.

Martinez-Corcoles, Gracia, Tomas, Piero, & Schobel (2013) analyzed how team leaders' behaviors influenced safety performance in nuclear power plants. They found empowering team leadership had a positive effect of safety compliance and participation, and reduced risky behavior. Martinez-Corcoles et al. (2013) stated, "Empowered leadership positively influenced safety behaviors by means of safety climate" (p. 299). Martinez-Corcoles, Schobel, Gracia, Tomas, and Peiro (2012) studied the relationship between empowering leadership and safety participation. They found empowering leadership had a positive relationship with safety participation mediated by collaborative team learning. Martinez-Corcoles et al., (2012) stated empowering leadership enhanced workers' safety participation behaviors which, in turn, helped workers to understand safety procedures and critical safety information or issues. In a study of the impact of leadership on safety behaviors, Martinez-Corcoles, Gracia, Tomas, and Peiro (2011) found empowering leaders improved safety climate and promoted positive safety behaviors. They also reported empowering leadership has a stronger effect in a weak safety culture than in a strong safety culture. Martinez-Corcoles et al. stated safety culture was a predictor of safety climate and had a positive influence on safety behaviors.

Ten articles were identified related to transformational leadership. Two of the studies discuss the role of transformational leadership and trust. In two studies of transformational leadership and employee psychological well-being, Kelloway, Turner, Barling, and Loughlin (2012) found a positive relationship between transformational leadership, trust, and employee well-being. They suggested leadership was important to enhance work performance and occupational safety; therefore, an effort should be made by companies to develop their leaders. Conchie, Taylor & Donald (2012) questioned 150 employees and their supervisors to determine the influence of trust on developing safety voice behaviors. This research supports the theory that supportive management in the form of safety-specific transformational leadership increases safety voice-citizenship behavior among a sample of petrochemical employees. If an organization is seeking to promote safety voice behaviors, they should focus on developing trust between the employee and employer. Inness, Turner, Barling, and Stride (2010) focused on whether or not managers who exhibited transformational leadership skills were effective at managing employees that

worked two jobs with regard to their safety. They found transformational leadership was a positive predictor of safety participation whether or not the leader is focused on safety; however, workers are empowered to use their discretion and achieve greater performance. Mullen, Kelloway, and Teed (2011) examined the effects of safety-specific leadership with two leadership styles: transformational and passive. They found passive safety-specific leadership was negatively associated with safety compliance but not safety participation, and transformational leadership was positively associated with both safety compliance and safety participation. They suggested organizations use safety-specific transformational leadership approaches through role-modeling, challenging individuals to develop innovative ways to solve safety-related issues, and show concern for the health and safety of the employees.

In an experimental, an online, and a field study, Kark, Katz-Navon, and Delegach (2015) found a positive relationship between transformational leadership and safety initiative behaviors. They also found a positive relationship between transformational leadership and followers' situational prevention focus; but there was an inconsistent relationship between followers' situational focus and safety compliance behaviors. Kark et al. suggested transformational leadership evokes safety compliance behaviors. In a survey study of production workers in small to medium sized manufacturing plants, Zohar and Luria (2010) found transformational group leaders acted as buffers from the potentially harmful effects of poor or weak organizational safety climates by promoting a strong group climate which reflected greater consensus amongst group members. They also found transformational leaders better informed group members of priorities which resulted in stronger relationships between supervisors and members. In a cross-sectional survey of construction and road workers, Kapp (2012) researched the relationship of contingent reward and transformational leadership with safety compliance and participation of employees. The researcher found a greater level of safety compliance and participation behavior with greater levels of transformation and contingent reward leadership. However, Kapp reported under non-positive group safety compliance there was no noted improvement in participant safety compliance and safety participation. The author suggested an improvement in leadership practices of front-line supervisors and showed support for a strong group safety climate. Fernandez-Muniz, Montes-Peon, and Vazquez-Ordas 2014) completed an empirical study with 188 organizations in Spain and found transformational leadership will promote positive safety behavior. When the managers demonstrate their commitment to safety and their concern for employee well-being, the employees tend to extend their role in the organization to include safety-related organizational citizenship behaviours. Transformational leadership transmits to the employees the idea that their managers are really concerned about their safety and well-being in the workplace. This leads to a reduction in workers' complaints about working conditions, greater employee satisfaction, and consequently, lower turnover in the organization. Transformational leadership also indirectly affects safety behaviour via the proactive risk management and safety outcomes via safety compliance.

Conchie (2013) reported on two survey studies of frontline employees in the UK construction industry. The author found safety-specific transformational leadership positively impacted employees' safety behaviors through intrinsic motivation. Conchie stated external regulation did not promote the same intrinsic motivation as the transformational leadership. In a survey study of 1167 construction

pipefitters and plumbers, Hoffmeister et al (2014) compared the transformational and transactional leadership facets of contingent reward, management-by-exception, idealized influence, inspirational motivation, and intellectual stimulation with safety participation, injury, and/or pain. They found all facets except management-by-exception were related to at least one safety outcome, some facets were related to safety compliance and participation, and none were related to injury or pain. Hoffmeister et al. reported idealized attributes were the most important for establishing a positive safety climate, whereas idealized behaviors were most important for safety participation. They also found apprentices felt leaders should demonstrate idealized behaviors whereas journeymen felt leaders should demonstrate idealized attributes.

Eight articles identified leadership skills in general or other leadership styles not covered previously. In a qualitative study of 100 craftsmen, construction workers, foremen, labor superintendents, project managers, company owners, and professional association managers, Rojas (2013) identified twelve pillars of effective supervision: humility, character, leadership, consistency, commitment, curiousity, communication skills, people skills, effectiveness, knowledge, experience, and willingness. Three leadership styles were identified in the articles: empowering, servant, and transformational leadership. Chughtai (2015) surveyed 179 doctors in Pakistan and found evidence that job autonomy and self-efficacy mediates effects of ethical leadership on safety compliance and safety participation. According to Chughtai's research, employers who focus on hiring and developing ethical leaders are more likely to create safer workplaces. Ethical leaders can inspire their subordinates to comply with safety regulations and take extra measures to make the workplace safe by empowering them and by raising their self-efficacy (Chughtai, 2015). Borgerson, Hystad, Larrsson, and Eid (2014) surveyed 463 Filipino seafarers sailing on 23 merchant vessels and found that authentic leadership is positively and significantly related to perceptions of safety climate. Their findings indicate that authentic leadership can be a significant predictor of perceived safety climate among Filipino seafarers. Eid, Mearns, Larsson, Laberg, and Johnsen (2012) developed a model indicating authentic leadership directly affects safety outcomes. They hypothesized authentic leadership is positively related to follower perceptions of safety climate and psychological capital, and psychological capital variables mediate the relationship between safety climate and safety outcomes. Eid et al. described psychological capital as employees' self-efficacy, optimism, hope, and resilience brought on by authentic leadership. Nielsen, Eid, Mearns, and Larsson (2013) found authentic leadership helped to reduce risk perception and improve safety climate, and safety climate played a mediating role between authentic leadership and risk perception. In this survey study of 293 offshore oil installation workers, the researchers found safety climate had the strongest effect on risk perception of all the constructs.

In an observation study of 84 cockpit and cabin crews during simulated in-flight emergencies, Bienefeld and Grote (2014) found shared leadership positively related to goal attainment and team success. They reported formal leaders and team members showed significantly more leadership behaviors which crossed role boundaries. Clarke (2013) developed and tested a model of safety leadership, which shows that both transformational and active transactional leadership styles are important aspects of effective safety leadership. This study can aid in the design of leadership training and development

programs, providing evidence that programs should focus on a range of leader behaviors that encompass active transactional as well as transformational style. The findings suggest that leadership styles have a differential effect on safety compliance and safety participation – thus training and development programs should make specific links between leader behaviors and their subsequent influence on employee behavior. In a survey study of 1379 employees, Probst (2015) found organizational efforts to improve safety were more effective than enforcement by supervisors. However, she stated accident reporting was dependent on the enforcement or transactional leadership of the individual supervisors.

Discussion

Employees respond to the workplace safety culture and base their safety attitudes on what they perceive management to have. Employees are more likely to engage in safety if they trust the leader, have good work relationships, feel supported by supervisors, and have good leaders. Employees' safety engagement may be affected by job demands including night shifts and long shifts.

Supervisors play an important role in safety engagement of employees. They provide the front-line safety leadership, set the standards for safety, and their leadership practices directly affect safety engagement. In the literature, quality supervisor-employee communication was indicated as an important indicator for safety engagement. Thus, supervisor training is a key area for organizations to concentrate. Relational leadership styles appear to work the best for engaging employees in safety behavior. Leadership styles that encourage collaboration, trust, employee well-being, support, concern, good communication, proactive risk management, intrinsic motivation, idealized attitudes, self-efficacy, goal attainment, team success, and transactional enforcement promote safety engagement.

The organization plays an important role in leadership for safety engagement. Management attitudes towards safety through their practices and leadership lead to the safety climate of the organization. The organization can strive to improve communication, encouraging upward safety communication. Management can learn from their employees and, by forming closer relationships with their employees related to safety, can improve safety culture. The organization is responsible for safety management, safety monitoring, developing a participatory hazard management system, operational safety practices, safety tours, reporting of safety incidence, and compliance with governmental agencies.

There may be a role for government in improving safety behavior; however, only two studies were identified which related to governmental influences. Governmental agencies have an inspection and punitive role in safety. When inspections are missed or rushed, there is a negative relationship with safety. Issuing violations may improve an organizations' safety behavior.

Gaps in the Literature. This scoping review uncovered a number of articles related to the role of leadership in safety engagement. 20% of the articles were related to mining. The articles provided a good overview of industrial workplaces, and of industry in general. There were qualitative, quantitative, and general articles. There were no scoping reviews or systematic reviews of the literature. The scoping review uncovered a number of suggestions for the role of leadership in safety engagement. Studies on whether these suggestions make an impact on safety engagement could support these suggestions.

Recommendations. From the scoping review, the following are recommendations for the mining industry:

- Relationships are important in encouraging safety engagement within an organization. Relational leadership styles (authentic, transformational, and empowering) should be encouraged to improve safety engagement.

- Supervisors are in a front-line position and have a huge impact on safety engagement. These individuals should be advocates for safety and demonstrate one of the relational leadership styles. Organizations may benefit from training supervisors to be safety leaders.

- Employees look to supervisors to determine how to act or behave in relation to safety. Therefore, supervisors must demonstrate safe behaviors. Supervisor training in this area may be helpful.

- Long shifts, night shifts, and overwhelming workloads can affect safety engagement at an individual level. Organizations should review these as potential job specific factors.

References

Agwu, M. O., & Emeti, C. I. (2013). Participatory Hazard Management System and Accident Prevention in the Bonny NLNG Construction Project. *International Journal of Business and Management, 8*(17), 50-61.

Akpan, E. I. P. (2011). Effective Safety and Health Management Policy for Improved Performance of Organizations in Africa. *International Journal of Business and Management, 6*(3), 159-165. doi: 10.5539/ijbm.v6n3p159.

Bahn, S. (2013a). Workplace hazard identification and management: The case of an underground mining operation. *Safety Science, 57*, 129-137. doi:10.1016/j.ssci.2013.01.010.

Bahn, S. (2013b). Transformational leaders? The pivotal role that supervisors play in safety culture. *International Journal of Training Research, 11*(1), 17-26. doi:10.5172/ijtr.2013.11.1.17.

Bienefeld, N., & Grote, G. (2014). Leadership in multiteam systems: How cockpit and cabin crews lead each other to safety. *The Journal of the Human Factors and Ergonomics Society, 56*, 270-286. doi: 10.1177/0018720813488137.

Borgerson, H. C., Hystad, S. W., Larsson, G., & Eid, J. (2014). Authentic leadership and safety climate among seafarers. Journal of Leadership & Organizational Studies, 21(4), 394-402. doi: 10.1177/1548051813499612.

Carrillo, R. A. (2011). Complexity and safety. *Journal of Safety Research, 42*, 293-300. doi:10.1016/j.jsr.2011.06.003.

Casey, T. W., & Krauss, A. D. (2013). The role of effective error management practices in increasing miners' safety performance. *Safety Science, 60*, 131-141. doi: 10.1016/j.ssci.2013.07.001.

Chimamise, C., Gombe, N. T., Tshimanga, M., Chadambuka, A., Shambira, G., & Chimusoro, A. (2013). Factors associated with severe occupational injuries at mining company in Zimbabwe, 2010: A cross-sectional study. *Pan African Medical Journal, 14,* 1-5. doi: 10.11604/pamj.2013.14.5.1148.

Chughtai, A. A. (2015). Creating safer workplaces: The role of ethical leadership. Safety Science, 73, 92-98. .doi: 10.1016/j.ssci.2014.11.016.

Clark, D.R. (2015). Concepts of leadership. Retrieved from http://nwlink.com/~donclark/leader/leadcon.html

Clarke, S. (2013). Safety leadership: A meta-analytic review of transformational and transactional leadership styles as antecedents of safety behaviours. Journal of Occupational and Organizational Psychology, 86, 22-49. doi: 10.1111/j.2044-8325.2012.02064.x.

Conchie, S. M. (2013). Transformational leadership, intrinsic motivation, and trust: A moderated-mediated model of workplace safety. Journal of Occupational Health Psychology, 18(2), 198-210. doi:10.1037/a0031805.

Conchie, S. M., Taylor, P. J., & Donald, I. J. (2012). Promoting safety voice with safety-specific transformational leadership: The mediating role of two dimensions of trust. *Journal of Occupational Health Psychology, 17*(1), 105-115. doi: 10.1037/a0025101.

Conchie, S. M., 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.

Dahl, O., & Olsen, E. (2013). Safety compliance on offshore platforms: A multi-sample survey on the role of perceived leadership involvement and work climate. Safety Science, 54, 17-26. doi:10.1016/j.ssci.2012.11.003.

Defining Leadership. (2013). Leading resources for resourceful leaders. Retrieved from http://www.defining-leadership.com/different-leadership-styles/

Economy, P. (2015). The 9 traits that define great leadership. Inc. Retrieved from http://www.inc.com/peter-economy/the-9-traits-that-define-great-leadership.html

Eid, J., Mearns, K., Larsson, G., Laberg, J. C., & Johnsen, B. H. (2012). Leadership, psychological capital and safety research: Conceptual issues and future research questions. Safety Science, 50, 55-61. doi:10.1016/j.ssci.2011.07.001.

Fernandez-Muniz, B., Montes-Peon, J. M., & Vazquez-Ordas, C. (2014). Safety Science, 70, 295-307. doi:10.1016/j.ssci.2014.07.010.

Griffin, M. A., & Hu, X. (2013). How leaders differentially motivate safety compliance and safety participation: The role of monitoring, inspiring, and learning. *Safety Science, 60*, 196-202. doi:10.1016/j.ssci.2013.07.019.

Guha, H., Thakur, B., & Biswas, P. P. (2013). Construction Safety Management Climate in Kolkata, India. *International Business Research, 6*(8), 68-78. doi: 10.5539/ibr.v6n8p68.

Hagevoort, G. R., Douphrate, D. I., & Reynolds, S. J. (2013). A review of health and safety leadership and managerial practices on modern day dairy farms. *Journal of Agromedicine, 18*, 265-273. doi: 10.1080/1059924X.2013.796905.

Hoffmeister, K., Gibbons, A. M., Johnson, S. K., Cigularov, K. P., Chen, P. Y., & Rosencrance, J. C. (2014). The differential effects of transformational leadership facets on employee safety. Safety Science, 62, 68-78. doi:10.1016/j.ssci.2013.07.004.

Inness, M., Turner, N., Barling, J., & Stride, C. B. (2010). Transformational leadership and employee safety performance: a within-person, between-jobs design. *Journal of occupational health psychology, 15*(3), 279-290. doi:10.1037/a0019380.

Kapp, E. A. (2012). The influence of supervisor leadership practices and perceived group safety climate on employee safety performance. Safety Science, 50, 1119-1124. doi:10.1016/j.ssci.2011.11.011.

Kark, R., Katz-Navon, T., & Delegach, M. (2015). Journal of Applied Psychology, 100(5), 1332-1348. doi: 10.1037/a0038818.

Kath, L. M., Marks, K. M., & Ranney, J. (2010). Safety climate dimensions, leader-member exchange, and organizational support as predictors of upward safety communication in a sample of rail industry workers. *Safety Science, 48*(5), 643-650. doi:10.1016/j.ssci.2010.01.016.

Kelloway, E. K., Turner, N., Barling, J., & Loughlin, C. (2012). Transformational leadership and employee psychological well-being: The mediating role of employee trust in leadership. *Work and Stress, 26*(1), 39-55. doi:10.1080/02678373.2012.660774.

Khdair, W. A., & Shamsudin, F. M. (2011). Improving safety performance by understanding relationship between management practices and leadership behavior in the oil and gas industry in Iraq: A proposed model. *Management and Artificial Intelligence, 6,* 85-93.

Kines, P., Andersen, L. P. S., Spangenberg, S., Mikkelsen, K. L, Dyreborg, J., & Zohar, D. (2010). *Journal of Safety Research, 41*, 399-406. doi:10.1016/j.jsr.2010.06.005.

Leadership. (2016). In *Business Dictionary.com*. Retrieved from http://www.businessdictionary.com/definition/leadership.html

Li, F., Jiang, L., Yao, X., & Li, Y. (2013). Job demands, job resources and safety outcomes: The roles of emotional exhaustion and safety compliance. *Accident Analysis and Prevention, 51*, 249-251. doi:10.1016/j.aap.2012.11.029.

Lofquist, E. A., Greve, A., & Olsson, U. H. (2011). Modeling attitudes and perceptions as predictors for changing safety margins during organizational change. *Safety Science, 49*, 531-541. doi:10.1016/j.ssci.2010.11.007.

Luria, G. (2010). The social aspects of safety management: Trust and safety climate. *Accident Analysis and Prevention, 42,* 1288-1295. doi:10.1016/j.aap.2010.02.006.

Luria, G., & Morag, I. (2012). Safety management by walking around (SMBWA): A safety intervention program on both peer and manager participation. Accident Analysis and Prevention, 45, 248-257. doi:10.1016/j.aap.2011.07.010.

Martinez-Corcoles, M., Gracia, F., Tomas, I., & Peiro, J. M. (2011). Leadership and employees' perceived safety behaviours in a nuclear power plant: A structural equation model. *Safety Science, 49*, 1118-1129. doi:10.1016/j.ssci.2011.03.002.

Martinez-Corcoles, M., Gracia, F. J., Tomas, I., Piero, J. M., & Schobel, M. (2013). Empowering team leadership and safety performance in nuclear power plants: A multilevel approach. *Safety Science, 51*, 293-301. doi:10.1016/j.ssci.2012.08.001.

Martinez-Corcoles, M., Schobel, M., Gracia, F. J., Tomas, I., & Peiro, J. M. (2012). Journal of *Safety Research, 43*, 215-221. .doi:10.1016/j.jsr.2012.07.002.

Maslen, S., & Hopkins, A. (2014). Do incentives work? A qualitative study of managers' motivations in hazardous industries. *Safety Science, 70,* 419-428. doi:10.1016/j.ssci.2014.07.008.

MHSA. (2014). Violation reforms improving mine safety culture, MSHA says. *Professional Safety*. Retrieved from http://www.highbeam.com/doc/1P3-3483186851.htm

Mullen, J., Kelloway, K., & Teed, M. (2011). Inconsistent style of leadership as a predictor of safety behavior. Work & Stress, 25(1), 41-54. doi: 10.1080/02678373.2011.569200.

Newman, S., Lewis, I., & Watson, B. (2012). Occupational driver safety: Conceptualising a leadership-based intervention to improve safe driving performance. Accident Analysis and Prevention, 45, 29-38. doi:10.1016/j.aap.2011.11.003.

Newstrom, J.W., & Davis, K. (1993). Organizational Behavior: Human Behavior at Work. New York: McGraw-Hill.

Nielsen, M. B., Eid, J., Mearns, K., & Larsson, G. (2011). Authentic leadership and its relationship with risk perception and safety climate. *Leadership & Organization Development Journal, 34*(4), 308-325. doi: 10.1108/LODJ-07-2011-0065.

Page, K. (2009). Blood on the coal: the effect of organizational size and differentiation on coal mine accidents. *Journal of Safety Research, 40*(2), 85-95. doi:10.1016/j.jsr.2008.12.007.

Probst, T. M. (2015). Organizational safety climate and supervisor safety enforcement: Multi-level explorations of the causes of accident under-reporting. *Journal of Applied Psychology, 100(*6), 1899-1928. doi:10.1037/a0039195.

Probst, T. M., & Graso, M. (2013). Pressure to produce = pressure to reduce accident reporting? *Accident Analysis and Prevention, 59*, 580-587. doi:10.1016/j.aap.2013.07.020.

Rashid, F., Edmondson, A. C., & Leonard, H. B. (2013). Leadership Lessons from the Chilean Mine Rescue. *Harvard Business Review, 91*(7-8), 113.

Rojas, E. M. (2013). Identifying, Recruiting, and Retaining Quality Field Supervisors and Project Managers in the Electrical Construction Industry. *Journal of Management in Engineering, 29*(4), 424-434. doi:10.1061/(asce)me.1943-5479.0000172.

Salminen, S., Gyekye, S. A., & Ojajärvi, A. (2013). Individual and Organizational Factors of Safe Behaviour among Ghanaian Industrial Workers. *Engineering Management Research, 2*(1), 98-110. doi:10.1016/injury.2011.08.018.

Stojadinovic, S., Svrkota, I., Petrovic, D., Denic, M., Pantovic, R., & Milic, V. (2012). Mining injuries in Serbian underground coal mines - A 10-year study. *Injury, 43*(12), 2001-2005. doi:10.1016/j.injury.2011.08.018.

Tong, D. Y. K., Rasiah, D., Tong, X. F., & Lai, K. P. (2015). Leadership empowerment behaviour on safety officer and safety teamwork in manufacturing industry. *Safety Science, 72*, 190-198. doi:10.1016/j.ssci.2014.09.009.

Torner, M. (2011). The "social-physiology" of safety. An integrative approach to understanding organizational psychological mechanisms behind safety performance. Safety Science, 48, 1262-1269. doi:10.1016/j.ssci.2011.04.013.

van Rensburg, N. J. J., Barkhuizen, E. N., & Stanz, K. J. (2012). Exploring the safe human mindset of production leaders of a platinum mine. *South African Journal of Industrial Engineering, 23*(1), 178-190. doi: 10.7166/23-1-229.

Winston, B. E., & Patterson, K. (2006). An integrative definition of leadership. International *Journal of Leadership Studies, 1*(2), 6-66.

Wu, T. C., Chang, S. H., Shu, C. M., Chen, C. T., & Wang, C. P. (2011). Safety leadership and safety performance in petrochemical industries: The mediating role of safety climate. *Journal of Loss Prevention in the Process Industries, 24*(6), 716-721. doi:10.1016/j.jlp.2011.04.007.

Yoon, I. K., Seo, J. M., Jang, N., Oh, S. K., Shin, D., & Yoon, E. S. (2011). A practical framework for mandatory job safety analysis embedded in the permit-to-work system and application to gas industry. *Journal of Chemical Engineering of Japan, 44*(12), 976-988. doi:10.1252/jcej.11we156.

Zohar, D., & Luria, G. (2010). Group leaders as gatekeepers: Testing safety climate variations across levels of analysis. *Applied Psychology: An International Review, 59*(4), 647-673. doi: 10.1111/j.1464-0597.2010.00421.x.

Zohar, D., Huang, Y-h, Lee, J., & Robertson, M. (2014). A mediation model linking dispatcher leadership and work ownership with safety climate as predictors of truck driver safety performance. *Accident Analysis and Prevention, 62*, 17-25. doi : 10.1016/j.aap.2013.09.005.