Upward safety communication in the workplace: How team leaders stimulate employees' voice through empowering and monitoring supervision

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ABSTRACT

The importance of employees' voice for workplace safety management is receiving growing attention. The present contribution focuses on three different categories of safety-specific voice behaviours and their links with complementary safety supervision styles: promotive voice (i.e. offering original suggestions to improve safety in work practices), preventive voice (i.e. raising personal concerns for potential risks), and proscriptive voice (i.e. speaking up against violations of safety standards). The first aim of the study is to provide evidence of the differential validity of the three categories of safety voice. Second, it intends to investigate how team leaders can stimulate these different kinds of employees' voice. A survey investigation was conducted in a multinational chemical industry (N = 192). The statistical results of the study unveil that only empowering supervision affected promotive and preventive voices, whereas proscriptive voice was found to be affected by both empowering and monitoring supervision. Overall, the findings seem to indicate a substantial conceptual independence between the three categories of safety voice. At the same time, the study suggests that distinct supervision actions may affect these different expressions of employees' safety voice in different ways, underlining the importance of a differential approach to these constructs, not only for research advancement, but also for the design of appropriate organisational programs aimed at stimulating open safety communication in the workplace, and to develop a more articulated approach to safety supervision, in order to support employees' propensity to engage in appropriate safety voice actions, in accordance with their working situations.

1. Introduction

Employees' voice refers to a form of open communication aimed at changing the current work conditions by identifying current limitations and possibilities to create a better workplace via formal and informal channels (Klaas, Olson-Buchanan, & Ward, 2012. In the context of workplace safety, speaking up about safety concerns – or safety voice – is understood as a proactive response that may reduce future injuries by alerting others who have the opportunity to change or be heedful of dangerous work (Barling, Kelloway, & Iverson, 2003; Conchie, 2013; Curcuruto et al., 2015; 2020; Noort et al., 2019; Tucker et al., 2008; Tucker and Turner, 2011, 2014, 2015).

Research on safety voice is becoming more relevant in the field of industrial and organisational research due to the high number of deaths and serious injuries that occur in the workplace (Christian et al. 2009).

Only in 2020, there were 4,764 fatal work injuries recorded in the United States, with a fatal work injury rate of 3.4 fatalities per 100,000 full-time equivalent workers (Bureau of Labor Statistics, 2019). Existing studies in literature research already demonstrated that organisations can reduce work-related accidents and injuries by listening and supporting employee initiative to engage in safety voice, which can offer a valuable contribution for the sustainability and improvement of both teams and organisations (Curcuruto et al., 2015; 2019a; Hofmann & Morgeson, 1999). Safety voice may include actions such as: raising safety concerns with a manager or union steward (e.g. Mullen, 2005), speaking before a safety committee (e.g. Eaton & Nocerino, 2000), reporting dangerous working conditions to government officials (e.g. Gray, 2009), and participating in safety programs (e.g. Cree & Kelloway, 1997). Safety voice may also be manifested in different ways and be directed to different targets (Walters & Haines, 1988) when workers

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raise safety concerns, like supervisors (42 %), co-workers (16 %), and safety representatives (7 %). On the basis of these observable manifestations of the general construct of safety voice, Tucker et al. (2008) proposed an holistic approach in the study of the construct, finding that employees' general propensity to engage in safety voice is positively affected by contextual factors like the perception of managerial support for safety, and the perceived support for workplace safety provided by the colleagues.

Despite the indisputable practical relevance of the construct of safety voice for managers and organisations, currently there is an existing conceptual debate in safety research literature concerning the dimensionality of the construct. While some studies tend to operationalise safety voice as a single unique construct (Tucker et al., 2008), other studies propose a multidimensional approach in the analysis of safety voice (Noort et al., 2021). This study aims to contribute by extending the current understanding on this construct by analysing distinct typologies of constructive safety voice in accordance with the focus of this behaviour, distinguishing promotive, preventive and proscriptive forms of safety voice, as recently conceptualised in the model proposed by Bazzoli and Curcuruto (2021). While the first two types of safety voice (promotive and preventive-oriented) share a future-oriented focus (aimed at improving workplace safety over time, or, conversely, by defending it from potential risks and hazards that may appear in a proximal future) (Bazzoli & Curcuruto, 2021), proscriptive safety voice focuses on guaranteeing compliance with the proscriptive safety standards and regulations in place in the organisation, against any violation (or non-intentional failure) that has already happened and that can create immediate harm to people and losses for the organisation. Furthermore, the present study aims to contribute to expanding the nomological network of Bazzoli and Curcuruto's model by showing how different forms of safety voice are uniquely influenced by distinct approaches of safety supervision in work-teams, namely, empowering and monitoring supervision (Curcuruto, Griffin, Kandola, & Morgan, 2018). This is also consistent with recent developments on safety leadership models that emphasise the importance of analysing the role of single supervision styles in the promotion of workplace safety (Casey et al., 2019; Griffin & Hu, 2013). In line with with these recent trends, we aim to fill some conceptual gaps in safety leadership literature, where the interaction between leadership behaviour and employees' contribution

in safety management is analysed mainly from the perspectives of leader-exchange (Hofmann et al., 2003) and perceived supervisor support (Curcuruto et al, 2020), without considering different kinds of leadership, and overlooking how different categories of behaviour enacted by safety leaders can stimulate distinct forms of employee safety behaviours, in this case, promotive, preventive and proscriptive safety voice. This focus on different supervisory styles can also contribute to a better understanding that the benefits leadership training programs can have to enable industrial managers and team supervisors to adapt their supervisory style to the different working situations and contingencies that can be encountered in daily work activities.

Our research model is illustrated in Fig. 1. The following sections of the article will start by providing the conceptual rationales for our set of research hypotheses. Then an empirical study conducted in the chemical industrial sector will be presented in order to test the research hypotheses. Finally, a general discussion of our empirical research findings will conclude the article.

2. Distinct forms of safety voice in the workplace

Bazzoli and Curcuruto (2021) proposed an expanded conceptualisation of safety voice, presenting three different constructive forms of upward employees' safety communication acts, that are characterised by a different regulatory focus (change vs stability) and a different temporal perspective (present vs future). These forms of safety voice will be briefly introduced in the following paragraphs.

The first category, *promotive* safety voice identifies communication actions undertaken by the employees to improve workplace safety management through the generation of new ideas to carry out their tasks more safely. Examples of this form of voice include offering suggestions to supervisors, colleagues, safety representatives or trade unions on potential ways to improve the safety of the work activities (Curcuruto, Parker, & Griffin, 2019b). In accordance with the authors, this category of voice would be characterised as a "change-oriented focus" and a "future-oriented perspective", given the emphasis given to the long-term improvement of the organisational context. Sharing solutions for improving occupational safety may be critical for the continuous improvement of organisational safety systems (Griffin, Cordery, & Soo, 2016), and eventually, to achieve better safety performances with the
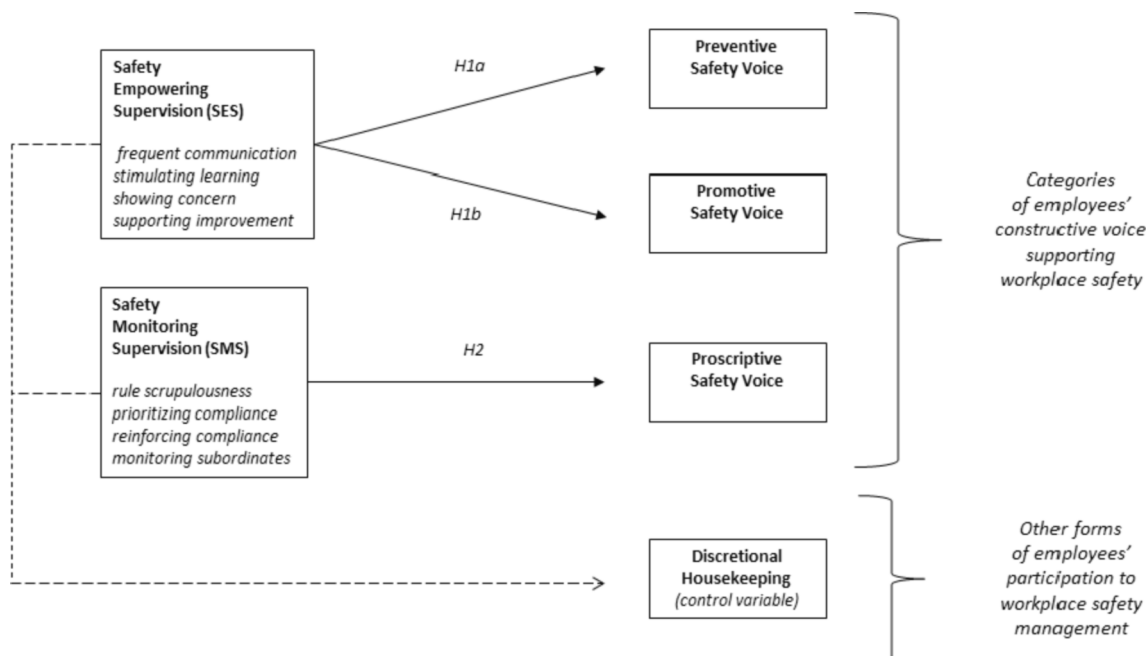

Fig. 1. Research model: safety supervision styles and constructive forms of safety voice.

reduction of injury rates (Curcuruto, Conchie, Mariani, & Violante, 2015). For instance, employees can communicate their safety-related ideas informally in one-to-one meetings with the supervisor, in periodic safety committee meetings, or again, in the context of plenary"safety day" programs, or through formal recording systems. Sometimes, this category of promotive safety voice is incentivised and rewarded by the companies, given its potential to contribute to the progressive improvement of the efficiency and productivity of the organisational systems, beyond its immediate contribution in terms of development of safer work practices (Saracino et al., 2015).

The second category discussed by Bazzoli and Curcuruto (2020) is *preventive* safety voice. This category of voice consists in the communication of personal safety concerns regarding potential risks and hazards not linked to human intentionality, and that can be due either to technological failures or non-deliberate human errors associated with aspects such as work stress or mental fatigue. Examples of this category of voice behaviour would be reporting a mechanical failure of the work machinery to colleagues or the supervisor, or warning the work-team about a product leak during the fulfilment of standard housekeeping operations. In accordance with the authors, this kind of safety voice would be characterised as a "stability-oriented focus" (i.e. returning to a previous safer workplace condition), but with a "future-oriented temporal perspective", as the emphasis here is avoiding any potential loss which still lies in the future (Bazzoli & Curcuruto, 2021). Other authors consider preventive voice a proactive employees' initiative that may reduce future accident risks by alerting others who can change or be heedful of dangerous work (Tucker & Turner, 2013). However, unlike the previous category of promotive voice, engaging in preventive safety voice is not necessarily related to the generation of new ideas to improve the organisational systems, and it does not entail a modification of the existing work practices or work procedures. Sometimes it can be also mandated by the national safety regulations (Tucker & Turner, 2014), which may consider a legal responsibility in the management of safety risks as shared by the workforce and the employers (Curcuruto et al., 2019a).

The third and last category, *proscriptive* safety voice, consists in safety-related communication actions focused in trying to correct, or report, not appropriate work conducts (i.e. deliberate violation or omissions of safety procedures) which may produce negative consequences for health and safety. In accordance with Bazzoli and Curcuruto (2021), this third category of safety voice is currently relatively less investigated than the previous two. However, an example of proscriptive voice that has been previously investigated in safety research is"whistleblowing" (Conchie, 2013), which is defined as "the disclosure by organisation members of immoral or illegitimate practices to persons or organisations that may be able to effect action" (Near & Miceli, 1985, p. 4). In concrete, examples of such safety-related communication actions are approaching co-workers to remind them that safety violations will not be tolerated, reporting such violations to the relevant organisational actors (i.e. the direct line manager; worker council; the health and safety office), or through formal anonymous reporting systems (Saracino et al., 2015). When compared with the previous two safety voice categories, proscriptive safety voice is characterised by a "stability-oriented focus" and a "present-time perspective", given its emphasis on the actual employees' compliance with the formally established safety regulations, and its main focus on the implementation of these safety regulations in "the here and the now" (Bazzoli & Curcuruto, 2021). Similarly with preventive voice, proscriptive safety is characterised by a "stability-oriented focus", in this case the adherence to the current organisational norms and safety standards. However, it differs from the previous one due to its "present-time perspective". While preventive safety voice aims to address potential risks which still lie in the future, proscriptive safety voice is focused on addressing contingent violations that have already happened, and which are more closely related to deliberate and intentional human decisions.

Although the authors concluded that some degree of similarity exists

between these three conceptual categories of safety voice behaviour, previous empirical studies conducted on this multi-dimensional model of safety voice showed that each category would be related to a distinct pattern of organisational antecedents and psychological drivers (Bazzoli et al., 2020; Bazzoli & Curcuruto, 2021). Furthermore, all three categories of safety voice here considered can differ in terms of legal implications of their omission. For instance, while the category of promotive voice can be rewarded by the single employers, which may not have been necessarily expected or demanded, preventive and proscriptive safety voice can be somehow embedded in different forms in the national safety regulation framework (Curcuruto et al., 2019a); therefore, they can be formally or informally expected by the organisations, due to the normative systems in place in the company. For this reason, exploring how organisational leaders can stimulate these different forms of upward safety communication represents an important research area that deserves more attention by both researchers and practitioners.

3. The influence of empowering and monitoring supervision on safety voice

There is consolidated agreement about the multidimensional nature of effective safety supervision in the workplace, and how team leaders can stimulate positive work conducts which are supportive of workplace safety through the usage of multiple supervisory styles to lead their subordinates toward the promotion of a safer work environment (Casey, Neal, & Griffin, 2019; Curcuruto & Griffin, 2018; Gagné et al., 2019; Zohar & Luria, 2005). For example, Griffin and Hu (2013) showed that leaders' behaviour can stimulate safety compliance and safety participation through distinct supervisory strategies such as monitoring, inspiring, and learning.

This study focuses on a specific classification of safety supervision in the workplace, which was originally proposed by Zohar and Luria (2005), and subsequently applied and further developed by Johnson (2007) and Curcuruto and colleagues (2018) in their empirical research conducted in the US manufacturing and UK railway industries. Based on the earlier conceptualisation advanced by Zohar and Luria (2005), Johnson suggested that three distinct supervision actions contribute together to promote a positive safety climate in the workplace, namely coaching, compliance, and caring. *Compliance*-oriented supervision refers to leaders' monitoring and enforcing behaviours that stimulate employees' adherence to the safety regulations currently in place in the organisation. *Caring*-oriented supervision would cover a set of leaders' daily communication initiatives, such as informing and updating their employees on safety matters. Finally, *coaching*-oriented supervision refers to leaders' actions aimed at stimulating safety-related learning and development among the subordinates, leading them to improve their current work routines and practices. The following study by Curcuruto and colleagues (2018) tested Johnson's safety supervision framework in a large sample of workers in the railway industry. The authors found that the two dimensions of"caring" and"coaching" could be merged into a single"empowering" safety supervision factor, providing support to a more parsimonious framework, with a two-factor structure representing monitoring and empowering supervision (Curcuruto et al., 2018). In support of the differential validity of their framework, the authors found that"monitoring" was closely associated with employees' perception of safety prioritisation, and with the perception of the efficiency of safety systems in place in the organisation, while"empowering" was more strongly related with employees' perceptions of social support in the work-team and organisational support to change. In the following subsections, the two supervision factors of empowering and monitoring will be described in more detail, before introducing a set of specific hypotheses related to the forms of safety voice introduced in the previous sections.

Empowering supervision. While leadership is usually described as a process of influencing others, empowering is more about giving and

sharing influence with other people, rather than having influence over them (Yukl, 2010). In the main leadership literature, Sims, Faraj and Yun (2009) discussed how the characteristics of an empowering leader are derived from the theories of participation and self-management. Such a leader focuses on influencing others, encouraging initiative, self-responsibility, proactive problem solving and self-confidence in his/her subordinates. The authors further explained that depending on the situation, a leader could be directive or empowering (Sims et al., 2009). In an emerging critical situation, directive leadership might be more practical (Gagné et al., 2019). However, in routine situations, where employees have some degree of experience and expertise, empowering leadership functions better.

In the present study, we refer to safety empowering supervision (SES) as a social process of sharing power and influence over safety-related issues in the workplace, giving more autonomy and responsibilities to followers through a specific set of leader behaviours that entails enhancing the meaningfulness of subordinates' contributions to workplace safety management, like encouraging open communication about safety-related concerns, fostering subordinates' confidence toward active participation in the safety programs by the organisation, and inspiring individual initiative to express their ideas and suggestions about how safety conditions in the workplace can be improved.

Monitoring supervision. Supervisors who monitor the work environment for risks, correct employee mistakes, and provide feedback about errors in a positive trust atmosphere (Conchie, 2013) also play an important role in affecting positive safety behaviours in work contexts (Griffin & Hu, 2013). In the main literature, these behaviours are encompassed by the concepts of "transactional leadership" and "active management by exception" (Clarke, 2013). In the field of safety research, studies on effective leader behaviours have shown that leaders who spend time monitoring follower performance tend to be more effective (Komaki, 1986; 1998; Zohar, 2000). Leaders who monitor performance can also reduce organisational errors by providing subordinates with corrective feedback, and ensuring errors are not easily repeated in future (Gagné et al., 2019). The feedback provided after performance monitoring can effectively improve subordinate performance (Grant & Higgins, 1991; Nebeker & Tatum, 1993). Monitoring is also a precursor to providing informative and corrective feedback, which leads to positive outcomes such as improved learning (Gibson & Vermeulen, 2003; Hattie & Timperley, 2007) and better work performance (Kluger & DeNisi, 1996; Komaki, Desselles, & Bowman, 1989).

In the present study, we refer to safety monitoring supervision (SMS) as the degree to which the leader observes and pays attention to whether employees are working safely. From a self-regulation perspective, monitoring is considered as a critical self-regulation mechanism as it allows the individual to be aware of the discrepancy between a current state and a desired state for safety (Griffin & Hu, 2013). This awareness may motivate the individual to allocate his/her cognitive and affect resources towards more desirable work outcomes. In a safety leadership context, safety monitoring may act as the external reminder source to assist employees in being aware of unsafe conditions, actions or behaviours that may not comply with the safety standards and organisational procedures in place.

4. Research hypotheses: Effects of empowering vs monitoring on safety voices

Overall, the existent literature on leadership and safety supervision discussed above seems to justify the formalisation of separate hypotheses on how supervisory actions of monitoring and empowering may be differently associated with distinct typologies of safety voice through the influence of distinct psychological processes. Therefore, our research hypotheses will be discussed and formalised here.

In the field of safety research, Martínez-Córcoles and colleagues (2012) examined the effects of empowering leadership on safety participation in two nuclear plants and found that this category of

leadership style enhanced workers' discretional participation in safety management programs. Furthermore, a following study by Tong, Rasiah, Tong and Lai (2015) showed a mediated effect by empowering leadership behaviour on individual safety initiatives through the mediation of psychological empowerment. Similarly, a longitudinal study by Curcuruto, Parker and Griffin (2019b) highlighted that psychological empowerment predicts future-oriented safety initiatives enacted by the employees, like providing suggestions to improve safety systems. In turn, safety initiative was also found to be associated with other preventive actions aimed at preventing potential accident events in the workplace, like for instance, proactive risk reporting and near-miss analysis. However, all these studies did not take into account a differential analysis of the influence of distinct supervision styles, nor did they distinguish between complementary forms of employees' safety initiatives, like distinct forms of safety voice behaviours.

In order to contribute to the advancement of the current understanding of the influence of supervision on employees' safety voice, we intend to investigate the role of safety-related empowering supervision on two distinct future-oriented forms of safety voice (Curcuruto et al., 2019a). On the one hand, we first hypothesise that empowering supervision affects preventive forms of safety voice aimed at adjusting unsafe work conditions. A characterising feature of empowering supervision is *showing concern* about relevant work-related issues which may have implications for the well-being of the team members (Arnold et al., 2000). When referred to workplace safety, a supervisor who frequently talks about safety-related issues and expresses genuine care for the safety and health of his/her subordinates is more likely to facilitate open communication in the team about potential safety-related problems (Zohar & Luria, 2005). In this facilitating atmosphere, the team members will be more motivated to engage in preventive forms of safety voice aimed at pointing out potential threats for workplace safety, in order to eliminate them before they result in a negative critical event for the safety of people and the organisation (Curcuruto & Griffin, 2018).

On the other hand, empowering supervision is also characterised by *encouraging* team members to show initiative and identify original problem-solving solutions to cope with current workplace issues (Arnold et al., 2000). In the field of safety, supervisors who inspire their subordinates to show active initiative (Griffin & Hu, 2013), can effectively stimulate the team members to engage in promotive safety voice (Curcuruto, Mearns, & Mariani, 2016). This constructive form of safety voice can provide original problem-solving solutions, or express original ideas about how to improve a work procedure or a team practice to eventually improve the safety of the work operations, and in the long term, contribute to the incremental improvement of the organisational safety systems (Griffin et al., 2016). In line with these conceptual arguments, we advance a first set of research hypotheses.

Hypothesis 1. *Safety-specific empowering supervision (SES) positively affects preventive safety voice (i.e. expressing concerns about future risks) (h1a) and promotive safety voice (i.e. suggesting ways to improve safety of the work activities) (h1b).*

Besides empowering-oriented forms of supervision, influent studies stressed the importance of monitoring activities enacted by safety supervisors in order to assure and defend appropriate levels of safety compliance in the workplace (Casey et al., 2019; Zohar 2000). Preoccupation with failures, attention to errors, and providing corrective feedback when mistakes are effectively made, is important as it can prevent future mistakes and aid learning from errors (Weick & Sutcliffe, 2007). This is particularly important when mistakes have safety-related implications and where safety is critical. Safety-monitoring supervision refers to the degree to which the leader observes and pays attention to whether employees are working safely (Cooper, 2006; Griffin & Hu, 2013; Komaki, 1998; 1986). In the daily context of safety management, safety-monitoring supervision may act as an external reminder that assists the employees in keeping an adequate level of situational awareness about all the unsafe actions and contingencies that do not comply

with safety standards (Zohar, 2000). In line with these assumptions, Griffin and Hu (2013) verified that safety-monitoring supervision positively affects safety compliance by employees. Moreover, monitoring supervision was also found to be associated with safety initiatives in teams characterised by a positive learning orientation.

In line with this past evidence from the literature, we suggest that employees who perceive their direct supervisor as being constantly engaged with monitoring the fulfilment of safety compliance standards will be motivated to contribute to the defence and maintenance of safety. In accordance with principles of role modelling offered by team leaders (Zohar, 2000), we expect that a "monitoring oriented supervision focused on rule compliance" should stimulate in the subordinates a similar monitoring attitude to address colleagues' deviations from the safety rules in place in the workplace. This can be manifested in proscriptive forms of safety voice, for instance, reminding colleagues to comply with safety rules and procedures when they fail to do so, or reminding colleagues that safety violations will not be tolerated by the organisation. This is especially relevant in safety–critical industrial contexts, where violations and deliberate inconsistencies with safety standards can result in significant hazards for the health and safety of other people, and/or in significant losses for the organisation. Consequently, we advance the following hypothesis:

Hypothesis 2. *Safety-specific monitoring supervision (SMS) positively affects proscriptive safety voice (i.e. approaching colleagues omitting safety standards; whistleblowing actions; reporting safety violations) (h2).*

Fig. 1 presents our research hypotheses about the relationships between empowering and monitoring supervisions with the three forms of safety voice introduced in the previous section. We excluded research hypotheses regarding any effect from monitoring supervision on promotive and preventive voice as both these forms of safety voice entail elements of voluntariness and autonomy which can be hardly stimulated by a control-based approach to safety supervision like monitoring. Furthermore, it needs to be reminded that given the intrinsic future orientation of these types of safety voice, it is not likely that monitoring the current employees' safety compliance in the here and the now should influence their propensity to engage in spontaneous initiatives which have a future temporal horizon, like presenting constructive suggestions to improve safety (i.e. promotive safety voice) or expressing concerns about risks that could affect workplace safety in a time horizon. On the other hand, we omitted to formalise hypotheses about a causal relationship between safety empowering supervision and proscriptive safety voice. In this case, we considered that proscriptive safety voice contemplates, by its intrinsic nature, elements related to employees' formal adherence with the organisational safety norms and regulations, which might be mandatory across several organisational circumstances and contingencies (i.e. addressing colleagues' omissions or violations of safety standards). As the emphasis of safety empowering supervision is placed mainly on stimulating initiative and active participation in the subordinates, we did not expect a specific effect on proscriptive safety voice, given the formal restrictions to individual agency related to this kind of safety voice.

Finally, we included an additional variable in our research model, discretional housekeeping. We introduced this extra variable in order to provide evidence of discriminant validity between the three categories of promotive, preventive and proscriptive safety voice with other forms of volunteering contributions offered by the employees to keep good standards of workplace safety. This specific variable was selected as it is considered an affiliative form of civic virtue in the context of workplace safety (Curcuruto et al., 2019b; Geller et al., 1996), which is distinct from other proactive forms of discretional bottom-up contributions offered by the workforce to support workplace safety. In the context of the present study, we did not hypothesise any specific differential influence by empowering and monitoring supervision on the housekeeping contribution, as this was beyond the scope of the investigation. However, the inclusion of this variable will allow us to check how the influence of both the styles of safety supervision on employees' voice differs from other mechanisms of influence exercised by leaders on their subordinates' discretional work conducts.

5. Method

Sample description. We conducted a survey study in a chemical manufacturing facility in Northern Italy, with about 250 workers involved in the plant operations. The plant was owned by a multinational company in the filter-making production business. The questionnaires were administrated at the beginning of the periodic monthly safety meetings held at a work-team level. Once filled out, the questionnaires were lodged in a box kept by the research team. Within a period of four weeks, all the 24 work-teams of the plant were able to be involved in the survey study.

At the beginning of each administration, the employees were informed that the only aim of the survey was to collect information for the development of a scientific program on the topic of safety participation, and that their company would have received a report with suggestions to improve workplace safety in that plant, but with all the results presented at a department level of analysis, in order to guarantee anonymity to all the participants. Participants were also informed that the items in the questionnaire aimed to evaluate employees' perception about how safety was managed in the daily work activities of their teams and how they contributed to the promotion of safety. At the end of the survey administration, 192 questionnaires were eventually returned (response rate: 77 %). In the final sample of respondents, most participants were employed in 'production' (44.6 %), 'maintenance' (14.1 %) and 'utilities' (12.5 %) departments. Staff from the engineering department and 'research and development' laboratories also joined the survey, due to the significant amount of chemical risk involved in the laboratory activities, and given the influence of the engineering department activities for the overall reliability of the plant. Finally, administration staff was not involved in the study, as this typology of personnel was not considered relevant for the aims of the present study. It should be specified that even if this kind of chemical plant is characterised by the presence of sophisticated process safety systems, participation in this survey-based research project was promoted in the workforce as a way to investigate employees' perceptions of the management of personal safety in the daily production activities of the work-teams.

Eventually, age average of the participants was 34.8 (SD = 8.16). 69 % of respondents were men. 60.6 % of participants declared a job tenure less than 5 years. The rest of the workforce was composed of clusters of workers with a job tenure between 5 and 10 years (35.7 %) or more than 10 years (3.7 %). The organisational information box at the end of the questionnaire allowed us to cluster the participants into 24 real work-teams in order to test the links of our triadic safety voice model with external sources of information such as supervisor evaluation of all the different categories of safety-related communication in the teams, as they have been conceptualised in the present research.

Self-report measures A questionnaire survey included two scales assessing safety supervision styles by supervisors (empowering- and monitoring-supervision), and three-scale measuring self-report individual safety voice behaviours (promotive, preventive and proscriptive safety voice). In addition, in order to test the discriminant validity of the scales of safety voice from other typologies of discretional safety behaviours, we included an additional self-report measure of housekeeping that assessed the extent to which people spontaneously engage in discretional activities to support the daily maintenance of the work environments.

Safety-specific empowering supervision (SES). We used four items of the safety empowering communication scale (Curcuruto et al., 2018), which was adapted by the authors from the questionnaire originally created by Zohar and Luria (2005), to measure safety-empowering oriented behaviours by supervisors. Workers were invited to report their degree of

agreement on sentences on their direct supervisor in relation to workplace safety, considering a range of participative- and empowering-supervision behaviours (1 = strongly disagree; 5 = strongly disagree). Items were *"he/she discusses with us how to improve safety in our work"*, *"he/she spends time helping us learn to see problems before they arise"*, *"he/she uses explanations (not just compliance) to get us to act safely"*, *"he/she frequently speaks with us about the risks we encounter in our work"*. In the present sample Cronbach α was 0.84.

Safety-specific monitoring supervision (SMS). We used a 4-item safety monitoring scale (Curcuruto et al., 2018) to assess safety monitoring-oriented behaviours by supervisors. As in the previous scale, this scale was adapted from the original questionnaire developed by Zohar and Luria (2005). As above, workers were invited to report their agreement on sentences on their direct supervisor behaviours in relation to workplace safety (1 = strongly disagree; 5 = strongly disagree). All the items focused on monitoring and vigilance supervisory behaviours: *"he/she makes sure we follow all the safety rules (not just the most important)"*, *"he/she insists that we obey safety rules when working with all the equipment"*, *"he/she frequently checks to see if we are all obeying the safety rules"*, *"he/she refuses to ignore safety rules when work falls behind schedule"*. In the present sample, Cronbach alpha was 0.78.

Preventive safety voice. Three items previously developed by Hofmann et al. (2003) were adapted to assess the preventive form of safety voice. Workers were invited to report how likely it was for them to engage in behaviours like *"making recommendations to assure the safety of the work activities"*, *"raising safety-related concerns during planning sessions"*, *"encouraging others to pay attention to safety-related issues"*. Responses were collected on a 5-point Likert scale (0 = very unlikely; 4 = very likely). In the present sample, Cronbach alpha of the scale was 0.81.

Promotive safety voice. We adapted three items previously developed by Simard and Marchard (1995) to measure voicing suggestion behaviours, adapting the original items to our current research aims. Participants were presented the following items focused on communication initiatives aimed at improving safety-related aspects of the organisational context: *"voicing suggestions to your colleagues about how to make your work routines safer"*, *"presenting suggestions to your supervisor about how to improve the safety of our work operations"*, *"putting pressure on the management to improve some aspects of workplace safety"*. Responses were collected on a 5-point Likert scale (0 = very unlikely; 4 = very likely). Cronbach's alpha of the scale in the present sample was 0.83.

Proscriptive safety voice. We adapted three items previously developed by Tucker et al. (2008). Participants were presented items focused on alerting colleagues or supervisors to unsafe acts or their negative consequences: *"telling colleagues who are doing something unsafe to stop"*, *"warning coworkers against working unsafely"*, *"reporting if my colleagues break any safety rules"*. Responses were collected on a 5-point Likert scale (0 = very unlikely; 4 = very likely). In the present sample, Cronbach's alpha of the scale was 0.77.

Control measure: discretional housekeeping. In addition to the two safety supervisory scales and three safety voice scales, we added in our survey a final control measure assessing volunteering housekeeping behaviours, which are discretionally enacted by the workers to keep their work environment safe (Geller et al., 1996). Three items previously developed by Geller, Roberts and Gilmore (1996) were used to assess discretional housekeeping contributions to adjust or correct current work situations related to poor maintenance of the physical workplace environments. Participants were asked to indicate how frequently they usually engage in the following activities: *"supporting other employees to maintain good housekeeping"*, *"fixing a potential risk myself if possible"*, *"correcting disorder in the workplace that I did not cause myself"*. Cronbach alpha was 0.72. Response range was: 0 = never; 4 = very frequently.

Concurrent validity: supervisor external rate of safety voice measures. In order to provide evidence of the concurrent validity of our self-reported safety voice measures, we focused on supervisor assessments of safety communication between team members of the plant. As in similar studies, we expected that these ratings would correlate with the average self-ratings of safety voice behaviours within the groups (Griffin, Neal & Parker, 2007). The "supervisor rate" was obtained via a short three-item checklist for evaluation by team-leaders on the three types of safety voice communication expressed by individuals in their team. Each item assessed the observable behavioural propensity in the team of one of the three categories of safety voice: promotive, preventive, proscriptive. These items were adapted from an existing scale by Tucker, Chmiel, Turner, Hershcovis, & Stride (2008): *"team members provide each other suggestions about how to work more safely"* (promotive safety voice), *"team members voice their concerns about safety in the workplace"* (preventive safety voice), *"team members are ready to talk to fellow employees who fail to use safety procedures"* (proscriptive safety voice). We expected that the group level aggregated scores in the three individual self-report measures of safety voice would be statistically associated with the correspondent external supervisor rates for the three distinct forms of safety voice observed by the supervisors at the team level.

Data analysis. Path analysis were used to test the research hypotheses regarding the influence of empowering and monitoring supervision styles on the three forms of safety voice included in the present study. The analyses were performed with AMOS version 26.0. Before testing our research hypotheses, preliminary measurement analyses models were performed with confirmatory factor analysis (CFA). Jackson et al. (2009) provided useful guidelines for the reporting of statistical results from CFA models, which suggest the inclusion of three classes of indices: the $\chi 2$/df ratio index (an index assessing the "lack of fit"), the Comparative Fit Index (CFI, an index describing "incremental fit"), and the Residual Mean Square Error of Approximation (RMSEA, a "residual-based measure"). The $\chi 2$/df ratio index is a traditional measure for evaluating overall model fit, assessing the magnitude of discrepancy between the sample and the fitted covariances matrices' (Hu & Bentler, 1999). Although there is no consensus regarding an acceptable ratio for this statistic, recommendations range from as high as 5.0 to as low as 2.0 (Jackson et al, 2009). However, given the sensitivity of the sample size (Byrne, 2016), it is strongly recommended to include the CFI index in our model fit evaluations. This second index analyses the model fit by examining the discrepancy between the data and the hypothesised model, while adjusting for the issues of sample size inherent in the chi-squared test of model fit. CFI ranges from 0 to 1. Values over 0.90 are considered to be an acceptable model fit to the data, whereas values higher than 0.95 are considered good (Kline, 2010). Finally, the RMSEA index analyses the discrepancy between the hypothesised model, with optimally chosen parameter estimates, and the population covariance matrix. RMESA values of less than 0.05 indicate a good fit, whereas values ranging from 0.05 to 0.08 are acceptable (Kline, 2010).

6. Results

Preliminary analysis, descriptive and correlation statistics. CFA statistical analyses showed a fair adequate fit of our six-factor measurement model including safety-specific empowering supervision, safety-specific monitoring supervision, promotive safety voice, preventive-oriented safety voice, prohibition-oriented safety voice, and housekeeping behaviour ($\chi 2$ = 357.9; df = 155; $\chi 2$ ratio = 2.31; CFI = 0.97; RMSEA = 0.05). This model was compared with other four concurrent models including: a one-method factor model to estimate the possibility that the correlations between the research variables are inflated by common method bias effects (*alternative model zero*, with all self-reports of items relating with workplace safety: $\chi 2$ = 3415.1; df = 170; $\chi 2$ ratio = 20.09; CFI = 0.54; RMSEA = 0.19); a four-factor model in which all three safety voice behaviour items were specified to load onto an unique safety voice factor (*alternative model one*: $\chi 2$ = 735; $\chi 2$ ratio = 4.48; df = 164; CFI = 0.92; RMSEA = 0.08); a five-factor model in which both two supervision scale items were loaded onto a single supervision factor (*alternative model two*: $\chi 2$ = 440.6; df = 160; $\chi 2$ ratio = 4.49; CFI = 0.95; RMSEA = 0.06); finally, a three-factor model in which all the three safety voice behaviour items loaded onto a unique

safety voice factor, with all supervision scale items loading on a single supervision factor, and the remaining items loading on housekeeping (*alternative model three*: χ2 = 501.8; df = 167; χ2 ratio = 3.01; CFI = 0.80; RMSEA = 0.11).

Based on these model tests, we excluded the possibility of relevant method bias effects affecting our analyses (*alternative model zero*), and other concurrent factor models representing safety supervision and safety voice as unidimensional constructs (*alternative models 1,2 and 3*); therefore, in the next stages of our statistical analyses, we treated safety voice and safety supervision constructs as represented by multiple behavioural factors, with two elements of safety supervision and three forms of safety voice, showing not only internal discriminant validity (three independent constructs of safety voice), but also discriminant validity when compared with other forms of discretional work conducts with relevance for safety, like volunteer housekeeping.

Descriptive and correlation statistics are reported in Table 1. As evident from the table, the safety-supervision empowering and monitoring dimensions present a high significant correlation (0.46), but in line with other studies on safety supervision styles (Griffin & Hu, 2013; Johnson, 2007), not so high to conclude for a potential identity between the two factors. The three measures of safety voice also presented considerable inter-correlations (min. = 0.43; max = 0.48), but again not so high to entail potential threats to the discriminant validity of the measures of distinct typologies of voice (Morrison, 2014).

Concurrent validity: correlations with external supervisory rates of safety voice. To check the external validity of self-report voice behaviours, we compared their aggregate values at the team level with supervisor rates of safety communications between members of their teams. 24 team units were identified on the basis of work organisational clusters. Each team was composed in average of eight members (Max = 17; Min = 3) employed across the different departments of the plants, such as production (twelve teams), maintenance (four teams), utilities (four teams), research and development (two teams), engineering (one team), and health and safety (one team). First, ANOVA analyses were computed in order to justify the aggregation of self-reported measures by employees at this higher organisational level. ANOVAs showed that there were significant differences between teams in every self-report voice scale included in our research (promotive voice: F = 1.985; df = 23; p <.05; preventive voice: F = 2.30; df = 23; p <.01; proscriptive voice: F = 1.76; df = 23; p <.05).

In addition, the interclass correlation index ICC(1) was computed to understand in which extent the individual self-report measures were affected by the team membership of the respondents. ICC(1) provides statistical information about the proportion of observed variance in ratings that is due to systematic between-group differences compared to the total variance in ratings (LeBreton & Senter, 2008). In the context of research conducted in organisational settings, ICC(1) is broadly used when quantitative measurements are made on units that are organised into groups, and it describes how strongly individual in the same group resemble each other. In the present study, ICC(1) provides an estimate of the extent with which individual ratings are attributable to their membership to one of the twenty-four organisational teams. ICC(1) can assume values from zero to 1, with high values indicating a strong similarity among the individual self-report measures collected in the single group unit (LeBreton & Senter, 2008). In the present sample, with

the adoption of a 95 % confident interval, we obtained ICC(1) values of 0.51 (preventive voice), 0.68 (promotive voice), and 0.62 (proscriptive voice). ICC(1) between 0.5 and 0.75 are considered indicative of a moderate degree of within-group agreement to justify in the present study the aggregation of the individual self-report rates of safety voice at the higher group level. Finally, correlation statistics were computed to examine how the individual self-report measures of safety voice aggregated at group level related with the correspondent supervisor rates of the three forms of safety voice. These correlation analyses showed acceptable statistical links between self-report measures and supervisor assessment of a given specific safety voice at the team level (r = 0.40, p <.05 for promotive voice; r = 0.44, p <.05 for preventive voice; r = 0.47, p <.05 for proscriptive voice). These results appeared to be in line with previous literature studies on proactive behaviours in industrial settings (Parker, William, & Turner, 2006), providing some evidence of validity of the self-report measures of safety voice used in the present study.

Hypothesis test. Based on the findings from the previous preliminary analyses, we used a path analysis model to test our research hypotheses. In the path analysis model, we specified two links from empowering supervision on the two categories of promotive and preventive safety voice respectively, and an additional link from monitoring supervision on proscriptive safety voice. Finally, both empowering and monitoring were linked to the control variable included in the model (housekeeping), in order to provide additional evidence of validity to our hypotheses, taking into account the influence of the two styles of safety supervision on other relevant discretional behaviours with some relevance for the management of safety in the workplace.

Eventually, the resulting statistical fit indices (Chi2 = 12; df = 3; CFI = 0.98; RMSEA = 0.10) almost confirmed our research hypotheses, but the RMSEA index was not adequate. In light of this, we tried to test two alternative models by including not hypothesised links for each of the two antecedent variables. First, alternative model 1 included a link from empowering supervision to proscriptive safety voice. We verified a statistical improvement of the model (Chi2 = 1.00; df = 2; CFI = 1.00; RMSEA = 0.00). We then tested a second alternative model including two links between safety-specific monitoring supervision with the promotive and preventive voice constructs. This second alternative model showed inadequate fit indices (Chi2 = 9.8; df = 2; CFI = 0.97; RMSEA = 0.14). Based on these findings, we considered alternative model 1 as the verified one.

Statistical analyses confirmed all our research hypotheses. The main results are reported in Fig. 2 with standardised parameter estimates. First, we verified a positive influence of empowering supervision on preventive safety voice (β = 0.36; p <.001) and promotive safety voice (β = 0.24; p <.001). Second, statistical analyses confirmed our hypothesised influence of SMS on proscriptive safety voice (β = 0.18; p <.001). Regarding the unexpected findings which emerged, we verified a link between empowering supervision and proscriptive safety voice (β = 0.21; p <.001). Finally, in regard to the links between the two safety supervisory styles and the control variable included in the model (housekeeping), they were both found statistically significant, and quite similar in terms of magnitude of their statistical effect on housekeeping behaviour (monitoring supervision: β = 0.17; p <.001; empowering

Table 1
Descriptive and correlation statistics (N = 192).

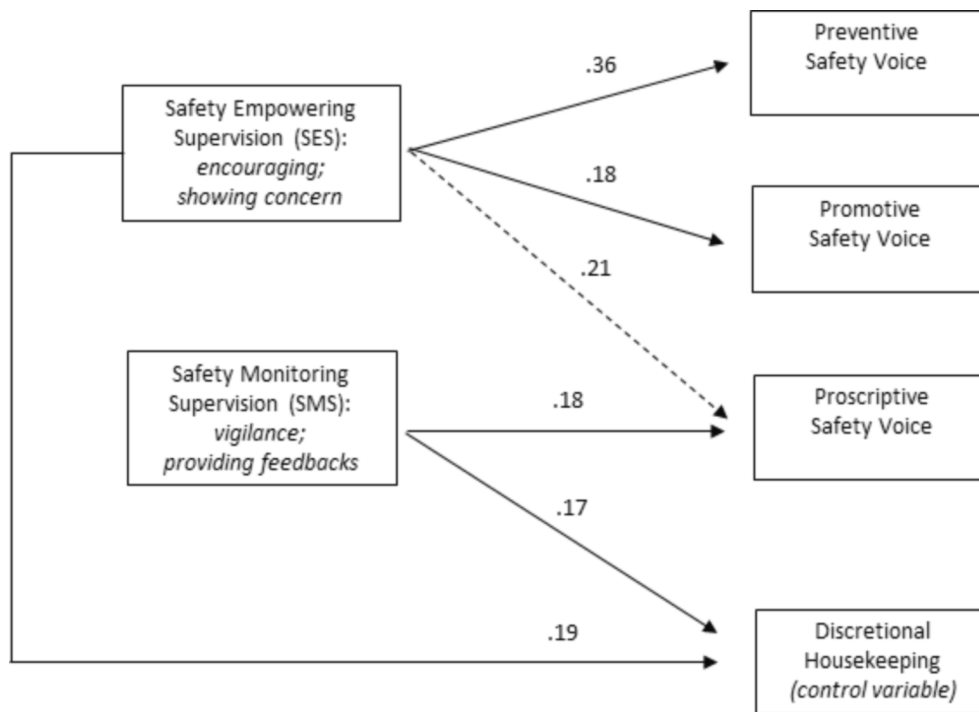| Dimension	M	SD	1	2	3	4	5	6
1. Safety Empowering Supervision	4	0.82	(0.84)					
2. Safety Monitoring Supervision	3.7	0.91	0.46**	(0.78)				
3. Preventive Safety Voice	4.1	0.81	0.35**	0.18**	(81)			
4. Promotive Safety Voice	3.5	1.05	0.19**	0.05	0.47**	(0.83)		
5. Proscriptive Safety Voice	3.8	0.98	0.28**	0.29**	0.45**	0.52**	(0.77)	
6. Discretional Housekeeping	4.1	0.85	0.27**	0.24**	0.48**	0.38**	0.45**	(0.72)

Note: *p <.05; **p <.01.

Fig. 2. Verified model with standardized parameter estimates. The dashed arrow indicates an addition to the hypothesised model.

supervision: β = 0.21; p <.001).

7. General discussion

Constructive voice is an emergent construct of growing importance for safety research and organisational behaviour literature (Curcuruto & Griffin, 2018; LePine & Van Dyne, 1998; Morrison, 2014). The present study aimed to expand our understanding of the multiple manifestations of safety voice behaviour in the workplace (promotive, preventive and proscriptive), and how these different categories of safety voice are elicited by distinct forms of safety supervision (monitoring vs empowering). In the next sections, we analyse the theoretical contributions of this study for literature advancement, providing suggestions for future research avenues and practical implications for workplace safety management, but we also address the limitations of our research.

7.1. Theoretical implications for research advancements on safety voice.

The findings from the present study contributed to the research advancement on safety voice by providing meaningful evidence in support of a differential approach in the study of this construct. First, from a perspective at the individual level of analysis, in the present research sample our statistical findings supported our conceptual assumption that promotive, preventive and proscriptive safety voice are three distinct forms of upward safety communication. This finding was supported by the better fit indices presented by our hypothesised measurement model (which included the three safety voice behaviours as distinct entities). These fit indices were remarkably higher than the ones presented by the other alternative measurement models included in our statistical analyses.

Second, at a group level perspective of analysis, the measures used to assess the three forms of safety voice at the individual level presented significant correlations with the external evaluation of the same forms of safety voice provided by twenty-four team leaders who were asked to provide an independent evaluation of these behaviours for the team they were responsible for. Although the external evaluation was collected at an aggregated team level, due to a previous agreement with the worker council who granted support for the implementation of the present study, our correlational findings showed that the individual self-report measures of the three safety voice behaviours presented a unique correlation with the correspondent external rates provided by the team leader at an aggregated group level of analysis.

Third, when analysing the nomological network of the three forms of safety voice, we found that each form of safety voice presented a specific pattern of antecedent effects exercised by the two forms of safety voice (empowering and monitoring) included in the present study. Preventive-oriented safety voice was found only and strongly influenced by safety empowering supervision. This finding is a cue of the prominent importance of empowering supervision to support employees' efforts to try to anticipate future risk scenarios in their workplace. Promotive safety voice was similarly affected by only empowering supervision, but in this case the magnitude of the statistical regression effect was significantly lower. This finding may be a cue that other organisational antecedents (not included in the present research) can contribute to stimulate employees' engagement in promotive safety voice. Given the change-oriented emphasis of this category of safety voice (i.e. providing original suggestions to improve the workplace), we suggest that other organisational antecedents and team dimensions (i.e. climate for innovation; levels of interpersonal trust) may be relevant to better analyse the conditions that facilitate the individual propensity to engage in promotive safety voice. Finally, we found that proscriptive safety voice was the only category affected by both empowering and monitoring supervision. Even if this finding was not in line with our original set of research hypotheses, given the potential of proscriptive voice to cause latent or manifest conflict in the organisation, we suggest that stimulating proscriptive safety voice can entail both a monitoring supervisory mechanism (resulting from the perceived importance of complying all the time with safety regulations in place), and an empowering supervisory element. The latter is needed to stimulate individual propensity to commit oneself in difficult courses of actions, like openly challenging inappropriate work conduct in the teams, or to remind colleagues that their violation will not be tolerated or not subject to sanctions.

In summary, in spite of a certain degree of statistical correlation between the three categories, taken as a whole, we believe that these

findings provide sufficient support for a differential approach to the construct of safety voice. The following paragraphs discuss the implications of the present study for the research advancement on safety supervision.

7.2. Theoretical implications for research advancement on safety supervision.

The results from the study provide support to the importance of adopting an articulated multidimensional approach to safety leadership (Griffin & Talati, 2013). Our findings show that an empowering-oriented supervision style characterised by coaching, guidance and active listening by team leaders seems to inspire a proactive engagement in future-oriented forms of safety voice. This might be expressed through the expression of preventive-oriented safety voice (i.e. raising personal concerns about potential future risks for workplace safety) or through promotive-oriented forms of the same construct (i.e. providing suggestions to improve the safety of work routines and procedures). Our findings effectively support this unique effect of safety empowering supervision on the two future-oriented categories of safety voice. However, it should be noted that the current study lacks a longitudinal research design. Therefore, empowering monitoring-oriented supervision may not affect proscriptive safety voice when measured at the same time, but a lagged influence of the earlier on the latter cannot be excluded in the light of the present cross-sectional findings.

Unexpectedly, our findings unveiled an additional not hypothesised effect of empowering supervision on proscriptive safety voice. This unexpected finding may suggest that empowering-oriented safety supervision may stimulate employees' engaging in proactive future-oriented forms of safety voice, but also to guarantee in the present time colleagues' compliance with safety regulations and procedures in place in their organisation. This unexpected influence of empowering-oriented supervision on proscriptive safety voice seems to suggest that organisational leaders and team supervisors should consider a mix of empowering and monitoring supervision behaviours if they aim to cultivate in their subordinates an active and deeper level of compliance with the organisational safety norms and systems (Griffin & Hu, 2013).

In accordance with our initial research hypotheses, monitoring-oriented supervision affected only the proscriptive category of safety voice, with no influence on the two future-oriented categories of promotive and preventive voice. This finding is not surprising, given that the emphasis of monitoring supervision is on checking the compliance of work conducted with pre-established safety standards and regulations, rather than simulating constructive changes, or anticipating future scenarios of risk and hazard. Nevertheless, as above, it is important to note that the current study lacks a longitudinal research design, therefore monitoring-oriented supervision may not affect future-oriented safety voices measured when these constructs are measured at the same time, but a lagged influence on these forms of voice cannot be excluded in the light of the present findings.

7.3. Research limitations

This study is not without limitations. First, this study is based on a cross-sectional design; therefore, our result interpretation of a causal relationship between voice and supervision is based on conceptual assumptions, but the statistical findings from the present investigation cannot exclude a reverse causal effect between the variables of our research model. Leaders of work-teams whose members are strongly committed to engaging in one of the categories of safety voice, may decide to adjust their safety supervisory style in accordance with the voice behaviour of their subordinates. For example, an empowering-oriented team leader could be the result of a response to the active engagement of his/her subordinates in future-oriented safety voice actions. In other words, if a leader sees a firm commitment in his/her subordinates to try to develop safer work practices, he/she may decide

to grant additional listenings to the improvement suggestions raised by his/her subordinates. Conversely, if a leader hears about people in the team reporting violation actions in the fulfilment of the work activities, he/she may decide to increase his/her engagement in monitoring team compliance with the established safety standards in order to avoid the reoccurrence of further safety violations. Future study replications adopting a longitudinal research design could provide insights about the validity of our study interpretation against other alternative conceptual hypotheses regarding the causality of the relationships between safety supervision and employees' voice.

The second limitation concerns the use of self-reported behaviour. This means that certain forms of biases affecting the findings of our study cannot be excluded (i.e. social desirability). Although previous studies suggesting that self-reported safety behaviours predict important safety outcomes (Neal & Griffin, 2006), it is important that future replications of the present study adopt additional forms of measurement of individual employees' safety voice, such as supervisor evaluation of each member of the teams. Given the previous agreement with the trade union, we were not able to collect these individual external rates for each one of our survey participants. However, in line with past studies on proactive forms of work conducts (Griffin et al., 2007), we were able to collect at least a group-level supervisory rate of the three categories of promotive, preventive and proscriptive safety voice. In any case, even if we found substantial unique correlations between the aggregated individual self-report measures of the three categories of safety voice with their corresponding group-level supervisor, future studies could improve the research design of the present study by trying to collect the external supervisory rates at an individual level.

A third limitation of this study might concern the generalisability of the findings to other organisational contexts. Our research studies were developed in the context of a multinational chemical industry. This sector is regarded as an example of High-Reliability Organisation where workplace safety is perceived as critically important, and where accident events can lead to catastrophic consequences for the workforce and broader society (Broughton, 2005; Poole, 1997; Roberts, 1989). Therefore, in these context the workforce is continuously involved in highly structured safety education and training programs (Carroll & Rudolph, 2006; Hopkins, 2009). The limited existing cross-industry research on the construct of safety voice (Curcuruto et al., 2019b) suggests that the way in which employees perceive the appropriateness of discretional safety-related initiative might be affected by industry-specific differences, such as legal regulations affecting employees' and leaders' safety responsibilities, or the presence of mandatory risk-reporting systems. Therefore, in order to support the generalisability of our research findings, future replication studies could benefit from analysing the three categories of promotive, preventive and proscriptive safety voice across research samples from a broader range of organisations and industries. These considerations are relevant for both empowering and monitoring supervisions, and especially for their implications on the emergence of proscriptive safety voice, whose specific reference to the employees' effort of making safety standards respected in the workplace can be specifically affected by contextual factors such as the normative regulations in place existing at different levels of analysis (industry sector level; national level).

Fourth, we need to report that the aggregated structure of our research sample in organisational subunits would have entailed a multilevel approach to the statistical analysis of the collected data. However, a preliminary analysis of the statistical ICC(1) aggregation index for the two safety supervision scales revealed values of 0.79 for empowering and 0.51 for monitoring supervision. Given that the accepted multilevel methodological standards (LeBreton & Senter, 2008) suggest having ICC (1) values higher than 0.70 for all the antecedent variables measured at group level, we decided to keep our statistical analyses at an individual level. The lower value of ICC(1) for the monitoring supervision scale might be in part related to the limited number of organisational group units identifiable in the present research sample (only twenty-four),

considering that literature standards on multilevel analyses suggests an optimal number of fifty groups to perform this kind of statistical analyses (LeBreton & Senter, 2008). For these reasons, future studies should probably aim to replicate this research in larger industrial samples where it is possible to identify a minimum of fifty organisational group units.

7.4. Future research avenues

From the perspective of future replication of our research, we need to point out the need to integrate our conceptualisation of safety empowering supervision with the general literature on empowering leadership in organisations (Arnold, 2000). Even if our study was specifically focused on understanding the role of certain types of supervision styles on employees' safety voice, the operationalisation provided by our four items to assess safety empowering supervision can hardly cover the entire breadth of the psychological mechanisms contemplated by the general literature on empowering leadership. For example, the model of empowering leadership proposed by Arnold et al. (2000) contemplates at least five different empowering processes elicited by team leaders: leading by example, coaching, participative decision-making, informing, and showing concern. Therefore, future replications of the present study could consider including in their research model some of the empowering dimensions conceptualised by Arnold and his collaborators.

Second, another strategy to consider in future research replications could consist of expanding the four-item scale that we used to measure safety empowering supervision in the present study to cover some contents of the five processes of empowering leadership proposed by Arnold et al. (2000) that were not well embedded or represented in our four-item measure scale. It is quite likely that four items cannot represent alone the conceptual richness of multidimensional constructs like empowering leadership and safety empowering supervision.

Third, it needs to be pointed out that the present study did not include a multilevel perspective analysis in the investigation of the relationship between safety supervision and individual employees' safety voice. This means that our study only focused on the understanding of how the individual perception of empowering and monitoring supervision affected individual propensity to engage in the different forms of safety voice. Future replications of the study should consider analysing the following logical step. This would entail trying to understand to what extent the perception of safety empowering and monitoring supervision styles is effectively shared by the members of the team, and how this shared perception at the group level effects the manifestation of the three forms of safety voice at the individual level. Unfortunately, the dimensions of our research sample composed of only twenty-four teams were lower than the ones recommended in literature for multilevel analysis (i.e. 50 units) (LeBreton & Senter, 2008). Therefore, future replication of the study could analyse the validity and generalisability of the present research findings when adopting a multilevel perspective of analysis with research samples presenting a higher internal number of work-teams.

Finally, another conceptual contribution that could arise out of future replications of the present study could be expanding the nomological network of the multidimensional model of safety voice. For instance, it could be relevant to explore the relationship of the three forms of constructive safety with other well established behavioural constructs, like safety compliance and safety participation, or to consider the links of the different types of safety voice with other forms of safety citizenship behaviour, like *helping* or *stewardship*, investigating how these safety related work conducts can be differently affected by supervisors' empowering and monitoring safety related styles of supervision.

7.5. Practical implications for managerial programs in organisations

The empirical evidence resulting from the present study can support organisations to improve the management of safety in work-teams in different ways, stimulating an appropriate employee participation in the promotion of workplace safety. Companies could use our taxonomy of multiple safety voices as a managerial tool to identify the kind of discretional contribution that should be expected from the workforce in different organisational circumstances.

First, in some industrial contexts characterised by relatively high levels of complexity and uncertainty, where risks and hazards can develop in unpredictable forms, it could be advantageous for the safety managers to pay attention to the bottom-up contribution offered by preventive-oriented safety voice. This kind of safety voice could certainly help the company to identify in advance unpredictable sources of risks and threats for safety, once their workers have promptly informed their supervisors (Renecle et al., 2020; Saracino et al., 2015). A practical way to exploit this information could be to set up specific risk-reporting systems and safety-communication channels that allow the safety board of the company to identify and categorise the inputs that they receive from the workforce against the three typologies of safety voice described in the present research to understand which ones need immediate attention in order to eliminate the causes of potential accidents.

Second, both managers and their subordinates may benefit from check-list tools that enable them to identify and differentiate promotive-oriented, preventive-oriented, and proscriptive-oriented voices. From a managerial point of view, this could be particularly important because addressing a confidential whistleblowing communication about a safety violation 'in progress' (proscriptive safety voice) might be profoundly different from following-up a suggested proposal to change a work procedure to make the work safer in the same work unit (promotive voice). Safety managers might need to act immediately to interrupt the occurrence of the violation of the safety standards once it has been communicated (proscriptive voice), while suggestions to operate constructive changes may require an accurate analysis of the feasibility of the bottom-up suggestion that has been spontaneously provided by the employees (promotive voice).

Third, being able to differentiate between distinct categories of safety voice can also help the organisation to identify specific constructive typologies of change-oriented suggestions to enable it to continuously improve the safety of its work practices and the reliability of its organisational systems (Curcuruto et al., 2019a). Given the implications for the general improvement of safety, being able to identify a constructive insight or suggestion might be particularly advantageous for the company, and it might be relevant for the management to differentiate these constructive voice actions from other hostile communication acts that might attempt to challenge the organisational status quo once a critical event has happened (Bazzoli et al., 2020), but without effectively providing effective solutions that can eventually enable the management to take all the necessary steps to avoid that same event happening again in the future. From this perspective, organisations might be interested in setting up safety-specific reward systems in order to value and provide recognition to those spontaneous bottom-up suggestions offered by the workforce that can help the organisation to improve a specific aspect of the daily management of safety, like proposals to correct some obsolete work routines, or suggestions to improve the reliability of a teamwork procedure.

Fourth, the evidence provided on the different influence of empowering and monitoring supervision styles can provide HR managers insights on how to design articulated safety leadership programs that enable their operation leaders to develop a more flexible and heterogeneous approach to the supervision of safety in the operations of their teams. In line with other recent developments in safety leadership literature (Casey et al., 2019), our findings suggest that team leaders in organisations can benefit from developing a broader set of team

management skills that support their lead across a different range of work situations. This is also consistent with recent studies from the general leadership research stream (Gagné et al., 2019) that highlight the importance for the organisational leaders to be equally effective in adopting both empowering and monitoring styles of supervision. In line with recent findings by Gagné and colleagues (2019), while empowering-oriented supervision might be more effective in standard situations where employees can easily express their skills and initiative, monitoring supervision could be more crucial in those situations of change related to the introduction of new regulations, new procedures, or new technologies with practical implications for the daily management of safety in work activities. In line with these assumptions, training programs on safety supervision should enable the operative leaders to not only effectively use distinct supervisory styles, but also enable them to recognise the organisational contingencies and situations where one supervision style can be more appropriate than another, and being able to shift their lead in their work-teams in a timely and sensible manner.

8. Conclusions

The relationship between leader supervision and safety voice has traditionally been limited to the investigation of the influence of the perceived quality of leader-member exchange or perceived supervisory support on employees' propensity to engage in open upward safety communication (or safety voice), without considering how this influence may vary when examining different expressions of the construct of safety voice. The results of the current study suggest that safety voice is better conceptualised as multiple behaviours that represent different, relatively independent, constructs (as opposed to a unitary construct), with distinct combinations of supervisory antecedent effects. These findings seem to support the claim that different forms of upward safety communication are effectively impacted by different supervisory actions.

CRediT authorship contribution statement

Matteo Curcuruto: Writing – review & editing, Writing – original draft, Project administration, Investigation, Formal analysis, Conceptualization. **Mark A. Griffin:** Writing – review & editing, Supervision, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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