


RESEARCH ARTICLE

# Development and validation of employee safety voice scale in the Chinese organizational context

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## Abstract

Safety voice helps organizations to identify safety issues timely and is critical to the long-term growth of the organization. Safety voice has become a hot research topic in organizational safety, and different scales have been developed. However, the unique cultural context in China has led to the need to redevelop safety voice measurement tools. In this paper, we developed an initial scale of safety voice for employees in Chinese organizational contexts fusing in-depth interviews and mature scales. The initial scale based on two samples ( $n_1 = 205$ ,  $n_2 = 420$ ) was revised and validated using item analysis, exploratory factor analysis, confirmatory factor analysis, and reliability analysis to finalize the final scale. We finally found that the safety voice scale in Chinese organizational contexts contains two dimensions: promotive safety voice and prohibitive safety voice. The scale developed in this paper is a reliable tool to measure safety voice behavior of Chinese employees.

**Key words:** Prohibitive safety voice; promotive safety voice; safety voice; scale development; the Chinese organizational context

## Introduction

The objects of modern enterprise safety management have the characteristics of interactive complexity and tight coupling (Pidgeon, 2011). Complex production systems may generate various forms of variation. Still, existing safety protocols cannot cover all combinations of scenarios, so organizations need to have some feedback capability and the ability to adjust to ensure their safety (Weick, Arbor, & Roberts, 1993). From an iterative perspective, employee safety voice can help companies obtain safety information from accidents or near-misses to continuously optimize safety measures for accident prevention purposes. Studies concluded that the main reason for safety incidents was the reluctance of employees to convey their thoughts and concerns related to job safety to their superiors, preventing the organization from identifying and eliminating safety hazards promptly (Morrow, Gustavson, & Jones, 2016; Okuyama, Wagner, & Bijnen, 2014). As a form of employee feedback on workplace safety hazards, safety voice can effectively avoid accidents and play an essential role in accident prevention. Hence, safety voice has attracted the attention of many scholars (Morrow, Gustavson, & Jones, 2016; Okuyama, Wagner, & Bijnen, 2014).

Studies of safety voice had an early start, and scholars have made many research results. In terms of measuring safety voice, many scholars have developed safety voice scales (Conchie, Taylor, & Donald, 2012; Tucker, Chmiel, Turner, Hershcovis, & Stride, 2008; Tucker & Turner, 2011). However, these scales are based on Western social contexts. Under such a cultural context in China, the behavior of employees in organizations is significantly different from that in

Western countries (Farh, Zhong, & Organ, 2004). China is a society with a strong sense of relationship and face (Cao & Zhang, 2021; Mak, Ho, Wong, Law, & Chan, 2015; Nolan, 2020). Chinese culture is not individual-based, not social-based, but relationship-based (Law, Wong, Wang, & Wang, 2000). Currently, the focus of intra-organizational relationship research is the link between superiors and subordinates. Safety voice is primarily targeted at leaders, and leadership behaviors are an essential factor (Conchie, Taylor, & Donald, 2012; Herachwati, Sulistiawan, & Alfirdaus, 2018; Tucker et al., 2008). For example, close relationships with supervisors may facilitate employees to convey views that are good for organizational safety, but poor relationships may deter employees from making safety suggestions. Moreover, in China's unique face-conscious culture, similar concerns may be more prevalent (Chen, Ren, Gu, & Zhang, 2019; Mak et al., 2015). Because of avoiding losing face by the leader's rejection or preserving the leadership's face, employee safety voice behavior, especially safety voice to superiors will be more inhibited.

Employee behavior strongly relates to the cultural context of the organization (Farh, Zhong, & Organ, 2004). In Western countries, where individualism is more prominent (Nisbett & Miyamoto, 2005), employees are not overly concerned that their behaviors will offend others and further jeopardize their workplace survival. Hence, they are more likely to raise safety issues straightforwardly. On the other hand, in Chinese culture, people follow collectivism and think voicing different opinions will create conflicts with others, and damage relationships with others (Kim & Ishikawa, 2020; Meng, Wong, & Chan, 2021). Therefore, Chinese employees tend to hide their safety views to maintain harmony with others. In addition, the Chinese mindset is deeply influenced by Confucianism. The Confucian culture emphasizes the importance of not overstepping hierarchy (Chen, Xu, Yu, Ke, & Zhao, 2022). This means that there is high power distance in the Chinese organizational environment and that superiors have absolute authority over subordinates (Farh, Tsui, Xin, & Cheng, 1998). Safety voice means not being satisfied with the current status. It will be perceived as a challenge to the leaders' authority, so employees choose to remain silent for fear of offending the leaders (Kim & Ishikawa, 2020; Manapragada & Bruk-Lee, 2016). In Western organizational contexts, where power distance is low and employees are less bound by their roles (Farh, Zhong, & Organ, 2004), they are less likely than Chinese employees to consider their relationship with their leaders and choose courageously to express safety concerns (Wang, Wu, Liu, Hao, & Wu, 2019). In conclusion, due to cultural differences, Chinese employees' safety voice behavior is significantly different from those in Western countries. The new safety voice scale for Chinese employees can be used to assess employees' willingness to talk about safety for Chinese corporate practice and to expand theoretical research on the safety voice field.

Safety voice means to raise safety concerns or suggestions to others through formal or informal channels to avoid personal injury (Tucker et al., 2008; Tucker & Turner, 2011). Safety voice is beneficial to the organizations because it is critical to identify and eliminate safety hazards in the organization's work and introduce measures to prevent possible future safety incidents, and improve the level of organizational safety (Hofmann & Morgeson, 1999; Kath, Marks, & Ranney, 2010; Tucker & Turner, 2015). However, there is a lack of safety voice scales applicable to Chinese employees. Therefore, this research aims to explore the structure of employee safety voice and develop a measurement scale based on the Chinese organizational context. The scale developed in this paper subdivides safety voice into two dimensions: promotive and prohibitive safety voice. The former emphasizes new safety initiatives and reflects the constructive nature of safety voice, while the latter has a prohibitive connotation and is intended to discourage unsafe behaviors in the workplace. This scale can be used to investigate safety voice of Chinese employees and to study the relationship between the two types of safety voice and other work variables. Depending on the characteristics of the two types of safety voice, companies can take appropriate measures to encourage employees to express more safety opinions.

## Literature review

### *Conceptual definition and connotation of safety voice*

When studying employee voice, scholars have gradually focused on the concept of safety voice (Morrison, 2011, 2014; Van Dyne, Ang, & Botero, 2003). Among the seminal studies of voice, Hirschman (1970) proposed the exit, voice, loyalty model. The model gave a clear definition of voice: voice is a behavior expressed to management that aims to bring about changes or improve an existing undesirable state. It considered voice as a positive and optimistic adaptive behavior. Later, Rusbult, Farrell, Rogers, and Mainous (1988) put forward the 'Exit-Voice-Loyalty-Neglect' model, in which employees are involved in passive voice behavior only when they are dissatisfied with the organization and their jobs. Later on, voice was introduced into organizational behavior (Van Dyne & LePine, 1998). Van Dyne and LePine (1998) defined voice behavior as the active behavior of coming up with unique ideas with the intention of changing the working state; Premeaux and Bedeian (2003) proposed a definition in which employees initiate suggestions or opinions closely related to their job content to their leaders. Scholars have classified various dimensions of voice based on different criteria and have developed scales to measure voice. Van Dyne and LePine (1998) were the first to develop a single-dimensional scale of voice behavior, which includes six items. Van Dyne, Ang, and Botero (2003) classified voice into prosocial, defensive, and acquiescent categories based on employees' motivation. Liu, Zhu, and Yang (2010) divided voice into voice to peers and voice to supervisors, and designed a 9-item voice scale by adapting Van Dyne and LePine's (1998) voice scale and Morrison and Phelps's (1999) taking-charge scale. Liang, Farh, and Farh (2012) argued that voice included promotive and prohibitive voice and they further developed a 10-item scale, which was widely used.

The study of safety voice is based on the literature of voice. Voice and safety voice are both extra-role behaviors (Noort, Reader, & Gillespie, 2019a). Organizations do not force employees to give their opinions about their work, so employees may hide their work-related ideas for a variety of reasons. In addition, both voice and safety voice ask the organization to make changes and are a challenge to the status quo (Morrison, 2014; Xu et al., 2022). This may either challenge the authority of the leaders, which is detrimental to the employee's workplace survival, or be seen as a troublemaker by colleagues, which deteriorates the employee's interpersonal relationships (Morrison, 2014; Morrow, Gustavson, & Jones, 2016). Therefore, there are certain risks associated with both voice and safety voice. Employees often remain silent because of these risks (Burris, 2012; Noort, Reader, & Gillespie, 2021b). Although voice and safety voice have common features, the particular focus on safety makes safety voice very different from general employee voice (Tucker et al., 2008). First, because of the particular concerns about organizational safety, a lack of safety voice can lead to severe consequences in terms of injuries and deaths. Many major accidents occur because employees failed to report safety issues timely (Reader & Oconnor, 2014). The loss of employee voice prevents the organization from operating more efficiently, mainly resulting in a loss of long-term economic benefits for the companies (Burris, 2012). Thus, the absence of safety voice often has more serious consequences than the absence of voice. In addition, voice can help companies improve organizational operations and therefore their performance and brings economic benefits (Liu, Zhu, & Yang, 2010). In contrast, safety voice does not directly improve the company's performance and may even cause a short period of reduced productivity, making it more likely to cause resentment from colleagues than employee voice (Noort, Reader, & Gillespie, 2019b).

At the beginning of the study of safety voice, lots of academics did not make a distinction between safety voice and safety participation. Such studies considered safety voice as a form of safety participation. However, some scholars later found a big difference between safety participation and safety voice. Therefore, they began to study safety voice separately from safety participation. Tucker et al. (2008) considered safety voice as the behavior of speaking to others about

safety concerns through various channels to reduce personal injury or death from safety hazards. Bienefeld and Grote (2012) considered safety voice as the act of expressing opinions to avoid physical harm from hazardous situations. The role of safety voice in curbing accidents has been recognized by academics. Although safety voice is vital to organizational safety, employees are often afraid to speak up about safety hazards due to concerns about negative impacts (Mathisen, Tjora, & Bergh, 2022). Much of the literature focuses on how and what motivates employees to speak up. Scholars mainly study the antecedent variables of safety voice at the organizational and individual levels. At the organizational level, supportive leadership behaviors (e.g., safety-specific transformational leadership; Conchie, Taylor, and Donald, 2012) promote employees' expression of safety concerns. Tucker et al. (2008) showed that employees were brave enough to express safety ideas when they felt supported by their leaders. Turner, Tucker, and Deng (2020) found that adult workers were more willing to make safety voice when faced with an explicit leadership commitment to safety. Hu and Casey (2021) surveyed employees of disability healthcare organizations in Australia, verifying that organizational identity and management's commitment to safety interacted to facilitate employees' expression of safety concerns. The desire of employees to speak up safely is also closely related to individual factors. Tucker and Turner (2015) revealed that young workers with safety ideas and affective commitment to the organization were more likely to make safety suggestions. Turner, Tucker, and Kelloway (2015) found differences in safety voice behavior by gender, with men being more active than women in speaking out about safety issues. Tucker and Turner (2014) also verified that the greater the employees' psychological safety, the greater their willingness to make safety suggestions. Hu and Casey (2021) found a positive relationship between employees' safety motivation and safety voice. Safety voice can function as an antecedent variable. In a survey of bus drivers, Herachwati, Sulistiawan, and Alfirdaus (2018) found that safety voice negatively affected employee satisfaction with the company. The results of the experiment by Zhang, Mei, and Liu (2019) showed that safety voice could significantly enhance the safety performance of companies when there is a labor shortage or when employees have high values. Mathisen, Tjora, and Bergh (2022) analyzed questionnaire data from oil workers and discovered that safety voice significantly inhibited safety risk and personal injury. Overall, there is relatively limited literature that examines the impact of safety voice as an antecedent variable.

According to the relevant studies, we identified three main characteristics of the concept of safety voice: first, from the behavior itself, it is a communication behavior that requires communicating safety information and ideas with superiors and colleagues; second, from its purpose analysis, it is an improvement need to solve safety problems arising in the organization and work so that the organization can have safer operations; third, from the content analysis, it is a job need to improve employees' safety performance and their value.

### **Measurement of safety voice**

Regarding measuring safety voice, scholars have now developed several safety voice scales. Tucker et al. (2008) designed a 5-item safety voice scale when examining the effect of perceptions of organizational support on employee safety voice; Tucker and Turner (2011) developed a 6-item scale to evaluate the safety behaviors of young workers, and Tucker and Turner (2015) used three of the items when investigating the influencing factors of young employees' safety voice behavior, and Turner, Tucker, and Deng (2020) also used three items from this scale to explore the different safety voice intentions of young and adult employees under different conditions of leadership safety commitment; Conchie, Taylor, and Donald (2012) developed a 13-item employee safety voice scale based on a safety citizenship scale which was designed by Hofmann, Morgeson, and Gerras (2003). In analyzing the effects of safety leadership style on safety voice, Bazzoli, Curcuruto, Morgan, Brondino, and Pasini (2020) developed a 15-item safety voice scale with four dimensions: promotive safety voice, prohibitive safety voice, preventive

**Table 1.** Safety voice dimension division

Structure	Author and year	Sub-dimensions	Number of items
Single dimension	Tucker et al. (2008)	Safety voice	5
	Tucker and Turner (2011)	Safety voice	6
	Conchie, Taylor, and Donald (2012)	Safety voice	13
	Tucker and Turner (2015)	Safety voice	3
	Turner, Tucker, and Deng (2020)	Safety voice	3
Four dimensions	Bazzoli et al. (2020)	Promotive safety voice	4
		Preventive safety voice	4
		Prohibitive safety voice	3
		Aggressive safety voice	4

safety voice, and aggressive safety voice. To conclude, the current measurement tools of safety voice are mainly unidimensional scales, and the scales are applicable to a wide range of people rather than limited to a certain occupation. The emergence of the four-dimensional scale means that safety voice can be subdivided into several aspects according to certain criteria, which is an innovation of the safety voice scales and a reference for the new dimensional division of safety voice in the future. A summary of the dimensional division of safety voice is shown in Table 1.

It can be seen that there are currently some shortcomings in the measurement of safety voice. First, most current safety voice scales are single-dimensional. They have fewer items, which is not conducive to a comprehensive and in-depth study of safety voice. Second, most of the existing safety voice scales were adapted from scales in other fields (e.g., the whistleblowing scale; Bazzoli et al., 2020), and the design process lacked a research methodology that combined qualitative and quantitative aspects. Although Tucker and Turner (2011) used focus group interviews, their scale is only applicable to young workers. Third, most of these scales were developed based on Western organizational contexts, and it is uncertain whether they apply to Chinese employees. There is, therefore, a lack of safety voice scales developed based on Chinese organizational contexts.

### **Chinese organizational culture background**

The unique organizational context in China is also likely to contribute to the different safety voice behavior of employees in Chinese organizations than in the West. The study of safety voice in the Chinese organizational context cannot ignore the cultural values of the Chinese people. In Western countries, people are individualistic and value personal interests and spiritual needs rather than relationships with others in the groups (Hong, Romans, Koch, & Ramakrishnan, 2022). In contrast to Western individualism, in Chinese culture, social relationships determine individual behavior, and people behave differently when interacting with people in different relationships (Chang, 2012). Face and favor are important behavioral rules for Chinese people to maintain relationships in social interactions (Chang, 2010). Face is a social prestige, social value, or social respect given to an individual by others (Leung & Chan, 2003). In China, which emphasizes the concept of face and is highly sensitive to face gain or loss, face is not only related to the status of an individual in their network, but also to the possibility of being accepted by others, so face is considered as one of the most delicate rules that Chinese people must follow in social interactions (Zhang, Cao, & Grigoriou, 2011). People can feel a loss of face because of the negative comments they receive (Leung & Chan, 2003). Safety voice may

not be taken seriously by leaders, and may even be criticized and dismissed as a wrong idea (Noort, Reader, & Gillespie, 2021a). Employees fear they will lose face if they speak up about safety and are rejected, so they keep silent. Employees in Western countries like to center their claims on their interactions, and they tend to express their ideas straightforwardly without thinking about saving face (Rhee, Alexandra, & Powell, 2020). Therefore, face has been a greater impediment to Chinese employees' safety voice than the West. Also, speaking up may expose employees to embarrassment as they are seen as troublemakers (Milliken, Morrison, & Hewlin, 2003). This is because safety voice implies that employees are asking for changes to existing safety measures (Conchie, Taylor, & Donald, 2012). Such a change would cause changes in workflow that other employees would find troublesome and thus anger the employee who made the suggestion (Morrow, Gustavson, & Jones, 2016). As a result, safety voice can damage the employee's relationship with other colleagues, which hinders the employee's safety voice. In addition, Chinese people are good at giving face to others and taking care of others' face to maintain harmony in their relationships with others (Seligman, 1999). An employee raising safety issues indicates that he is not satisfied with the current state of organizational safety. This may be perceived as questioning the leader's competence and making the leader lose face (Liu, Zhu, & Yang, 2010). Employees often hide their views to preserve the leader's face (Ren, Ma, Chen, Wang, & Ju, 2021). In companies in Western countries, supportive leadership behaviors (e.g., leaders' safety commitment, safety-specific transformational leadership; Conchie, Taylor, & Donald, 2012; Turner, Tucker, & Deng, 2020) motivate employees to make safety voice, but the face of the leaders is not an influential factor in employee safety voice.

Favor is a set of behavioral rules for individuals to express their emotions and maintain interpersonal relationships under the premise of 'repayment' and 'gratitude' (Hwang, 1987). As a social exchange behavior, it consists of three behavioral rules: to give, to receive, and to repay. The exchange of favor causes the recipient to feel psychologically indebted to varying degrees. In Chinese relational culture, individuals behave in accordance with their moral and ethical responsibilities to the people they interact with. Once they feel indebted, they need to repay this psychological indebtedness in the future (Chang, 2012). Safety voice can offend others (e.g., make leadership authority challenged and make colleagues' jobs more complicated) (Morrow, Gustavson, & Jones, 2016). Employees will forgo expressing safety ideas for fear of indebteding others. However, individualistic cultures advocate the independence of character and the ability of individuals to exist apart from the organization, so Western employees' behavior is based primarily on formal contracts or rules rather than on the exchange of resources in interpersonal relationships (Cho & Kim, 2017; Farh, Zhong, & Organ, 2004). Therefore, Western employees do not give up safety voice because of favor.

In short, Chinese people advocate collectivism, while Westerners insist on individualism. The cultural difference causes Chinese employees to behave differently from Western employees in safety voice. Therefore, it is vital to develop specialized measurement tools to study the safety voice behavior of Chinese employees.

## Method

### *Development of the safety voice scale*

This paper explored the specific processes building on the research of scale construction by Churchill (1979), including (1) concept definition. The conceptual definition of safety voice was based on the organization and generalization of the literature. (2) Generating question items. Based on the existing studies of safety voice at home and abroad, the initial scale of safety voice in the Chinese context was compiled through literature review, grounded interviews, inductive analysis, organization and refinement, and content summary. (3) Initial collection. The initial data collection was only for small-scale typical target groups, and questionnaires were

administered to obtain valid data. (4) Purification of question items. Based on the small sample survey, the initial question items were refined by exploratory factor analysis (EFA) and other methods to analyze the multidimensional structure and measurement items of safety voice in the Chinese context. (5) Secondary collection. The retained question items were optimized through data analysis of large sample data. (6) Reliability testing. The scale's reliability was tested by confirmatory factor analysis (CFA) to construct a formal measurement scale of safety voice in the Chinese context. (7) Scale generation. We used the Likert 5-point scale, with scores from 1 to 5 indicating 'strongly disagree' to 'strongly agree.' Then, demographic variables were added to obtain the final safety voice scale.

### **Acquisition of the initial items of the scale**

There are two main sources for the scale items in this paper: (1) the in-depth interview method. To understand the content of safety voice in China deeply, this paper used the in-depth interview method to conduct in-depth research in enterprises, and through interviews and research with employees, initially determined the dimensions and some of the items of the scale; (2) literature research method. We used the database resources to collect literature related to safety voice and added the items in the existing safety voice scales to the above scale to supplement, enrich and improve the scale items.

### **In-depth interviews**

This study used the coding technique of grounded theory to process the interview data. Grounded theory, the method of qualitative research, is mainly concerned with the process of data collection and analysis (Glaser & Strauss, 1967), using factual data as the basis for theory construction, getting information from it and building a theory appropriate to the data. The process of analyzing information in grounded theory is called coding. Coding is a process in which decomposing the collected or transcribed textual information, referring to the phenomenon, and gradually conceptualizing it. Grounded theory analysis consists of three main steps: open coding, axial coding, and selective coding. In this study, we used the in-depth interview method to construct a safety voice scale in the Chinese context.

### **Data collection**

First, we conducted data collection, which is mainly done through direct observation, in-depth interviews, documentary records, and film analysis. In this paper, the data collection was set to in-depth interviews. The interviewees were selected mainly by theoretical sampling following the analytical framework and conceptual development. Since the selection of interviewees has an important impact on the analysis results, the interviewees selected must have certain knowledge and understanding of safety voice. In this paper, the interview subjects were limited to employees of companies with 1 or more years of current employment. We determined the number of interviewees according to the theoretical saturation principle. That is, the sample can be stopped if the new sample extracted no more presents new important messages.

In this paper, 32 interviewees from Beijing, Hebei, and Tianjin were selected. These interviewees were employees in the construction and service industries. More of the interviewees were male, accounting for 62.5%. The average age was 32 years old. In total, 59.38% of the interviewees had a bachelor's degree or above, and 62.5% had more than 3 years of work experience. Basic information about the respondents is shown in [Table 2](#).

To obtain the most original and real information on safety voice, this paper understood the language and thinking habits of the interviewees through interviews, based on which the language of the scale and the way of asking questions were improved. In the early stage, we ensured that the interviews were conducted in a friendly manner through topic selection, time arrangement,

**Table 2.** Basic information statistics of interviewees

Items	Sample classification	Number	Percentage
Gender	Male	20	62.50
	Female	12	37.50
Age	25 years old and below	11	34.38
	26–35 years old	9	28.12
	35–50 years old	4	12.50
	50 years old and above	8	25.00
Education level	High school and below	7	21.87
	College	6	18.75
	Bachelor	14	43.75
	Postgraduate and above	5	15.63
Position	Front-line employee	21	65.63
	Grass-roots manager	8	25.00
	Middle/senior management	3	9.37
Work experience	1–3 years	12	37.50
	3–7 years	13	40.63
	7 years and above	7	21.87

location determination, outline preparation, question preparation, process development, and interview response. The main content of the interview outline includes ‘What do you think are the behavioral characteristics of safety voice,’ ‘Based on your work experience, how do you feel you have done in terms of safety voice,’ and ‘What do you usually include when you make a safety voice.’ Each interview generally lasted 1.5–2 h. The researcher created a relaxed atmosphere and pleasant conversation to understand the interviewees’ views on what safety voice in the Chinese context and took notes throughout the interview.

#### *Data analysis methods*

*Open coding:* Open coding involves organizing, labeling, and conceptualizing the collected interview data literally to derive initial concepts and categories from them. The grounded theory emphasizes that ‘the interviewer’s self-reporting is the main focus’ (Božič, Siebert, & Martin, 2020). Therefore, in the open coding phase, an open mind is kept. A large amount of data is conceptualized and categorized item by item. To further reduce the influence of the researcher’s mindset, we chose interviewees’ original words as labels as much as possible to uncover initial concepts from them as labels to uncover initial concepts from them.

We eliminated the simple and ambiguous responses from the interview transcripts. First, simple responses were short and less informative statements. For example, ‘I usually work safely,’ ‘We rarely get hurt on the job,’ and ‘We only have one safety officer in the company.’ Second, ambiguous responses referred to unclear or inconsistent descriptions. For example, ‘I really hope that my workers are safe and sound, and I don’t care if one of them is injured occasionally’ and ‘I often chat with my colleagues about who is stubborn and doesn’t even listen to the boss.’ In total, we finally obtained more than 300 original statements and the corresponding initial concepts. Due to the large number and crossover of initial concepts, we chose the initial concepts that were repeated more than three times for categorization and excluded the inconsistent initial concepts. The open coding was started after the first interview. Table 3 reflects the process of



Table 3. Open coding results

Initial concept	Conceptualization
Safety goals	<p>(1) Many times the safety goal is virtually non-existent, and no one cares about safety. Thinking that safety is quite important, I will advise workers to pay attention to safety.</p> <p>(2) Since the accident last month, the leadership began to pay attention to safety, and set a goal to reduce future accidents. I also want to contribute to safety so I begin to raise some of the views to improve safety.</p> <p>(3) Our unit still attaches great importance to safety, and often set targets to ensure safety and our workers are also willing to raise safety voice because once an accident occurs, the enterprise will have great losses due to downtime.</p>
Risky consequences	<p>(1) I see on the news that the scene of the accident at the construction site is very bloody, and I am very afraid of this happening around me, so when I meet a dangerous place when I'm working, I tell the leader how serious the consequences are and ask him to agree to stop.</p> <p>(2) Managers who are not on the front line of work may not see or appreciate how terrible the dangerous working conditions are. I think as an employee, I should remind him often, which is good for everyone.</p>
Working planning	<p>(1) I have been working in our factory for many years. I know where accidents are prone to happen, so I will do my best to propose solutions to make my colleagues safer.</p> <p>(2) I have only joined the company for more than a year, and discovered that the company has a lot of unsafe practices. This is too dangerous and there is a possibility of accidents. I often bring up some safety-related planning during meetings.</p> <p>(3) The safety plan is too important. If there is no formal plan, everyone will be in a hurry and don't know how to work safely.</p> <p>(4) I think safety planning is very important to the safety of the workplace, but the plan alone is not enough. The plan must be realistic and not too troublesome and reduce work efficiency.</p>
Safety matters	<p>(1) When I feel unsafe at work, I will bring it up, no matter if others will support it or not. Safety is too important. If a serious accident happens to a person, his family is ruined.</p>
Violations	<p>(1) I often see workers failing to follow the rules in order to save trouble. It looks dangerous. I will tell the leader when I see this situation. If the leader criticizes him, he will not dare to do this. This is also for their safety.</p> <p>(2) I think the safety regulations must be followed if they are established. Because if everyone does not follow the regulations, the entire construction site is unsafe. If something goes wrong, everyone is unlucky. So when I see someone violating the safety regulations, I report to the leader.</p> <p>(3) If managers are willing to punish those who do not like to comply with the rules for the sake of convenience, then other workers will not dare to disobey the rules, so it is very necessary to report those who violate the rules to the management.</p> <p>(4) If a person does not follow the safety regulations, many people will be affected by him and start to fail to comply with the regulations. If this is the case, there will definitely be an accident, so I will report to the leader when I see such a person.</p>
Work steps	<p>(1) I don't know who has made some unreasonable steps that are troublesome.</p> <p>(2) Now that technology has advanced, many machines have been introduced in the factory, and hurt people. I have to think about how to change unreasonable steps to make my employees safer, so I often suggest amendments.</p>
Unsafe behavior	<p>(1) I am a very enthusiastic person. I let my colleagues stop when I see where they are dangerous when they work. I don't want my colleagues who work together to get hurt.</p> <p>(2) In order to get off work early, there are too many people risking their work. I am scared for them when I see it. I try to persuade them not to do this.</p>
Working way	<p>(1) I'm a more flexible mind. I like to work in a way that I think is safe. Safety comes first.</p>
Hazard reporting	<p>(1) Safety matters are very troublesome. I often find places that may endanger people when I work. For safety reasons, I take the trouble to report these problems to the leader.</p> <p>(2) Our leaders often emphasize the importance of safety with us, and I feel more and more that we must pay attention to safety, so I tell the leaders when I see hidden dangers.</p>

(Continued)

Table 3. (Continued.)

Initial concept	Conceptualization
Safety participation	(1) If you want safety to be the most important thing, you have to be responsible for yourself. You cannot always expect the safety officer to check for problems. I love to ask my colleagues to discuss safety issues.
Safety coordination	(1) Although many people say that safety is important, there are a lot of inconsistencies in the work, which makes people uncomfortable at work. When I find this kind of thing, I will go to the leader to report it, and I hope they can improve.
Work methods	(1) After working hours, I will figure out some safer working methods, and the workers also feel very good after listening to my methods. (2) The leader sits in the office all day and doesn't know the situation on the spot, so I go to him and talk to him about the safety method I summarize myself. When he thinks it is good, he will also encourage everyone to use my method when meeting.
Work regulations	(1) As a manager, I often pay attention to the unreasonable aspects of work regulations, and try to change the problematic regulations to make the employees safer at work.
Safety supervision	(1) I usually do things carefully and in compliance with the regulations. I am also used to supervising my colleagues. If they do not comply with the regulations, I will dissuade them. I think it is safer to do things according to the work regulations. (2) I have a good relationship with my colleagues around me and I hope they will be safe, so I will pay attention to their working status to ensure that they are working safely. (3) Supervising each other in the workplace can improve everyone's safety. If you do not abide by the safety regulations when you work, others will remind you, so you're embarrassed to ignore safety.
Safety concerns	(1) When companies are meeting to plan the next step of work, I am used to raising concerns about safety. I hope that safety considerations are included in the work plan, which is very important to us employees.
Safety precautions	(1) There used to be a colleague who didn't wear a helmet because of the trouble, but he was hit by a heavy object and died. That scene was too tragic. I still have shadows. From then on, when I see someone who does not wear a helmet, I reminded him. (2) I always remind my colleagues to fasten their seat belts. Some people think that they do not need to wear seat belts when climbing is low. However, I have heard that falling from a place less than 2 m can cause death. (3) Providing you with protective equipment means that there is a need for protection. I cannot understand that some colleagues feel brave without protective equipment, so I will persuade them to protect themselves.

conceptualization and scoping of the original interview transcripts. Considering the limitation of space, we selected only representative original phrases and initial concepts for listing, as shown in Table 3.

*Axial coding:* Axial coding is to obtain important categories and reintegrate these categories into a logical whole based on open coding. The researcher analyzes one category at a time, explores the correlations of this category, and determines whether the categories have similar concepts. Next, the levels of the categories within the group are identified, that is, the main categories and subcategories are identified, and then the linkages between the main categories and subcategories are established under continuous comparative analysis. In this study, 16 previous categories were further analyzed and re-categorized through axial coding into a logical whole that includes two major categories of relationships: promotive safety voice and prohibitive safety voice (shown in Table 4).

*Selective coding:* Selective coding is to dig deeper and systematically deal with the relationships among the main categories to identify the core categories that can override all the main categories.

**Table 4.** Axial coding results

Main categories	Subcategories	Concept connotation
Promotive safety voice	Working planning	Propose safer work planning
	Work steps	Suggest working steps to improve safety
	Safety goals	Make reasonable suggestions to help work units achieve safety goals
	Working methods	Discuss with co-workers or supervisors methods to improve working safety
	Safety precautions	Remind co-workers to take safety precautions
	Safety participation	Propose and encourage others to get involved in safety
	Safety matters	Speak up about work safety matters over the objections of others
	Safety supervision	Monitor co-workers to ensure they are working in compliance with safety regulations
	Working ways	Change the working ways to improve work safety
	Work regulations	Change working rules to improve working safety
Prohibitive safety voice	Safety coordination	Point out safety uncoordination issues
	Unsafe behavior	Stop unsafe work behavior of colleagues
	Violations	Report co-workers' safety violation
	Risky consequences	Emphasize the consequences of hazardous working conditions
	Safety concerns	Raise working safety concerns at corporate planning meetings
	Hazard reporting	Report potential hazards at work to supervisors

In this paper, we found that the concept of safety voice can be used as a core category to overlap other categories and the two subcategories of safety voice are promotive safety voice and prohibitive safety voice obtained by axial coding. Promotive safety voice means coming up with new ideas or suggestions to enhance organizational safety; prohibitive safety voice is to proactively point out the problems in existing work in order to avoid accidents.

*Theoretical saturation test:* Theoretical saturation is the point at which no further information can be obtained to develop a theoretical idea and is used as a criterion for terminating the survey sampling (Fassinger, 2005). To avoid conceptual omissions to reach theoretical saturation, we continuously compared and iteratively mined the original data, labels, concepts, and categories, used the remaining three uncoded interviews to test the theory, and found no new concepts or categories emerged. Therefore, theoretical saturation can be considered to have been reached.

### **Initial scale development**

Based on the grounded coding results above, two dimensions of the safety voice scale were obtained: promotive safety voice and prohibitive safety voice. Combined with the literature analysis related to safety voice, we defined promotive safety voice as the behavior that employees make innovative suggestions and approaches to improve corporate safety performance; and prohibitive safety voice as the behavior that employees make defensive suggestions and measures for issues that hinder the safety performance and achievement of safety goals of the organization (e.g., behaviors that are detrimental to the organization, and inappropriate work procedures or norms, etc.) Liang, Farh, and Farh (2012) separated voice into two dimensions of promotive and prohibitive voice and developed the corresponding scale. For safety voice, although few

current studies have explicitly proposed different dimensions, it can be concluded from them that safety voice has promotive aspect and prohibitive aspect. On the one hand, employees will propose new procedures, work methods, etc., intended to improve organizational safety (i.e., promotive safety voice) (Reader, Mearns, Lopes, & Kuha, 2016; Tucker & Turner, 2015). Rather than complaining about the inadequacy of the current state of safety, such improvement suggestions emphasize the enhancement of the state of safety (Hu *et al.*, 2016). This type of facilitation-based safety voice is more moderate and more acceptable. On the other hand, employees raise concerns about unsafe elements at work, known as prohibitive safety voice, such as when they discover that a colleague is not working in accordance with safety regulations (Noort, Reader, & Gillespie, 2019a; Okuyama, Wagner, & Bijnen, 2014). Such safety concerns are often the key to avoid accidents (Kines, Andersen, Spangenberg, Mikkelsen, Dyreborg, & Zohar, 2010; Noort, Reader, & Gillespie, 2021b). But safety concerns accentuate dissatisfaction with the state of safety and may give others a mean-spirited impression, which in turn causes resentment. These risks can hinder rewards, promotions, or even cause employees to lose their jobs, so employees often choose to remain silent out of these risks (Fischer & Orasanu, 2000; Krenz, Burtscher, & Kolbe, 2019).

To improve the reliability and validity of the scale, the base framework was to refer to the concepts obtained from the coding of axial under the two dimensions and introduce the items from the maturity scale of safety voice in the academic field appropriately when designing the questionnaire items. We invited two PhD students in management for the discussion and gave them one item for each category to describe. Then, one professor and 16 middle/senior managers were invited to participate in the questionnaire revision meeting, during which the participants discussed merging and removing the items. Finally, an initial scale of safety voice including 26 items measured on a 5-point Likert scale was obtained. In order to ensure the accuracy of information collection, the initial questionnaire was given guiding words such as 'anonymous' and 'for academic research only,' and then the pre-testers were asked to answer according to the actual situation.

### **Data collection and analysis**

To test the developed scale empirically, we released initial questionnaires and formal questions, which were divided into two parts: the first part consisted of basic information, specifically gender, age, education level, position, and work experience; the second part consisted of scale items, and items were rated on a 5-point Likert scale ranging from 1 to 5. We asked participants to choose from 'strongly disagree' to 'strongly agree' according to the degree of conformity of the listed behaviors or situations with themselves. The participants were employees from large companies in the service, construction, and technology industries in Hebei and Tianjin.

In the initial test, we sent out 262 questionnaires. After excluding the missing answers and invalid questionnaires with concentrated answers, a total of 205 valid questionnaires were recovered, with an effective recovery rate of 78.24%. In the formal test, we sent out 490 questionnaires, and recovered 420 valid questionnaires; the valid recovery rate is 85.71%. The sample size of the initial and formal questionnaires met the requirements (Aleamoni, 1976; Carpenter, 2017). The basic information about the subjects of the two tests is shown in Tables 5 and 6.

Based on the recommendations of Hinkin (1998), we used the first sample ( $N = 205$ ) for EFA and the second sample ( $N = 420$ ) for CFA. By clarifying the principles of reliability analysis and EFA, item analysis, reliability, and validity analysis were conducted on the data collected from the initial questionnaire. Based on results of the analysis, we revised the initial scale and streamlined the measurement items to establish the formal questionnaire. We conducted a CFA and internal consistency analysis test on the formal questionnaire to further test the stability and validity of the scale. Statistical Product and Service Software Automatically was used to perform item analysis, EFA, CFA, and reliability test on the data to determine the final scale.

**Table 5.** Basic information statistics of the initial test sample

Items	Sample classification	Number	Percentage
Gender	Male	107	52.20
	Female	98	47.80
Age	25 years old and below	42	20.49
	26–35 years old	103	50.24
	35–50 years old	50	24.39
	50 years old and above	10	4.88
Education level	High school and below	27	13.17
	College	32	15.61
	Bachelor	130	63.41
	Postgraduate and above	16	7.81
Position	Front-line employee	51	24.88
	Grass-roots manager	106	51.71
	Middle/senior management	48	23.41
Work experience	1 years and below	28	13.66
	1–3 years	65	31.71
	3–7 years	72	35.12
	7 years and above	40	19.51

**Table 6.** Basic information statistics of the formal test sample

Items	Sample classification	Number	Percentage
Gender	Male	237	56.51
	Female	183	43.49
Age	25 years old and below	181	43.72
	26–35 years old	159	37.91
	35–50 years old	62	14.42
	50 years old and above	18	3.95
Education level	High school and below	22	5.24
	College	54	12.85
	Bachelor	252	60.00
	Postgraduate and above	92	21.91
Position	Front-line employees	165	39.29
	Grass-roots managers	203	48.33
	Middle/senior management	52	12.38
Work experience	1 years and below	128	30.48
	1–3 years	142	33.81
	3–7 years	95	22.61
	7 years and above	55	13.10

## Results

### Results of stage 1: initial test

#### Item analysis

The study conducted an EFA on the structure of the initial scale of employee safety voice. Before factor analysis, we conducted item analysis to purify the measurement items. In this study, we conducted item analysis on the first data collected, and the results show that each item reaches the significance level, which indicates that all 26 items of the scale developed in this study have a high level of differentiation and can effectively distinguish between high and low sub-groups without the need for deletion.

#### Exploratory factor analysis

In this study, the first collected data ( $N=205$ ) was used for EFA. Bartlett's sphericity test (Tabachnick & Fidell, 2007) should be performed first. In this paper, the Bartlett's spherical test showed significant values ( $p < .001$ ) and the value of Kaiser–Meyer–Olkin was .911, which was much greater than .7, indicating that the study data were well suited for EFA.

Then EFA was performed. In this paper, we used principal component analysis for exploratory analysis and extracted factors according to the principle of factor eigenvalues greater than 1. The rotation method was a great variance orthogonal rotation. The advantage of orthogonal rotation is that the information provided by the factors does not overlap, and it is a very common rotation method in principal component analysis (Norris & Lecavalier, 2010). Researchers use orthogonal rotations when the set of factors underlying a given item set are assumed or known to be uncorrelated (Worthington & Whittaker, 2016). In this article, we assumed that promotive and prohibitive safety voice have no influence on each other, so we used orthogonal rotations. After EFA, the factor loading matrix was obtained, and items with factor loadings less than .50 and cross-loadings over .40 should be removed (Heckler, 1996). After three EFAs, 5, 7, and 1 items were removed successively and a factor structure with good convergent and discriminant validity was obtained, and the factor naming and the degree of variance explained are shown in Table 7. We judged the factor number by the trend of steepness and smoothness of the scree plot. According to Table 6 and Figure 1, we can see that two factors were extracted from the factor analysis. The explained variance of these two factors after rotation was 29.572 and 27.717%, respectively. The cumulative variance explained after rotation was 57.288%, which meets the

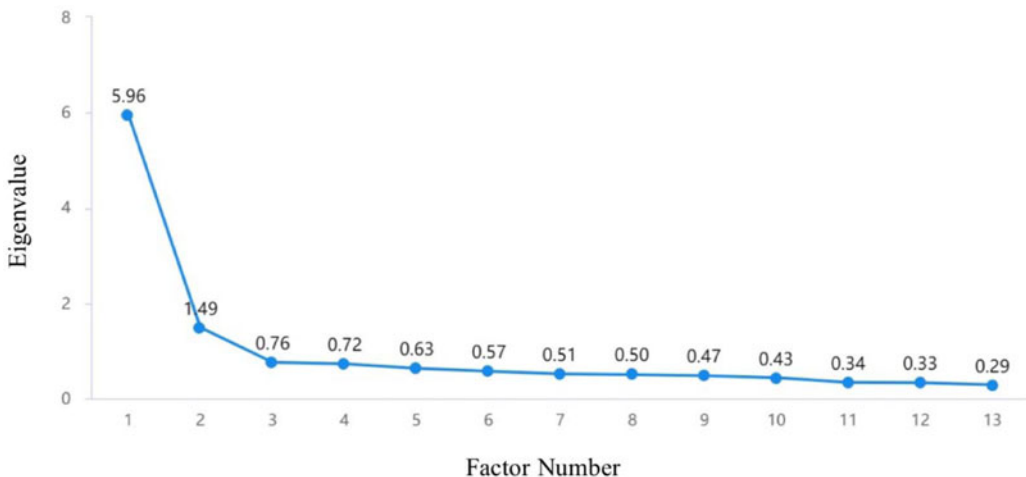


Figure 1. Scree plot.

**Table 7.** Principal component and factor loadings

	Factor loading		Commonality
	Factor 1 (prohibitive safety voice)	Factor 2 (promotive safety voice)	
I proactively make suggestions for the overall safety planning.		.785	.655
I make advice on how to improve safety steps.		.714	.600
I take the initiative to propose rationalizations that help my company achieve its safety goals.		.811	.660
I discuss with leaders new ways to improve working safety.		.679	.573
I talk to colleagues who work with risks and persuade them to work in safe conditions.		.680	.541
I am proactive in expressing opinions related to safety work, regardless of others' objections.		.640	.550
I report the consequences of hazardous working conditions to my leader.	.611		.477
I dare to reveal safety problems that arise at work, even if that would damage my relationship with my colleagues.	.769		.599
When a colleague's behavior may reduce the safety performance of the company, I stop it in time.	.696		.545
I tell my colleagues about the safety procedures violators.	.690		.551
I warn new colleagues against safety violations.	.608		.521
I honestly point out issues that are detrimental to workplace safety, no matter if others disagree.	.719		.545
I report potential dangers at work to the leader.	.756		.631

criterion that the variance explained should be at least 50% (Beavers, Lounsbury, Richards, Huck, Skolits, & Esquivel, 2013), which indicates that the factor structure of the safety voice is desirable.

### *Reliability analysis*

It is necessary to test the scale's reliability after EFA (Hinkin, 1998). Generally, researchers believe that a reliability coefficient of .70 or higher for subscales is considered highly desirable (Nunnally, 1994). We found that the Cronbach's alpha of the total scale, promotive safety voice and prohibitive safety voice were .901, .858, and .860, which were higher than .70. Hence, the scale passes the reliability test.

### **Results of stage 2: second test**

#### *Confirmatory factor analysis*

After the EFA, validity tests were conducted using CFA to verify the correspondence between each factor and the measured items (Floyd & Widaman, 1995). The CFA of the formal scale revealed that some items had small factor loading coefficients. According to Fornell and Larcker (1981),

**Table 8.** Result of the CFA

Model	Factor	$\chi^2/df$	GFI	NFI	CFI	TLI	RMSEA
Single-factor model	PSV1 + PSV2	7.310	.857	.891	.904	.880	.058
Two-factor model	PSV1, PSV2	4.238	.925	.938	.952	.938	.087
Ideal model		<5	>.9	>.9	>.9	>.9	<.1

PSV1, promotive safety voice; PSV2, prohibitive safety voice.

the factor loading coefficients should be greater than .7. To improve the quality of the fit and to further modify the model, we deleted the two items with factor loading coefficients less than .7.

For the CFA, we determined the best model by comparing the fit of a competing model (Jackson, Gillaspay, & Purc-Stephenson, 2009). We primarily compared two competing models: (1) a single-factor model, in which 11 entries shared a common factor, and (2) a two-factor model, in which the corresponding entries were loaded on two independent factors based on EFA results. After debugging, the best fits of the two models are shown in Table 8.

The fit metrics commonly available for the CFA are  $\chi^2/df$ , GFI, NFI, CFI, TLI, and RMSEA (Schreiber, Nora, Stage, Barlow, & King, 2006). The results of the CFA shows that the two-factor model fit better ( $\chi^2/df = 4.238$ , GFI = .925, NFI = .938, CFI = .952, TLI = .938, RMSEA = .087) and is significantly better than the one-factor model ( $\chi^2/df = 7.310$ , GFI = .857, NFI = .891, CFI = .904, TLI = .880, RMSEA = .058), and each goodness-of-fit indicator is largely within the acceptable range (Browne & Cudeck, 1993; Kline, 2015), which suggests that the model is reasonable.

Hinkin (1998) noted that the convergent and discriminant validity of self-administered scales could be tested by comparing the correlation coefficients between the results of a scale and other scales measuring another construct. Theoretically related measures should have similar results (i.e., high correlations), which would indicate convergent validity. Theoretically different measures should have high differences (i.e., low correlations), indicating that the scale has discriminant validity (DeVellis, 2012).

The results of convergent validity can be judged based on AVE (average variance extraction) and CR (combined reliability). An AVE greater than .5 and a CR value greater than .7 for all factors proves high convergent validity (Fornell & Larcker, 1981). From Table 9, it is clear that the convergent validity of the two factors is good.

The diagonal line in Table 10 shows the AVE square root values, and the remaining value is the correlation coefficients. The discriminant validity of the scale is acceptable if the maximum correlation coefficient is less than the minimum value of the AVE square root value (Fornell & Larcker, 1981). As shown in Table 10, the study data have good discriminant validity.

#### *Internal consistency reliability test*

The reliability test in this study used Cronbach's alpha coefficient to evaluate the internal consistency of the multidimensional scales and combined with the corrected item-total correlation (CITC) to purify the measurement items. According to the relevant criteria, Cronbach's alpha coefficient of the scale is greater than .6, and the CITC index is not less than .5 to be retained. Otherwise, the corresponding items should be deleted (Nunnally, 1978). We found that all items had CITC values above .5 and reliability greater than .8 (.930 for the total scale, .869 for the promotive safety voice dimension, and .905 for the prohibitive safety voice dimension), which indicates good internal consistency of the formal scale.

Taken together, these analyses and studies indicate that the empirically derived two-dimensional scale of safety voice has the same dimensions as expected and has good convergent and discriminant validity. Therefore, the formal scale has strong stability and is definitive, reliable, and scientific.



**Table 9.** Convergent validity results

Factor	AVE	CR
Promotive safety voice	.572	.870
Prohibitive safety voice	.617	.906

**Table 10.** Discriminant validity results

Factor	Promotive safety voice	Prohibitive safety voice
Promotive safety voice	.756	
Prohibitive safety voice	.753	.785

In the past, safety voice was thought to be unidimensional (Conchie, Taylor, & Donald, 2012; Tucker et al., 2008; Tucker & Turner, 2011); Bazzoli et al. (2020) argued that safety voice could be divided into four dimensions based on function. This scale explains for the first time two dimensions of safety voice – promotive and prohibitive – depending on their content. Both safety voices can improve workplace safety, but differ in content. Promotive safety voice is when employees come up with new ideas and innovate on existing safety efforts, and prohibitive safety voice is when they dismiss existing safety deficiencies. Therefore, this scale provides a new perspective and a comprehensive picture of employees' safety voice. In addition, previous safety voice scales were developed with samples of employees from Western countries (Bazzoli et al., 2020; Conchie, Taylor, & Donald, 2012; Tucker et al., 2008; Tucker & Turner, 2011), while the survey respondents in the development of this scale were all Chinese employees. This scale can be used to measure employee safety voice behavior in Chinese organizational contexts.

## Discussion

### *Summary of major findings*

In this research, we collected the items of the safety voice scale through in-depth interviews and then extracted, combined, and categorized the collected data through coding analysis to obtain the safety voice scale. The initial structure of the scale was established by axial coding, which consisted of two dimensions. After expert discussion and analysis, we developed the initial scale of safety voice and extracted two common factors by principal component analysis in EFA, which could explain 57.288% of the total variance. Based on the content of the items corresponding to each metric factor, we named the two factors as promotive safety voice and prohibitive safety voice. CFA found that the first-order two-factor structural model fitted better than all other models. The reliability analysis revealed that the internal consistency coefficients of two dimensions exceeded the psychometric requirement of .7, and the correlation coefficients between each item and the corresponding dimension were higher than .7. The deletion of any of the items did not increase the reliability of the dimension in which it was used, thus ensuring the rationality and validity of the questionnaire design. The analysis of content validity, convergent validity, and discriminant validity revealed that the safety voice scale has good validity.

The newly developed scale is unique in several ways compared to the existing safety voice scales. First, we used qualitative research in the item generation process. Most of the existing safety voice scales are adapted from scales in other domains. Although Tucker and Turner (2011) received the items for safety voice through focus groups, the focus groups were composed of young workers and lacked a sample of adult workers. In this article, in-depth interviews were

used to obtain primary data, and coding techniques of grounded theory were used to initially obtain the two dimensions of safety voice and the initial scale items. Second, we divided safety voice into two dimensions: promotive and prohibitive safety voice. Many scholars currently study safety voice as a single-dimensional variable (Conchie, Taylor, & Donald, 2012; Tucker et al., 2008; Tucker & Turner, 2011). Bazzoli et al. (2020) first classified safety voice into four sub-dimensions based on their different functions: preventive safety voice, passive safety voice, hostile safety voice, and promotive safety voice. But this scale has not been validated by the EFA. We conducted two questionnaires after obtaining the initial items according to Churchill's (1979) suggestion, and determined the factor structure of safety voice by EFA, and then validated the validity of the scale by CFA to ensure the normality of the scale development. Third, this new safety voice scale has universal applicability. The current scales were developed by selecting a sample of specific occupations (Conchie, Taylor, & Donald, 2012; Tucker et al., 2008) and age groups (Tucker & Turner, 2011). Bazzoli et al.'s (2020) survey respondents are blue-collar workers. The sample in this paper covered the construction, service, and manufacturing sectors and was distributed across a wide range of ages. Therefore, this scale is somewhat generalizable (Tabachnick & Fidell, 2007).

In occupational safety, the potential risk of personal injury in the workplace has prompted many employees to voice. Then a growing number of scholars are focusing on such safety voice (Curcuruto, Strauss, Axtell, & Griffin, 2020; Liang & Zhang, 2019; Tucker et al., 2008). Noort, Reader, and Gillespie (2019a) summarized the literature on safety voice and found that safety voice had a role in avoiding personal injury by communicating safety issues to others. Current research on safety voice is more focused on employees raising concerns about safety issues and neglects the constructive nature of safety voice (Hu et al., 2015), where employees can voice new ideas or approaches to their work that can improve workplace safety. Thus, safety voice has both a promotive effect on organizational safety (i.e., employees make safety-related suggestions to improve workplace safety) and a prohibitive effect on situations that are harmful to prevent safety (i.e., raising safety issues in the workplace to avoid accidents) (Herachwati, Sulistiawan, & Alfirdaus, 2018), which is consistent with the two dimensions of safety voice obtained in this paper: promotive safety voice and prohibitive safety voice.

We define promotive safety voice as the behavior of employees who make innovative suggestions and approaches to improve corporate safety performance; and prohibitive safety voice as the behavior of employees who make defensive suggestions and measures for issues that impede organizational safety performance and the achievement of safety goals (e.g., inappropriate work procedures or norms, etc.). Both promotive and prohibitive safety voice are extra-role behaviors that are beneficial to the organization's long-term survival. However, there are some differences between them. Based on a comprehensive understanding and grasp of the characteristics of the two types of safety voices, this paper summarizes their differences in the following aspects: first, the focus is different: promotive safety voice is suggestion-oriented, and tends to maintain and protect the existing organizational safety policies or practices, express ideas and opinions to improve the current work and organizational processes, and focus on the benefits; prohibitive safety voice is problem-oriented, in which employees find problems with existing safety practices and rules and regulations in the organization, and give their views about the threat of accidents and inadequacies in the organization to modify or even change the existing work environment, and focus on stopping losses. Second, the time point is different: promotive safety voice points to the future, cannot immediately impact the organization; prohibitive safety voice mainly points to the past or the current problems, and can play a timely stop-loss effect. Third, the degree of challenge to the organization is different: promotive safety voice is based on the improvement of the existing safety work of the company, its good intentions are easily perceived by the organization, so the degree of challenge to the organization is less; although also based on good intentions, prohibited safety voice challenges existing management practices and procedures and is a rejection of corporate safety practices. Organizations tend to feel the

challenge of this kind of safety voice, thinking that safety voice is challenging the authority of the leader, and it is easy to be seen by colleagues as causing trouble, with a higher risk of controversy and interpersonal conflict (Li, Barnes, Yam, Guarana, & Wang, 2019). Fourth, different resource consumption: promotive safety voice often proposes some creative ideas, which requires more cognitive resources of employees; prohibitive safety voice may bring personal risk, and employees will constantly self-regulate and control this kind of safety voice, which requires more self-regulation resources of employees. Fifth, the information is presented in different ways: promotive safety voice presents information in a positive way; prohibitive safety voice presents information in a negative way. Sixth, for the solution, promotive safety voice suggests ways to improve. In contrast, prohibitive safety voice does not offer solutions to the identified problems.

## Implications

### *Theoretical implications*

First, this study developed a scale of employee safety voice applicable to the Chinese context and named the two dimensions as promotive safety voice and prohibitive safety voice, respectively. Previous safety voice scales have been developed in Western contexts. Little research has shown that these scales apply to employees in Chinese organizational contexts. Chinese culture is rich in connotations, and employee behavior is influenced by Chinese culture even in modern societies that have undergone dramatic changes. Relationship, face, and favors are all cultural concepts with Chinese characteristics that impact on Chinese thinking and behavior (Chee, Harrison, McKinnon, & Wu, 1999; Mak et al., 2015). China is a society that emphasizes ‘private feelings,’ and ‘private feelings’ need to be guaranteed by personal relationships, and leadership–subordinate relationships are strongly ‘extra-organizational’ and ‘private emotions.’ The leadership–subordinate relationship is strongly ‘extra-organizational’ and ‘personal,’ and this relationship can penetrate the normal organizational work, thus playing a role in the context of organizational system (Chen, Chen, & Xin, 2004; Farh et al., 1998). The relationship between superiors and subordinates and colleagues in an organization is a mixed relationship, and favor and face play a key role in the interaction between the two parties with a mixed relationship. Close relationships between superiors, subordinates, and colleagues can facilitate employees’ expression of ideas that are beneficial to organizational safety. However, poor relationships may cause employees to be cautious in what they say and do (Herachwati, Sulistiawan, & Alfirdaus, 2018; Tucker et al., 2008). Therefore, the closeness of relationships between superiors and subordinates and the subtlety of colleague relationships in Chinese organizations have a complex impact on safety voice behavior. This study offers a valid measurement tool for safety voice in the Chinese cultural context.

Second, we expanded the definition of safety voice by adding the concepts of promotive safety voice and prohibitive safety voice. We obtained two dimensions through grounded interviews and named them as promotive safety voice and prohibitive safety voice according to the content of each dimension containing the questions. The two dimensions were identified through EFA. The former involves employees proposing new thoughts or advice proactively to improve organizational safety performance and operations. In contrast, the latter refers to the behavior of employees who take the initiative to point out the problems in the organization that may endanger organizational safety to prevent personal injuries caused by accidents in the organization. Previous studies on safety voice have mostly considered the aspects of safety voice that point out organizational safety problems, and less attention has been paid to the innovative suggestions and approaches in safety voice to improve the overall safety of the organization (Herachwati, Sulistiawan, & Alfirdaus, 2018; Tucker et al., 2008; Turner, Tucker, & Deng, 2020). This study divided safety voice into two parts: promotive safety voice and prohibitive safety voice, which more comprehensively and accurately elaborated the concept of safety voice and expanded the connotation of safety voice.

Finally, in the previous measurement of safety voice, many studies used single-dimensional scales (Conchie, Taylor, & Donald, 2012; Tucker et al., 2008; Tucker & Turner, 2011, 2015).

By referring to the maturity scale and in-depth interviews, we redesigned the two-dimensional safety voice scale, including promotive safety voice and prohibitive safety voice. Its credibility and rationality have been verified, providing more comprehensive measurement of safety voice tools, and enriching the theoretical research of safety voice measurement.

### *Practical implications*

The findings of this study have important practical significance to enhance enterprise safety decision and optimize safety management system. Combining promotive and prohibitive aspects of safety voice, there are three ways for an organization to motivate employees to engage in safety voice behavior. First, the organization formulates and implements an incentive mechanism for employees' prohibitive safety voice to convey to employees that the safety issues are positively recognized by the company or leadership. For example, leaders can give reasonable spiritual rewards or material rewards to employees who clearly point out safety issues and increase the courage of employees to suppress safety suggestions. Second, leaders should pay attention to promotive safety voice from their subordinates, carry out more internal organization building, and provide employees with channels to put forward constructive opinions on safety. For example, regular safety discussion meetings can be organized to encourage employees to speak freely and put forward new ideas and methods to improve workplace safety. Finally, the organization should create a good atmosphere and system for safety voice, advocate a healthy face culture, and eliminate employees' face concerns. The superiors should also show a positive image of being willing to accept words and encourage employees to make safety voice.

### *Limitations*

As an exploratory study, there are some limitations in this study. First, this study used a convenience sampling method due to the limitation of social resources. The sample was mainly from Hebei, Beijing, and Tianjin, lacking data from enterprises in other places, making it difficult to control the influence of geographical and cultural factors. Future studies should fully consider the above factors, expand the sample size and adopt a more rigorous design to avoid the above problems. Second, our scale development process only used the coding technique of grounded theory and did not satisfy the complete grounded theory study. For example, some of the interview questions contained presuppositions, which did not meet the requirements of grounded theory (Turner & Astin, 2021). In the future, subsequent studies can strictly follow the criteria of grounded theory in the scale design to ensure the rigor of the study. Finally, the safety voice measurement tool developed in this study was not used to explore the effects of safety voice on other work behaviors, and future research needs to investigate the influence of safety voice on other important organizational outcomes through the collection of different samples in order to further clarify the role of safety voice.

### *Conclusion*

In this study, we first conducted a literature review and in-depth interviews to obtain a theoretical conceptualization of the structure of safety voice. Then, we formed the initial scale based on the theoretical conceptualization, improved the scale structure and validated the composition of the items by item analysis, EFA and CFA, and finalized the formal scale with two dimensions (promotive and prohibitive safety voice) and 11 items. The scale was developed for employees in Chinese organizational contexts, filling a theoretical gap in the study of employee safety voice in China. And the scale can also be used in corporate practice to help companies obtain ongoing safety information in order to identify activities to focus on in managing employee safety voice and thereby improve corporate safety.

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**Conflict of interest.** The authors declare none.

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## Appendix A

**Table A1.** Final scale of safety voice

Dimension	Items
Promotive safety voice	I proactively make suggestions for the overall safety planning.
	I make advice on how to improve safety steps.
	I take the initiative to propose rationalizations that help my company achieve its safety goals.
	I talk to colleagues who work with risks and persuade them to work in safe conditions.
Prohibitive safety voice	I am proactive in expressing opinions related to safety work, regardless of others' objections.
	I report the consequences of hazardous working conditions to my leader.
	I dare to reveal safety problems that arise at work, even if that would damage my relationship with my colleagues.
	When a colleague's behavior may reduce the safety performance of the company, I stop it in time.
	I honestly point out issues that are detrimental to workplace safety, no matter if others disagree.
	I report potential dangers at work to the leader.
I warn new colleagues against safety violations.	

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