

RESEARCH ARTICLE

Unpacking leader critical thinking in employee voice quality and silence frequency

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Abstract

Previous research has predominantly examined either voice quantity or quality. We know little about the potential tradeoff between voice quantity and quality and the role of leaders in this tradeoff. This study focused on the dual aspects of voice, examining how and when the same leader attribute facilitates (inhibits) one aspect of voice, but does not facilitate (inhibit) or even hamper (facilitate) the other aspect. Specifically, we proposed that leader critical thinking stimulates the formation of employees' implicit voice theory of the need for solid data or solutions (IVT-SDS) before one speaks up. This belief boosts the quality of employee voice especially when voice efficacy is high, but increases the frequency of employee silence especially when voice efficacy is low. In Study 1a, we experimentally tested the relationship between leader critical thinking and employees' IVT-SDS. In Study 1b, we experimentally examined the interactive effect of employees' IVT-SDS and their voice efficacy on both their voice quality and silence frequency. In Study 2, a multilevel, multi-wave and multi-source field study, we tested the entire research model. The results supported our hypotheses. We extend the research on leadership and voice by revealing a potential tradeoff between voice quality and quantity.

KEYWORDS

implicit voice theory, leader critical thinking, silence frequency, social cognitive theory, voice quality

Jing Jiang and Yaping Gong contributed equally to this manuscript.

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BACKGROUND

Employee voice refers to the 'informal and discretionary communication by an employee of ideas, suggestions, concerns, information about problems, or opinions about work-related issues to persons who might be able to take appropriate action, with the intent to bring about improvement or change' (Morrison, 2014, p. 174). Since leaders authorize actions upon receipt of a voice (Detert & Burris, 2007), much research has investigated the influence of leaders on employee voice (Burris et al., 2008; Liu et al., 2010; Morrison et al., 2011). Although the traditional focus has been on voice quantity (Liu et al., 2010; Ng & Feldman, 2013; Tangirala & Ramanujam, 2012), recent research has shifted to the quality and substance of employee voice (Brykman & Raver, 2021, 2023; Liu, 2022). For example, research suggests that leaders often resist ideas that are excessively challenging (Burris, 2012; Maynes & Podsakoff, 2014) or lack clear operationalization (Whiting et al., 2012), but evaluate more favourably suggestions that are rational, feasible, organizationally focused and novel (Brykman & Raver, 2021, 2023). Additionally, leaders tend to endorse ideas characterized by a high level of importance but require low resources and interdependency for implementation (Burris et al., 2017).

Despite the shift in focus to the quality of employee voice, little is known about the potential tradeoff between voice quantity and quality and the role of leaders in this tradeoff. The quantity and quality of employee voice stem from different cognitive systems. The quantity of employee voice is primarily driven by automaticity and intuition, whereas the quality of voice relies on the degree of cognitive elaboration by the speaker (Wolsink et al., 2019). This raises an important question regarding leadership and voice: How and under what circumstances does a leader facilitate (inhibit) one aspect of voice without facilitating (inhibiting) the other – or even hampering (facilitating) the other? This question is theoretically important because voice quality and quantity may have different antecedents, and a leader's characteristics may foster one without necessarily affecting the other. It is practically crucial to examine both quantity and quality simultaneously to gain a comprehensive understanding of the role of leaders in the two aspects of voice and to provide accurate and actionable insights. Neglecting to consider quality and quantity simultaneously may result in incomplete knowledge and potentially misleading practical suggestions.

To address this research question, we aligned with the emerging trend in research examining the dual nature of voice-related phenomena (Huai et al., 2024). Consequently, we investigated both dimensions of employee voice, quantity and quality and examined how and when a particular leader attribute may facilitate (inhibit) one aspect of voice without facilitating (inhibiting) the other – or even hampering (facilitating) the other. In addition, we identified the conditions that are more likely to facilitate each aspect. Employee voice quality refers to 'the value of an employee's voice communications, as inferred by message characteristics (i.e., rationale, feasibility, organizational focus, and novelty)' (Brykman & Raver, 2021, p. 6). Building on prior studies (Detert & Edmondson, 2011; Knoll et al., 2021), we captured employee voice quantity through silence frequency where silence refers to an employee's conscious withholding of important information, advice or concerns to a person who might be capable of acting on that suggestion (Kish-Gephart et al., 2009; Tangirala & Ramanujam, 2008).

In this study, we focus on leader critical thinking, defined as 'a purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological or contextual considerations upon which that judgment is based'. (Facione, 1990, p. 2). Research suggests that a leader's cognitive processing (i.e., the mental processes involved in gaining knowledge and comprehension, such as thinking, judging and problem-solving; Colman, 2006) plays an important role in evaluating and selecting ideas (Wolsink et al., 2019). It stands to reason that a leader's critical thinking drives his or her behaviours (e.g., evaluation and questioning) in processing employee suggestions, and such behaviours significantly influence the formation of employee beliefs regarding leaders' inclinations towards the voice, thereby affecting their voice-related behaviours. Research on leader critical thinking predominantly portrays it in a positive light (D'Alessio, 2006; Dragoni et al., 2011; Godzyk, 2008; Kayes, 2006; Mumford et al., 2017). For instance, Dragoni et al. (2011) showed that leaders' critical thinking is

positively related to their strategic thinking competency. Powley and Taylor (2014) found that critical thinking aids leaders in handling crises. We attempt to shift this consensus-positive view by revealing the negative side of leader critical thinking in inducing employee silence frequency, and when it is more likely to occur.

In summary, we aim to advance knowledge regarding how and when leader critical thinking may increase employee silence frequency (i.e., reduce voice quantity) but strengthen voice quality. To do so, we adopted social cognitive theory (Bandura, 1986, 1997), an umbrella theory that includes social learning and self-efficacy. This theory posits that individuals acquire attitudes, beliefs and behaviours (skills) through observational learning from social environments that inevitably include leaders as visible and influential workplace models (Bandura, 1986). Visible role models convey rules of behaviour and observers extract principles embodied in the specific actions of their leaders (Bandura, 2001). Leaders' reactions to employee suggestions and requests for data and rationale serve as important cues that stimulate employees to form beliefs about leaders' expectations regarding how to appropriately propose suggestions. Leaders with critical thinking demand data, evidence and reasoning and evaluate and question employee suggestions along these dimensions (Facione, 2011; Yanchar et al., 2008). By observing such leader behaviours in voice scenarios, employees develop data-driven implicit voice theory (hereafter IVT), the belief that employees must have solid data, polished ideas or clear solutions before they speak up (hereafter IVT-SDS; Detert & Edmondson, 2011). IVT-SDS, which captures the 'will-to-do' source of motivation for voice, in turn regulates an employee's voice-related behaviours.

Furthermore, social cognitive theory suggests that whether employees practice what they have learned is influenced by the expected outcomes of their actions and their beliefs about their capabilities (Bandura, 1986, 1997). It follows that the extent to which an employee's IVT-SDS translates into a specific type of voice behaviour also depends on the employee's voice efficacy, a central mechanism regulating behavioural choices and strategies (Bandura, 1986, 1997). Voice efficacy, which reflects an employee's belief that they are capable of voicing opinions and ideas effectively, captures the 'can-do' source of motivation (Ashford et al., 1998; Tangirala et al., 2013). An employee with high voice efficacy believes that they have the requisite knowledge and skills to provide useful suggestions to the leader (McAllister et al., 2007). Under high voice efficacy, an employee with IVT-SDS channels the effort to develop a high-quality voice and persists in such effort. However, under low employee voice efficacy, an employee with IVT-SDS opts for a high frequency of silence because of a lack of confidence in their ability to voice ideas that can survive a critical leader's scrutiny. Voice efficacy therefore holds the promise of advancing our understanding of when employees' IVT-SDS directs them to offer high-quality voice or simply stay silent.

In summary, we built and tested a model in which leader critical thinking fosters employee IVT-SDS, which in turn boosts employee voice quality when voice efficacy is high, but increases silence frequency when voice efficacy is low. We tested the model through two experiments and one field study and made three major contributions. First, we integrate the quality and quantity of employee voice into a unified model, revealing the critical role that leaders play in this multifaceted process. This holistic approach addresses the omissions of previous studies regarding voice, which tended to focus on a single aspect – either quantity or quality – of employee voice, and hence offers an opportunity to reveal the potential tradeoff between voice quantity and quality (e.g., a leader may facilitate one, but not the other). Second, we challenge the prevailing view that leader critical thinking is positive by revealing its negative side (i.e., it increases employee silence frequency via employee IVT-SDS), and uncover when this negative side is more likely to occur (i.e., under low employee voice efficacy). From a practical standpoint, managers must recognize that leader critical thinking is not always beneficial and that they should wield it wisely. Third, specific to research on IVT, whereas prior research has focused on the quantity of voice as an outcome (Detert & Edmondson, 2011), we extend such knowledge by highlighting the quantity–quality tradeoff. IVT-SDS can induce more frequent silence (lower voice quantity), as prior research has suggested, but holds the potential for enhancing voice quality. Whilst prior research combined different types of IVT (Detert & Edmondson, 2011), we highlighted IVT-SDS, examined it in depth and extended understanding of the construct by revealing its potential benefits regarding voice quality.

LITERATURE REVIEW AND HYPOTHESES

Theoretical background

Social cognitive theory suggests that individuals acquire attitudes, beliefs and behaviours (skills) by observing others (Bandura, 1986). Leaders are visible workplace role models to which employees pay attention because leaders have frequent interactions with and strong influence over employees (Bandura, 1986; Wo et al., 2019). A leader's critical thinking is conceptually relevant to employee voice because they share similar cognitive underpinnings. By observing a critical leader and their high standards for and behavioural reactions to suggestions in voice scenarios (e.g., demanding strong data, scrutinizing a suggestion and questioning its rationale), an employee acquires IVT, a belief about the risk of speaking up (Detert & Edmondson, 2011) and acts accordingly. The social cognitive theory also demonstrates that the environment (e.g., leader and rule structure) does not compel uniform action and 'there is a lot of personal variation in their interpretation, enforcement, adoption...' (Bandura, 1997, p. 6). This theory posits that self-efficacy is a central variable in an individual's self-regulation of behavioural strategies and actions (Bandura, 1986, 1997). Extending this rationale to the voice context, it is possible that employee IVT, once formed by observing the behavioural manifestations of a leader's critical thinking, would work with employee voice efficacy to jointly influence an individual's voice-related behaviours. Although an IVT compels an employee to offer high-quality suggestions or stay silent, the type of voice behaviour they pursue and the extent to which they pursue it also depends on employee voice efficacy.

The next question is which employee IVT is most relevant to leader critical thinking. Detert and Edmondson (2011) identified five types of IVT. The first type, presumed target identification (IVT-PTI), refers to the belief that managers assume that they are personally identified or targeted for the issue at hand. The second type, IVT-SDS, refers to the belief that one must have solid data, polished ideas or clear solutions to voice concerns or suggestions to managers. The third and fourth types respectively refer to the belief that one should not bypass (IVT-DBBU) or embarrass (IVT-DEB) one's manager. The fifth involves the belief about the negative career consequences of speaking up (IVT-NCCV).

Amongst the five types of IVT, IVT-SDS is conceptually the most relevant to both leader critical thinking and voice quality. Employees with IVT-SDS are concerned about whether their voice meets the high requirements of critical leaders (Detert & Edmondson, 2011). The other four implicit beliefs are conceptually related to the voice target or the image and interests of employees or leaders and hence are less related to leader critical thinking (Detert & Edmondson, 2011; Facione et al., 1997). For instance, IVT-PTI deals with a specific voice target, whereas our focus is on voice at work. One may reason that a leader with critical thinking engenders IVT-NCCV because such a leader is critical. However, a leader with critical thinking is unbiased, rational and fair (Facione, 2011; Facione et al., 1997) and hence decides an employee's career outcome (e.g., promotion) according to the overall performance record rather than voice quality only.

More importantly, our choice of IVT-SDS was guided by social cognitive theory. The observation of critical leaders facilitates the formation of an employee's IVT-SDS because both leader critical thinking and employee IVT-SDS share a cognitive focus (i.e., data and/or ideas), where the former focuses on the leader demand side and the latter on the employee supply side (i.e., the motivation to supply high-quality suggestions). Other IVTs do not closely match IVT-SDS; for instance, IVT-PTI has little conceptual match with leader critical thinking in terms of leader demand or employee supply of (or motivation to supply) solid data and/or polished ideas. The same rationale applies to other types of voice-related beliefs.

Finally, we note that voice quality and silence frequency are not opposite but conceptually orthogonal; hence, they should be examined as separate dependent variables. First, although some employees voice their highest-quality ideas, they withhold/censor most of their good ideas and therefore remain mostly silent (i.e., the 'silent gold' type or those with high-quality ideas but remain silent mostly). Second, some employees voice low-quality ideas and remain largely silent when they do not have any good ideas (i.e., the 'silent wood' type or those with low-quality ideas and high silence frequency). Third,

some employees do not withhold/censor any ideas, but the ideas voiced out are of low quality (i.e., the ‘outspoken wood’ type or those with low-quality ideas and low silence frequency). Finally, some employees do not withhold/censor their ideas, and most, if not all, of the voiced ideas are of high quality (i.e., the ‘outspoken gold’ type or those with high-quality ideas and low silence frequency). Because these four scenarios are conceptually possible, voice quality and silence frequency should be conceptually independent (Figure 1) and examined separately as employee voice-related outcomes. Detert and Edmondson (2011) included employee silence but not voice quality and showed that IVT, as an overall construct, increases employee silence. Building on and extending their work, we investigated the quantity–quality tradeoff by examining the differential effects of IVTs on voice quality and silence frequency. With the above theoretical background, we next develop hypotheses on the differential effects of leader critical thinking on employee voice quality and silence frequency via employee IVT-SDS and the moderating role of employee voice efficacy.

Leader critical thinking and employee IVT-SDS

Employees look to their leaders to form or acquire attitudes, expectations and beliefs because leaders set standards and evaluate employees at work and, hence, are visible and influential models for employee observational learning (Bandura, 1986). Yanchar et al. (2008) considered leader critical thinking to be method-centered (scientific) and analytical reasoning. This represents a leader's use of rational and unbiased interpretation, analysis, evaluation, inference, explanation and self-regulation to make judgments (Facione, 1990). Leaders are responsible for the unit's development and effectiveness and therefore expect employees' suggestions to add value towards improving the unit (Brykman & Raver, 2021; Burris et al., 2017). Because leaders with stronger critical thinking are more data-driven, analytical and reasoning-oriented (Facione, 2011; Facione et al., 1997), they apply higher standards for employee suggestions and scrutinize and evaluate them more vigorously to determine which to accept or reject (Facione, 2011; Facione et al., 1997).

More specifically, employees observe and learn from their leaders in the workplace (Bandura, 1986; Wo et al., 2019). Leaders' thought processes and beliefs reveal the criteria by which employees are evaluated. Critically thinking leaders are analytical and critical, and employees are influenced by the leaders' approach to information processing and decision-making. Although employees do not directly observe a leader's mental processing, such as critical thinking, they observe its behavioural manifestations, such as setting high standards for employees' suggestions, questioning the data and their underlying rationale when interacting with a leader in voice-related scenarios. The foundation of critical thinking is questioning, which refers to maintaining a sceptical attitude and seeking to establish truth based on the underlying facts (Facione, 1990, 2011). Through regular interactions, leaders' questioning behaviour fosters IVT-SDS amongst employees,



FIGURE 1 Four scenarios of voice quality and silence frequency.

so that employees believe they must carefully evaluate the validity and rationality of their suggestions before speaking up (Facione, 2011; Facione et al., 1997). Through repeated interactions, employees receive ample opportunities to acquire the belief that voice must be well grounded in and supported by solid data and proof, and be accompanied by polished solutions (i.e., IVT-SDS). For instance, by observing a leader scrutinizing, questioning and even rejecting a peer's proposal based on high standards of data and/or solution quality, an employee anticipates a similar occurrence when they speak up and, hence, forms their own IVT-SDS. Therefore, we hypothesized the following:

Hypothesis 1. Leader critical thinking is positively related to employee IVT-SDS.

Employee IVT-SDS, voice quality and silence frequency: the role of voice efficacy

Social cognitive theory assigns a central role to self-efficacy – ‘beliefs in one's capabilities to organize and execute the course of action required to produce given attainments’ (Bandura, 1997, p. 3) – in the exercise of self-influence to determine the course of action (Bandura, 1986). The extent to which individuals translate their learning (e.g., acquired beliefs) into action depends partly on their degree of confidence in their own abilities (Bandura, 1997). In the voice context, although employee IVT-SDS may increase employee voice quality, it may also induce higher silence frequency (i.e., suppress ideas unless one is sure that they are genuinely useful). Next, we elaborate that employee voice efficacy, the belief about one's capability to voice effectively (Morrison et al., 2011; Tangirala et al., 2013), determines when employee IVT-SDS leads to higher employee voice quality or silence frequency.

Specifically, whereas employee IVT-SDS provides the ‘will-to-do’ motivation, employee voice efficacy enhances the ‘can-do’ spirit and perceived capability resources for voice-related activities. Employees with high voice efficacy believe that they have the capability to voice effectively. When paired with high voice efficacy, an employee with IVT-SDS is more likely to generate a high-quality voice, for two reasons. First, motivation (‘will-to-do’) and ability (‘can-do’) have a synergistic interactive effect on employee behaviour and performance (Blumberg & Pringle, 1982; Campbell et al., 1993). Extending this logic to voice-related behaviours, employee IVT-SDS, which provides motivation for high-quality voice, is more likely to lead to high-quality voice when employees also have high voice efficacy and hence believe that they have the resources (e.g., requisite expertise and skills) to provide a high-quality voice to address important issues (Kish-Gephart et al., 2009; Tangirala et al., 2013). For instance, with such beliefs, employees with high IVT-SDS would be more actively involved in preparing voice content to make their suggestions more valuable.

Second, self-efficacy regulates behaviour, including the intensity and persistence of efforts and behavioural strategies (Bandura, 1997). An employee with high voice efficacy appraises voice situations as more controllable and believes they can succeed despite the inherent challenges in such situations (Morrison et al., 2011). That is, when employees with IVT-SDS have high voice efficacy, they believe that they can meet the leader's high demand by offering valuable suggestions. With a high voice efficacy belief, employees with IVT-SDS would direct their efforts towards generating high-quality ideas or solutions, increasing the intensity and persistence of effort in such endeavours. When facing setbacks, employees with high voice efficacy are more likely to search for effective strategies to develop high-quality suggestions. Therefore, they are more likely to put forward high-quality suggestions. This rationale led us to hypothesize the following:

Hypothesis 2. Employee IVT-SDS is positively related to employee voice quality when employee voice efficacy is high rather than low.

Despite strong employee IVT-SDS, we expect that employees with low voice efficacy are more likely to remain silent. When an employee with IVT-SDS also has low voice efficacy, the expected probability of voice success decreases and they remain silent to avoid expressing ideas that do not pass the leader's scrutiny (Brykman & Raver, 2021; Detert & Edmondson, 2011; Kish-Gephart et al., 2009; Ng et al., 2022). With IVT-SDS, employees with low voice efficacy further believe that they may not be able to base their suggestions on solid proof and may lack the confidence to accept or justify their position (Kish-Gephart et al., 2009; Morrison et al., 2011; Tangirala et al., 2013). Such individuals easily give up any voice-related effort, even on rare occasions when they start voice preparation activities, because they doubt their capability to justify their voice effectively (Bandura, 1997; Kish-Gephart et al., 2009; Morrison et al., 2011). Based on the above rationale, an employee with IVT-SDS but low voice efficacy will have a higher silence frequency, as IVT-SDS raises the bar for voice, and thus, the prospect of negative evaluations.

Hypothesis 3. Employee IVT-SDS is positively related to employee silence frequency when employee voice efficacy is low rather than high.

An integrative moderated mediation model

Combining Hypotheses 1 and 2 leads to our first second-stage moderated mediation relationship (Edwards & Lambert, 2007). Specifically, leader critical thinking fosters employee IVT-SDS. This belief, in turn, enhances employee voice quality to meet the expectations of leaders when employees have high voice efficacy but increases employee silence frequency to avoid ideas failing to pass leaders' scrutiny when employees have low voice efficacy. The overall research model is illustrated in Figure 2.

Specifically, employees with high voice efficacy have a stronger belief that they are capable of voicing effectively (e.g., identifying issues and developing effective suggestions) (Bandura, 1997; Kish-Gephart et al., 2009; Morrison et al., 2011; Tangirala et al., 2013). Thus, they respond more positively to the IVT-SDS. They can be motivated and guided by IVT-SDS to identify sound solutions to meet or even exceed leaders' requirements and pass critical assessments (Detert & Edmondson, 2011; Facione, 2011). Thus, when employee voice efficacy is high, employee IVT-SDS can trigger employees to develop high-quality voices. Hence, we hypothesized:

Hypothesis 4. Employee voice efficacy moderates the indirect relationship between leader critical thinking and employee voice quality via employee IVT-SDS, such that it is more positive when employee voice efficacy is high rather than low.

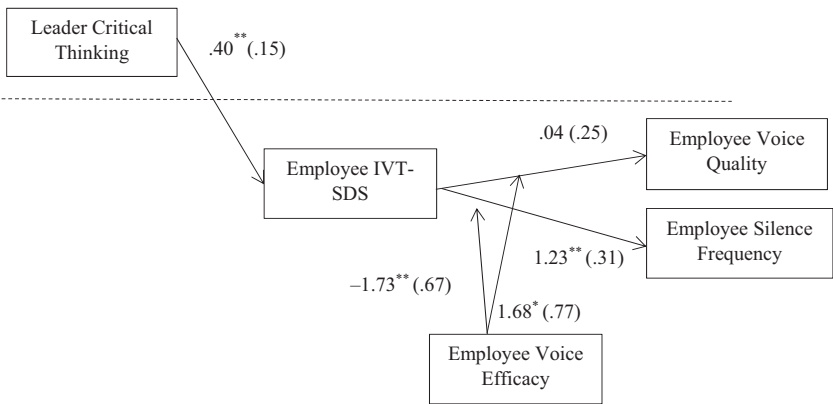


FIGURE 2 Hypothesized model.

Similarly, combining Hypotheses 1 and 3 leads to another second-stage moderated mediation relationship (Edwards & Lambert, 2007). Specifically, leader critical thinking has a stronger positive indirect relationship with employee silence frequency (via employee IVT-SDS) when employees have low rather than high voice efficacy. Employees with low voice efficacy lack confidence in handling voice situations (Bandura, 2001; Tangirala et al., 2013). Employee IVT-SDS is, therefore, ineffective in the voice process for employees with low voice efficacy. Because such employees do not believe that they have the necessary knowledge and skills to generate well-developed and researched ideas (Detert & Edmondson, 2011; Tangirala et al., 2013), employee IVT-SDS should engender greater silence frequency. In summary, we hypothesized the following:

Hypothesis 5. Employee voice efficacy moderates the indirect relationship between leader critical thinking and employee silence frequency via employee IVT-SDS, such that it is more positive when employee voice efficacy is low rather than high.

OVERVIEW OF STUDIES

We conducted three studies, namely two experimental studies (Studies 1a and 1b) and one multi-level, multi-source and multi-wave field study (Study 2). In Study 1a, pre-registered at https://aspredicted.org/GSB_4ZP, we tested the causal relationship between leader critical thinking and employee IVT-SDS. In Study 1b, which was pre-registered at https://aspredicted.org/MJL_3JF, we manipulated both employee IVT-SDS and voice efficacy and examined their interactive effect on employee voice quality and likelihood of staying silent. Studies 1a and 1b were conducted through the same platform but with different participants (i.e., university students invited by the first author vs. employees recruited through the Credamo platform). Studies 1a and 1b strengthened internal validity through their experimental method, whereas Study 2, a multi-level, multi-wave and multi-source field study, not only replicated the interactive effect but also confirmed the external validity of the experimental findings. Through this multi-study and multi-method design, we enhanced replicability and strengthened the internal and external validity of our findings.

STUDY 1A

Participants and procedure

We invited 200 students from a university in China to participate in our experiment using the Credamo platform (similar to MTurk). All accepted the invitation. The participants were informed that their participation was voluntary. Amongst the invitees, 127 participated, with a response rate of 63.50%. To ensure the quality of our data, we included one attention check question which instructed participants to select 'totally disagree'. After excluding three participants who did not pass the attention check question, our final sample contained 124 participants. This sample size was acceptable because power analysis conducted with G*Power suggested a moderate effect size d (.50), $\alpha = .05$, $N_1 = 63$, $N_2 = 61$, power $(1 - \beta)$ is as high as .79 (Faul et al., 2007; MacCallum et al., 1996). We paid 5 RMB (approximately .69 dollars) to each participant. Amongst the participants, 52.42% were men and the average age was 29.75 years ($SD = 6.59$). Most participants were master's students (87.90%), and the remainder were undergraduates (12.10%). Participants were from different academic majors, including science (19.35%), engineering (14.52%), liberal arts (45.16%) and others (20.97%).

We randomly assigned participants to one of two conditions: 61 to the high leader critical thinking condition and 63 to the low leader critical thinking condition. In each condition, we presented the

participants with a specific scenario in which they reported to a leader with high or low critical thinking, following which they responded to questions on their IVT-SDS and the critical thinking of the leader on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Manipulation

We told the participants that their school would hold a Students' Teaching Advisory Committee (STAC) meeting to improve teaching quality. STAC aims to collect students' suggestions for teaching improvement. The participants were also told that they had been selected as student representatives to participate in STAC, following the recommendations of the teachers and other students. We informed them about other participants in the committee, namely seven other student representatives and Dr. Wang from the teaching office, who was the leader in charge of the committee and teaching management. Their task was to voice suggestions at committee meetings on how to improve teaching. The student representatives were free to offer (or not offer) their suggestions.

We manipulated Dr. Wang's critical thinking level based on the definition and measurement of critical thinking (Ennis, 1991; Facione, 1990; Facione et al., 1997, see Appendix S1). The high leader critical thinking condition stated, 'Dr. Wang has a strong logical mindset and questioning spirit, and therefore, would not take any statement or opinion for granted. S/he tends to ask for clarification of problem(s) and related information. In addition, Dr. Wang always seeks reasons and evidence behind the opinions or arguments presented and deeply analyzes their potential effectiveness and consequences'. The low leader critical thinking condition stated, 'Dr. Wang does not have a strong logical mindset and generally does not question others' statements or opinions. She or he would not ask much about the problem(s) and related information and tend to rely on intuition to make decisions. Dr. Wang tends to make quick rather than deep analyses of the potential effectiveness and consequences of the opinions and arguments presented'.

Measures

Because the employee IVT-SDS measure was originally developed in English, we translated it into Chinese following Brislin's (1986) translation and back-translation procedure. The English measure was first translated into Chinese by a bilingual management professor and then translated back into English by another bilingual professor. The research team compared the translated English version with the original version and made further modifications to the Chinese scale to improve comparability and accuracy.

IVT-SDS

We adapted Detert and Edmondson's (2011) four-item scale to measure participants' IVT-SDS by adding 'Dr. Wang' to the items to fit the experimental scenario. A sample item is 'Presenting underdeveloped, under-researched ideas to Dr. Wang is not a good idea'. (Cronbach's $\alpha = .73$).

Results

Manipulation check

To check whether the leader's critical thinking manipulation was effective, we asked the participants to rate Dr. Wang's critical thinking using Facione et al.'s (1997) 10-item scale. A sample item is, 'Dr. Wang

seeks reasons and evidence to support offered assertions and evaluations'. (Cronbach's $\alpha = .91$). The results of two-sample *t*-tests showed that the manipulations were successful. Participants in the high condition reported a higher level of leader critical thinking ($N = 61$, $M = 3.95$, $SD = .39$) than those in the low condition ($N = 63$, $M = 2.87$, $SD = .70$): $t_{(122)} = -10.61$, $p = .00$.

Hypothesis testing

The regression results showed that the relationship between leader critical thinking and employee IVT-SDS was positive ($B = .21$, $SE = .08$, $p = .01$). These results support Hypothesis 1, which proposed that leader critical thinking is positively related to participant IVT-SDS.

STUDY 1B

Participants and procedure

Experiment 1b was conducted using the Credamo platform by recruiting 450 employees from different organizations. To ensure data quality, we recruited participants whose previous responses (to other studies conducted through the platform) were judged to be of good quality and thus, adopted (by previous researchers) more than 70% of the time; this information is available to researchers only. We adopted a 2×2 between-subject design, with participants randomly assigned to high versus low IVT-SDS conditions and high versus low voice efficacy conditions.

A total of 409 individuals participated in the experiment, with a response rate of 90.89%. We paid 5 RMB (approximately .69 dollars) to each participant. We included one attention check question which instructed participants to answer 'totally disagree'. After excluding eight participants who did not pass the attention check question, we obtained usable data from 401 participants ($N = 202$ in the high IVT-SDS condition, $N = 199$ in the low IVT-SDS condition; $N = 200$ in the high voice efficacy condition, $N = 201$ in the low voice efficacy condition). The average age was 33.68 years ($SD = 7.51$), 40.90% were male, 91.52% had a bachelor's degree or higher and the average work tenure was 9.64 years ($SD = 6.94$).

Manipulation

IVT-SDS manipulation

Following previous studies, which manipulated various implicit theories (Chao et al., 2017; Hahn et al., 2014; Kuwabara et al., 2023; Levy et al., 1998), we manipulated IVT-SDS in two ways with one reinforcing the other. In the high IVT-SDS condition, participants were first asked to recall an important event in their past work experience, in which their direct leader asked employees, including the participants themselves, to make suggestions on an issue and critically evaluate employees' suggestions in the process. Participants strongly believed that presenting underdeveloped and under-researched ideas or ideas without clear solutions to their direct leader was never a good idea. In addition, to look good when speaking up with an idea or suggestion, participants had to be able to answer every question they were asked and saying 'I don't know' or 'I'm not sure' would put them in a bad position. Following this instruction, participants were asked to describe the following in a short essay: (1) What issue did their leader ask for suggestions on? (2) Why did they think voicing behaviour was inappropriate or risky? (3) In this incident, did they remain silent or choose to voice? The recall task and short essay writing completed the first manipulation of participant IVT-SDS.

Participants were then told that they were analysts at a securities company. Their team's main responsibilities were market research, tracking and road shows in certain fields. Owing to the impact of the COVID-19 pandemic, their work has been conducted online and remote work has become common. Thus, improving remote work has become an urgent issue. At a recent regular meeting, the team leader asked for suggestions on improving remote work. Employees in the high IVT-SDS condition read the following paragraph, which reinforced our manipulation through priming, before starting the experimental task:

You have developed a strong belief during the long time working with your team leader. You believe that you must have solid data, a polished idea, or a clear, well-developed solution, and be able to clearly answer any questions your team leader has about your suggestions when presenting to your team leader.

Similarly, in the low IVT-SDS condition, employees were also, first, instructed to recall an event in which they were asked to make suggestions on an issue. In this process, leaders did not evaluate their employees' suggestions critically. Participants strongly believed that presenting underdeveloped, under-researched ideas or ideas without clear solutions to their direct leader was not a significant problem. In addition, when speaking up with an idea or suggestion, participants did not have to be able to answer every question they were asked; it was also considered acceptable for them to say 'I don't know' or 'I'm not sure'. Similarly, participants wrote a short essay on the event (i.e., the issue their leader asked them for suggestions on, why they thought the voice was relatively low risk, and whether they stayed silent or voiced out). Participants were then presented with the experimental task (i.e., how to improve remote work in a securities analysis company), but read a paragraph intended to reinforce the low IVT-SDS before they started the task:

You have developed a strong belief during the long time working with your team leader. You believe that you do not need a solid foundation of data, a polished idea, or a clear, well-developed solution, and you do not have to clearly answer any questions your team leader has about your suggestion when presenting it to your team leader.

Voice efficacy manipulation

We built on previous research (Brokner et al., 1998; Hsu et al., 2019; Vancouver et al., 2002) and made slight adaptations to manipulate voice efficacy, in which we provided feedback on performance during a recent voice evaluation activity. We also provided information on the extent to which they had experience and knowledge of improving remote work. In the high voice efficacy condition, the participants received the following information:

Your company regularly evaluates employees' suggestions. In a recent voice evaluation activity, 75% of your previous suggestions received high evaluation from your team leader, ranking you in the top 5% of all employees. Furthermore, you have extensive experience and knowledge on how to improve remote work and have previously proposed suggestions for this.

In the low voice efficacy condition, participants received the following:

Your company regularly evaluates employees' suggestions. In a recent voice evaluation activity, only 25% of your previous suggestions received high evaluation from your team leader, ranking you in the bottom 30% of all employees. Furthermore, you lack relevant experience and knowledge on how to improve remote work and do not know where to start.

Measures

As all the measures were originally developed in English, we translated them into Chinese following Brislin's (1986) procedure. We measured all constructs using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

IVT-SDS

We adapted Detert and Edmondson's (2011) scale to measure employee IVT-SDS by adding 'your leader' to the items to fit the experimental scenario. A sample item is 'Presenting underdeveloped, under-researched ideas to your leader is not a good idea'. (Cronbach's $\alpha = .91$).

Voice efficacy

We adapted Morrison et al.'s (2011) six-item scale to measure employee voice efficacy in improving remote work. A sample item is 'I am capable of effectively speaking up with ideas for improving remote work'. (Cronbach's $\alpha = .96$).

Voice quality

We invited four independent research assistants who were blinded to our research (i.e., objectives, hypotheses, experimental conditions and participant characteristics) to evaluate the quality of the suggestions developed by the participants. First, we created a coding scheme containing a brief introduction to the scenario and elaborated on the standards for rating voice quality. Based on the definition of voice quality (Brykman & Raver, 2021), suggestions were defined as high quality if they were rational, feasible, organization-focused and novel. We then provided the raters with a list of 663 suggestions from 401 participants. The four raters were divided into two groups for two separate tasks: two raters evaluated the quality of each specific suggestion proposed by each participant and the other two raters evaluated the overall quality of all suggestions from each participant (1 = very low to 7 = very high). The agreement amongst the two raters was above the threshold of .70 (LeBreton & Senter, 2008) for ratings of a specific suggestion ($r_{wg} = .72$) and for ratings of the overall quality of all suggestions ($r_{wg} = .88$). In addition, the correlation between these two ratings was high for both specific suggestions ($r = .92, p < .01$) and the overall quality of all the suggestions ($r = .92, p < .01$). Therefore, we averaged the ratings of the two raters.

Based on the ratings, we derived three measures of voice quality: (a) rating of the participant's highest-quality suggestion (i.e., the highest-rated idea), (b) average rating of a given participant's suggestions and (c) overall rating of the quality of a given participant's suggestions. As we were interested in the effect of generating high-quality suggestions rather than the total number of suggestions, we followed previous research to use the highest rating as the dependent variable in our analysis (Baer et al., 2010; Liu et al., 2020).

Silence likelihood

Because this experiment included only one issue, we could not measure silence frequency directly. Instead, we adapted Xu et al.'s (2015) five-item scale to measure the likelihood of participants remaining silent in a recent regular meeting (1 = not at all, 7 = quite possible). Sample items included 'Although I have ideas for improving remote work in the securities company, I would not speak up' and 'I would choose to remain silent when I have concerns about remote work in the securities company'. (Cronbach's $\alpha = .95$).

Results

Manipulation check

The results of the two-sample *t*-tests showed that the manipulations of the IVT-SDS and voice efficacy were successful. Participants in the high condition reported a higher level of IVT-SDS ($N=202$, $M=5.50$, $SD=.94$) than those in the low condition ($N=199$, $M=2.92$, $SD=1.37$): $t_{(399)}=-21.95$, $p=.00$. Participants in the high voice efficacy condition reported a higher level of voice efficacy ($N=200$, $M=5.85$, $SD=.61$) than those in the low voice efficacy condition ($N=201$, $M=3.77$, $SD=1.65$): $t_{(399)}=-16.75$, $p=.00$.

Hypothesis testing

Results showed that the interaction between participant IVT-SDS and voice efficacy was significantly related to voice quality ($B=.09$, $SE=.04$, $p=.01$) and silence likelihood ($B=-.14$, $SE=.02$, $p=.00$). We also performed a simple slope test (Aiken & West, 1991). As shown in Figure 3a, participant IVT-SDS was positively related to voice quality at high employee voice efficacy ($B=.18$, $SE=.09$, $p=.03$, 95% $CI=[.01, .35]$) but not at low employee voice efficacy ($B=-.11$, $SE=.09$, $p=.22$, 95% $CI=[-.28, .06]$). As shown in Figure 3b, participant IVT-SDS is positively related to participant silence likelihood when employee voice efficacy is low ($B=.52$, $SE=.04$, $p=.00$, 95% $CI=[.45, .60]$) rather than high ($B=.07$, $SE=.04$, $p=.06$, 95% $CI=[-.002, .15]$). The results remained the same, and our hypotheses were supported by the other two measures of voice quality.

Discussion of Study 1

The objectives of Studies 1a and 1b were to strengthen causality inferences. The results supported the positive relationship between leader critical thinking and employee IVT-SDS as well as the moderating role of voice efficacy in the relationship between employee IVT-SDS and voice quality (silence likelihood). However, these experimental studies have limited external validity. In addition, we did not measure employee silence frequency directly but instead assessed the likelihood of staying silent in Study 1b. This was necessary because the short duration of the experiment prevented us from presenting a series of work issues in which participants stayed silent multiple times, as in a real workplace. Furthermore, voice quality was rated by independent research assistants rather than by leaders or supervisors at work. In Study 2, a multilevel, multi-source and multi-wave field study, we directly assessed employee silence

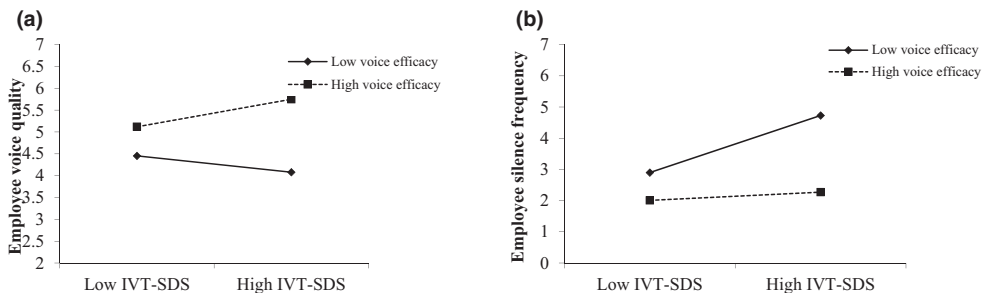


FIGURE 3 (a) Relationship between employee IVT-SDS and voice quality under high and low employee voice efficacy in Study 1b. (b) Relationship between employee IVT-SDS and silence likelihood under high and low employee voice efficacy in Study 1b.

frequency and used direct supervisor ratings of employee voice quality. We did this to check the generalizability of our findings from the experiments to the real world.

STUDY 2

Sample and procedure

We surveyed employees and their direct leaders working in a hotel group headquartered in Hunan, China. The group operates a chain of 200 branch hotels and enjoys a strong reputation in the hotel industry. We collected our data from a hotel group because it encourages its employees to propose suggestions for improving service quality, such as seeking suggestions for innovative services and providing rewards for high-quality suggestions. In addition, leaders in our sample were the heads of each branch and responsible for branch performance; thus, they need high cognitive ability (e.g., critical thinking) and are motivated to make good business decisions. Therefore, the sample fits well with the aim of this study. We obtained permission and support from the hotel group CEO to conduct the study and secured approval for the participation of 150 branches. Each branch has employees with different job functions (e.g., lobby, customer service and security) working under one branch leader. As the turnover rate was high for frontline employees, especially during COVID-19, our sample focused on branch leaders (i.e., general managers) and their direct subordinates (i.e., department/office/unit managers).

Before the survey began, we obtained a roster from the human resources (HR) manager and coded all questionnaires to match the leader–subordinate dyads. For example, branch leader A was coded 01, subordinate A was coded 0101 and subordinate B was coded 0102. The coding sheet was deleted after data matching to maintain the confidentiality and anonymity of the responses for analysis. Electronic questionnaires and codes were sent to corresponding leaders and subordinates with the help of the HR manager. The participants were required to enter passwords (i.e., codes) to complete the questionnaires. We explained to the participants that their responses would be kept confidential and used only for academic research and that no one else would access their responses, except the research team.

We collected data online at three time points, with a 1-month lag between each wave of the survey. Prior research suggests that the choice of time lag should be based on theoretical, empirical and/or pragmatic reasons (Li et al., 2021). Our selection of time lag was informed by research on IVT showing a small-to-moderate time-lagged effect of IVT-specific leader behaviours on individual-level IVTs in a 1-month interval (Detert & Edmondson, 2011). In addition, a 1-month time lag was chosen to reduce common method bias (Podsakoff et al., 2012). Podsakoff et al. (2012) note that the choice of time lag should be neither too short nor too long. If the time lag is too short, memory effects may artificially inflate the relationships between variables. If the time lag is too long, certain factors (e.g., strong response attrition and leadership development programs) may mask the existing relationships between variables (Ployhart & Vandenberg, 2010). Furthermore, research has shown that leader attributes or behaviours (e.g., leader bottom-line mentality, unethical behaviour, leader proactive goal regulation and abusive supervision) can have a significant impact on employees with a time lag of 1 month (Babalola et al., 2022; Fehr et al., 2020; Liu et al., 2012; Wang et al., 2022). Pragmatically, our choice of time lag aligns with the company's monthly performance evaluation and feedback cycles. Overall, the 1-month lag choice was appropriate based on theoretical, empirical and practical considerations (Li et al., 2021).

At Time 1, we distributed the survey to 150 branch leaders, 114 of whom returned the completed survey, for a response rate of 76.00%. Branch leaders responded to questions on their critical thinking and demographic information.¹ Approximately 1 month later (Time 2), we distributed a survey to 570

¹We also measured leader critical thinking from the employee perspective. We conducted a supplementary analysis of employee-rated leader critical thinking. Results showed that its relationship with employee IVT-SDS was positive ($r = .20$, $SE = .07$, $p = .00$). Therefore, our hypothesis was supported. However, we did not rely on employee ratings in our main analysis or the results of the study to minimize common method bias with employee IVT-SDS and silence frequency.

subordinates of the 114 branch leaders who responded at Time 1 and received completed surveys from 473 of them, for a response rate of 82.98%. On average, each branch leader oversaw 5 direct reports, with the number of subordinates ranging from 2 to 6. Subordinates responded to questions regarding their IVT-SDS, voice efficacy and demographic characteristics. One month after Time 2 (i.e., Time 3), we sent a survey to the 473 subordinates who responded at Time 2 and asked them to report their silence frequency. We also distributed a survey to 104 branch leaders of these 473 subordinates and asked them to evaluate their subordinates' voice quality. We received complete responses from 286 subordinates and 77 branch leaders, with response rates of 60.47% for subordinates (286 of 473) and 74.04% for leaders (77 of 104).

In the final sample (i.e., 286 subordinates and 77 branch leaders), the average age of branch leaders was 33.57 years ($SD = 9.34$), with 35.06% being women and 46.75% having a college or higher degree. Amongst the subordinates, the average age was 31.17 years ($SD = 11.37$), 35.31% were women and 32.17% had a 3-year college or higher degree. The average working tenure of the subordinates with their current branch leaders was 2.83 years ($SD = 3.91$).

Measures

Because our measures were originally in English, we translated them into Chinese following Brislin's (1986) translation and back-translation procedures when a Chinese version was not available. Participants responded to the measures on a seven-point scale (1 = strongly disagree to 7 = strongly agree) unless indicated otherwise (all items are listed in Appendix S2).

Leader critical thinking

We assessed the branch leaders' critical thinking using Facione et al.'s 10-item scale (1997). A sample item is, 'I seek reasons and evidence to support offered assertions and evaluations'. (Cronbach's $\alpha = .71$).

Employee IVT-SDS

As in Studies 1a and 1b, we adapted Detert and Edmondson's (2011) four-item scale to measure employees' IVT-SDS. The scale was modified to capture the employees' IVT-SDS regarding their branch leaders at work. A sample item is 'Presenting underdeveloped, under-researched ideas to the branch leader is never a good idea'. (Cronbach's $\alpha = .73$).

Employee voice efficacy

We adopted Morrison et al.'s (2011) six-item scale to measure employee voice efficacy. A sample item is 'I am capable of effectively speaking up with ideas for new projects or changes in procedures'. (Cronbach's $\alpha = .81$).

Employee voice quality

As supervisors assess suggestions for potential adoption based on quality, we asked branch leaders to rate their employees' voice quality during the previous month using Brykman and Raver's (2021) 12-item scale. A sample item is 'This employee provides evidence to support the suggestion'. (Cronbach's $\alpha = .96$). Because voice quality contains four dimensions – rationality, feasibility,

organizational focus and novelty – we conducted a second-order CFA to examine whether these items could be aggregated into a composite score. The second-order CFA model had an acceptable fit to the data ($\chi^2 = 153.26$, $df = 46$, $\chi^2/df = 3.33$, CFI = .96, TLI = .94, RMSEA = .09, SRMR = .03). Therefore, we followed previous research and treated voice quality as an overall construct (Brykman & Raver, 2021).²

Employee silence frequency

We used Xu et al.'s (2015) five-item scale, which has been used in the Chinese context and has shown good reliability and validity, to measure employee silence frequency. The respondents were asked to rate the frequency of their silence during the previous month (1 = never to 7 = almost always). A higher score indicates a higher frequency of silence. Cronbach's alpha was .93. The frequency of employee silence indicates how often a person deliberately withholds ideas for self-protection. It is difficult, if not impossible, for leaders to know whether an employee has ideas but suppresses them for self-protection. In this case, employee self-report is more valid because employees have more accurate information on whether they keep ideas to themselves and the self-protection motive underlying such a choice. Indeed, it is common practice in prior research that employees report their own silence (see Knoll et al., 2019; Tangirala & Ramanujam, 2008; Xu et al., 2015).

Control variables

Following recommendations for control variables (Becker et al., 2016; Bernerth & Aguinis, 2016), we controlled for several employee characteristics such as age, gender (0 = female, 1 = male) and education (0 = below bachelor's degree, 1 = bachelor's degree or above). Older employees may have greater status to speak out in the workplace (Hussain et al., 2019). Gender could potentially influence employee silence frequency, as men usually face fewer psychological obstacles to speaking out than women (Tangirala & Ramanujam, 2012). Employees with higher levels of education may speak out more because of their greater knowledge and skills or may become more cautious in speaking up to avoid unworthy ideas. We also controlled for dyadic tenure (i.e., how long an employee and leader worked together) because an employee with a longer dyadic tenure with a leader may feel more comfortable speaking out than a newcomer would (Morrison et al., 2011).

In addition to employee IVT-SDS, IVT suggests four voice beliefs: IVT-PTI, IVT-DBBU, IVT-NCCV and IVT-DEBP (Detert & Edmondson, 2011). Conceptually, these beliefs may influence the frequency of employee silence. We measured these four voice beliefs using Detert and Edmondson's (2011) scale. Cronbach's alpha values for the four voice beliefs were .79, .79, .76 and .82. As employees' own critical thinking prompts them to analyse problems and evaluate ideas carefully and rigorously, they may speak out less often, but with better-quality ideas. On the other hand, they might also fall into the trap of overanalyzing situations, leading to overly complex or impractical suggestions. To partial out this effect, we controlled for employee critical thinking using the same scale used to assess leaders' critical thinking. Cronbach's alpha was .77 on the scale. We controlled employee psychological safety because feeling safe may influence whether employees decide to speak up or stay silent (Morrison, 2014). Employees' psychological safety was measured using Harvey et al.'s (2019) four-item scale. Cronbach's alpha was .78 on the scale. Employees with a growth mindset (Dweck, 2006) tend to initiate work-related improvements (Heslin & Keating, 2017;

²We conducted analyses to check for differences among the individual dimensions of voice quality: rationality, feasibility, organizational focus, and novelty. The results showed that the interaction effects were significant for rationality ($B = .19$, $SE = .08$, $p = .01$), feasibility ($B = .22$, $SE = .08$, $p = .01$), and organizational focus ($B = .23$, $SE = .09$, $p = .01$), and marginally significant for novelty ($B = .21$, $SE = .12$, $p = .09$). This is logical because employee IVT-SDS emphasizes solid data, proof, and polished solutions rather than novelty (Detert & Edmondson, 2011).

van der Heijden et al., 2020). So, we controlled for an employee growth mindset to partial out its effect on employee voice-related activities. We measured growth mindset with a four-item scale from Török et al. (2022). Cronbach's alpha was .78.

We also controlled for branch leader characteristics. It has been suggested that age (Hirst et al., 2011), gender (Sijbom et al., 2015) and education level (Hirst et al., 2009) influence openness to new ideas. Accordingly, we reasoned that the branch leader's age, gender (0 = female, 1 = male) and education (0 = below bachelor's degree, 1 = bachelor's degree or above) would influence leaders' openness to employee ideas and, hence, silence frequency (Zhu & Akhtar, 2019). Because a leader's trait openness can influence employee voice (Morrison, 2014), we measured leader openness using Zhu and Akhtar's (2019) four-item scale. Cronbach's alpha was .86 for the scale. Narcissistic leaders belittle employees' contributions and hence may increase employee silence frequency. We measured leader narcissism using Ames et al.'s (2006) 16-item scale. Cronbach's alpha for the scale was .88.

Analytical strategy

Given the nested nature of our data (i.e., employees were nested within branches; ICC(1) for IVT-SDS was .40, $F = 3.49$, $p = .00$, ICC(1) for voice quality was .60, $F = 2.55$, $p = .00$, whilst ICC(1) for silence frequency was .29, $F = 5.70$, $p = .00$), we adopted Mplus 8.1 software and conducted a multi-level analysis to test our hypotheses (Muthén & Muthén, 1998–2017). Mplus can account for the interdependence amongst observations and avoid inflated effect sizes. It is also able to assess within- and between-effects separately to provide estimations of hypothesized relationships (Preacher et al., 2011). Following previous studies (Algina & Swaminathan, 2011), the independent variables at the individual level, except for employee gender and education level, were group-mean-centered. We grand-mean-centered branch-level variables, including leaders' age, openness, narcissism and critical thinking. To test the moderated mediation effect, we adopted a Monte Carlo simulation with 20,000 repetitions in R (Selig & Preacher, 2008). This approach calculates bias-corrected confidence intervals (CI) to estimate the conditional indirect effects.

Multi-level CFA results

We conducted multi-level CFA using Mplus 8.1 (Dyer et al., 2005) to examine the discriminant validity of the constructs, which included leader critical thinking, employee IVT-SDS, voice efficacy, employee silence frequency and employee voice quality. Multi-level CFA allows for the simultaneous examination of the factor structure of the constructs, both within and between levels (Dyer et al., 2005). Given that the ratio of the sample size to the number of estimated parameters at Level 2 fell below the recommended level (5:1; Bentler & Chou, 1987; Tang et al., 2022), we followed Landis et al.'s (2000) advice on parcel scales for constructs with more than six items. Scholars have suggested that a larger number of items decreases the sample size to the estimated parameter ratio, which 'can cause parameter instability related to the presence of multiple solutions, correlated residuals, and cross-loadings, and increased standard errors' (Grant & Berry, 2011, p. 84; also see Little et al., 2013). When complex models are involved, 'using parcels can improve model convergence and model stability' (Little et al., 2013, p. 24). Indeed, when we conducted CFA without parcelling, the model did not converge. Therefore, we proceeded with parcelling.

Specifically, we assigned the 10 items of leader critical thinking to five parcels (indicators), following the item-to-construct-balance method suggested by Little et al. (2013). We parcelled the items with the highest and lowest loadings into the first parcel, items with the second-highest and second-lowest loadings into the second parcel, items with the third-highest and third-lowest loadings into the third parcel and so on. We also parcelled the 12 employee voice quality items into four indicators based on

four conceptual dimensions (Brykman & Raver, 2021). By default, we set the factor loading of the first indicator of the latent variables to 1, whilst setting the error terms both within and between levels as independent.

The results indicated that the five-factor model ($\chi^2=647.48$, $df=388$, $\chi^2/df=1.67$, CFI=.92, TLI=.91, RMSEA=.05, SRMR_{within}=.06, SRMR_{between}=.12) fit the data better than did the alternative models (Table 1). The five-factor model had CFI and TLI values greater than .90, RMSEA less than .06, SRMR_{within} less than .08 (Hu & Bentler, 1999) and SRMR_{between} less than .14 (Hsu et al., 2015). The SRMR_{between} value was comparable to that in other published studies (Chong et al., 2020; Hoffman et al., 2011). Overall, the model had an acceptable fit to the data, supporting the distinctiveness of the constructs.

Hypothesis testing results

Table 2 shows the means, standard deviations (SDs), correlations and scale reliabilities.

Table 3 presents the multi-level analysis results. Hypothesis 1 stated that leader critical thinking is positively related to employees' IVT-SDS. The results of Model 2 in Table 3 suggest a positive relationship ($\gamma=.40$, $SE=.15$, $p=.007$). Therefore, Hypothesis 1 was supported.

Hypothesis 2 stated that employee voice efficacy moderates the relationship between employee IVT-SDS and voice quality such that the relationship is positive when employee voice efficacy is high rather than low. The results suggest that employee IVT-SDS was not significantly related to employee voice quality (Model 4 in Table 3: $\gamma=.32$, $SE=.24$, $p=.18$). The interactive was positive (Model 5 in Table 3: $\gamma=1.68$, $SE=.77$, $p=.03$), supporting Hypothesis 2. We followed Aiken and West's (1991) procedure to conduct a simple slope test and plot the interactions in Figure 4a. The results of the simple slope test support Hypothesis 2. The relationship between employee IVT-SDS and employee voice quality was positive ($\gamma=1.11$, $SE=.47$, $p=.02$, 95% CI=[.20, 2.03]) when employee voice efficacy was high (1 SD above the mean), but not significant ($\gamma=-1.04$, $SE=.63$, $p=.10$, 95% CI=[-2.28, .20]) when employee voice efficacy was low (1 SD below the mean). The difference between these two effects was significant (difference = 2.15, $SE=.99$, $p=.03$, 95% CI=[.21, 4.09]).

Hypothesis 3 proposed a moderating role of employee voice efficacy in the relationship between employee IVT-SDS and employee silence frequency, such that the relationship is more positive when

TABLE 1 Results of confirmatory factor analysis in Study 2.

Models	χ	df	χ^2/df	CFI	TLI	RMSEA	SRMR _{within}	SRMR _{between}
Model 1: Five-factor model	647.48	388	1.67	.92	.91	.05	.06	.12
Model 2: IVT-SDS and employee silence combined into one factor	1147.36	395	2.90	.76	.73	.08	.10	.15
Model 3: IVT-SDS and voice efficacy combined into one factor	980.26	395	2.48	.81	.79	.07	.12	.29
Model 4: IVT-SDS, voice efficacy and employee silence combined into one factor	1502.34	400	3.75	.65	.61	.10	.18	.33

Note: N=286 subordinates and 77 branch leaders.

Abbreviation: IVT-SDS, implicit voice theory of the need for solid data or solutions.

TABLE 2 Means, standard deviations and correlations amongst variables in Study 2.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Level 1 (N=286)																	
1. Employee gender	.65	.48															
2. Employee age	31.17	11.34	-.03														
3. Employee education	.04	.18	.14*	-.08													
4. Leader–employee tenure	2.83	3.91	.20**	.40**	-.07												
5. Employee critical thinking	4.83	.70	.12*	.03	.04	.06	(.77)										
6. Psychological safety	5.06	1.03	-.60	.05	.05	.02	.32**	(.78)									
7. Growth mindset	4.13	.93	.50	.02	.07	.02	-.03	.02	(.83)								
8. Employee IVT-PTI	4.29	1.17	.12*	.01	.08	-.03	.10	-.04	-.01	(.76)							
9. Employee IVT-DBBU	3.97	1.25	.05	-.02	.04	-.02	.09	-.01	.00	.50**	(.76)						
10. Employee IVT-NCCV	3.74	1.27	-.00	-.06	.06	.05	.09	-.07	.00	.45**	.52**	(.76)					
11. Employee IVT-DEBP	4.85	1.04	.07	.06	-.00	.07	.26**	.20**	.01	.28**	.45**	.25**	(.77)				
12. Employee IVT-SDS	4.59	.72	.05	-.05	.06	-.06	-.01	-.13**	.05	.57**	.48**	.42**	.26**	(.73)			
13. Employee voice efficacy	4.79	.64	-.04	.02	.02	-.02	-.03	-.11	.04	.03	.06	.05	-.11	.07	(.89)		
14. Employee voice quality	4.93	1.24	-.01	.08	.05	.04	.08	-.06	-.05	.11	.08	.04	-.01	.09	.16**	(.96)	
15. Employee silence frequency	3.75	1.16	.07	-.05	.12*	.03	-.01	-.12*	-.09	.27**	.25**	.22**	.10	.42**	.07	-.11	(.92)
Level 2 (N=77)																	
1. Leader gender	.65	.48															
2. Leader age	33.57	9.34	.29*														
3. Leader education	.05	.22	-.07	-.07													
4. Leader narcissism	4.25	.94	-.07	.11	.17	(.88)											
5. Leader openness	5.41	.69	.10	.16	.16	.09	(.86)										
6. Leader critical thinking	4.89	.48	.12	.10	.21	.12	-.06	(.71)									

N=77: N=286 subordinates and 77 branch leaders; Reliability estimates (coefficient alpha) are on the diagonal. Gender: 0 = female, 1 = male. Education level: 0 = below bachelor's degree, 1 = bachelor's degree or above. Abbreviations: DBBU, do not bypass the boss upward; DEBP, negative career consequences of voice; IVT-SDS, implicit voice theory of the need for solid data or solutions; NCCV, do not embarrass the boss in public; PTI, presumed target identification.

* $p < .05$. ** $p < .01$ (two-tailed).

TABLE 3 Results of multilevel analyses in Study 2.

Variable	Employee IVT-SDS		Employee voice quality			Employee silence frequency				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Control variables										
Employee gender	.00 (.08)	-.01 (.08)	-.16 (.15)	-.16 (.15)	-.16 (.15)	-.15 (.15)	-.02 (.12)	-.02 (.12)	-.02 (.12)	-.02 (.12)
Employee age	-.00 (.00)	-.00 (.00)	-.01 (.01)	-.01 (.01)	-.01 (.01)	-.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)
Employee education	-.13 (.09)	-.10 (.08)	.01 (.17)	.01 (.17)	-.00 (.15)	-.01 (.16)	.49 (.29)	.50 (.29)	.49 (.29)	.50 (.29)
Leader–employee tenure	.00 (.01)	.00 (.01)	.07** (.02)	.07** (.02)	.07** (.02)	.07** (.02)	.00 (.02)	.00 (.02)	.00 (.02)	.00 (.02)
Employee critical thinking	-.07 (.04)	-.07 (.04)	.07 (.09)	.07 (.09)	.07 (.09)	.07 (.09)	-.01 (.10)	-.01 (.10)	-.01 (.10)	-.01 (.10)
Psychological safety	-.05 (.03)	-.05 (.04)	-.01 (.10)	-.01 (.10)	-.01 (.10)	-.01 (.10)	-.14 (.08)	-.14 (.08)	-.14 (.08)	-.14 (.08)
Growth mindset	.07** (.03)	.07** (.03)	-.02 (.08)	-.02 (.08)	-.02 (.08)	-.02 (.08)	-.04 (.05)	-.04 (.05)	-.04 (.05)	-.04 (.05)
Employee IVT-PTI	.22** (.03)	.22** (.03)	.05 (.08)	.05 (.08)	.05 (.08)	.05 (.08)	.07 (.06)	.07 (.06)	.07 (.06)	.07 (.06)
Employee IVT-DBBU	.03 (.03)	.03 (.03)	.09 (.08)	.09 (.08)	.09 (.08)	.09 (.08)	-.01 (.05)	-.01 (.05)	-.01 (.05)	-.01 (.05)
Employee IVT-NCCV	.05* (.02)	.05* (.02)	-.05 (.07)	-.05 (.07)	-.05 (.07)	-.05 (.07)	.06 (.04)	.06 (.04)	.06 (.04)	.06 (.04)
Employee IVT-DEBP	.09* (.04)	.09* (.04)	-.03 (.09)	-.03 (.09)	-.03 (.09)	-.03 (.09)	.13* (.06)	.13* (.06)	.13* (.06)	.13* (.06)
Leader gender	-.05 (.15)	-.09 (.14)	.23 (.23)	.22 (.23)	.26 (.22)	.13 (.23)	-.08 (.25)	-.11 (.26)	-.02 (.23)	.11 (.24)
Leader age	-.01 (.01)	-.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)	-.02 (.01)	-.02 (.01)	-.01 (.01)	-.01 (.01)
Leader education	.09 (.17)	-.12 (.16)	-.07 (.55)	-.13 (.56)	-.02 (.52)	.19 (.40)	-.02 (.40)	-.18 (.39)	.03 (.31)	-.23 (.21)
Leader narcissism	-.01 (.09)	-.02 (.09)	-.07 (.09)	-.07 (.10)	-.08 (.09)	-.15 (.09)	-.00 (.13)	-.02 (.13)	-.00 (.11)	.08 (.11)
Leader openness	-.08 (.10)	-.05 (.09)	-.01 (.17)	-.00 (.17)	.07 (.18)	.05 (.18)	-.32* (.16)	-.30 (.16)	-.22 (.20)	-.19 (.18)
Main variables										
Leader critical thinking		.40** (.15)		-.29 (.21)	-.33 (.24)	-.21 (.23)		.49 (.27)	.15 (.32)	.02 (.30)
Employee IVT-SDS					.32 (.24)	.04 (.25)			.94** (.32)	1.23** (.31)
Voice efficacy (VE)					.45 (.30)	.24 (.27)			.22 (.31)	.45 (.23)
Employee IVT-SDS × VE						1.68* (.77)				−1.73** (.67)
Residual Variance-Level 1	.20** (.03)	.20** (.05)	1.03** (.13)	1.03** (.13)	1.03** (.13)	1.03** (.13)	.54** (.07)	.54** (.07)	.54** (.07)	.53** (.07)
Residual Variance-Level 2	.23** (.06)	.20** (.04)	.41 (.10)**	.41 (.10)**	.34 (.10)**	.19 (.11)	.66** (.10)	.64** (.10)	.45 (.13)**	.26 (.14)

Note: N = 286 subordinates and 77 branch leaders; unstandardized coefficients were reported. Values in parentheses are standard errors. Abbreviations: DBBU, do not bypass the boss upward; DEBP, negative career consequences of voice; IVT-SDS, implicit voice theory of the need for solid data or solutions; NCCV, do not embarrass the boss in public; PTI, presumed target identification. * $p < .05$. ** $p < .01$.

employee voice efficacy is low rather than high. The results suggest that employee IVT-SDS had a positive relationship with employee silence frequency (Model 7 in Table 3: $\gamma = .94$, $SE = .32$, $p = .00$). The interaction was negative (Model 8 in Table 3: $\gamma = -1.73$, $SE = .67$, $p = .01$), suggesting that employee IVT-SDS led to lower employee silence frequency under higher employee voice efficacy. Hence, Hypothesis 3 was supported. The simple slope test and interaction plot depicted in Figure 4b further support Hypothesis 3. The relationship between employee IVT-SDS and employee silence frequency was not significant when employee voice efficacy was high ($\gamma = .12$, $SE = .52$, $p = .82$, 95% CI = [-.89, 1.13]), but the relationship was positive when employee voice efficacy was low ($\gamma = 2.33$, $SE = .53$, $p = .00$, 95% CI = [1.28, 3.38]). The difference between these two effects was significant (difference = -2.21, $SE = .85$, $p = .01$, 95% CI = [-3.88, -.54]).

Hypothesis 4 stated that employee voice efficacy moderates the indirect effect of leader critical thinking on employee voice quality via employee IVT-SDS, such that it is more positive when employee voice efficacy is high. We conducted a Monte Carlo simulation (5000 replications) to produce a 95% bias-corrected CI for the indirect effects. The results in Table 4 support Hypothesis 4. The indirect effect of leader critical thinking on employee voice quality via employee IVT-SDS was positive when employee voice efficacy was high (indirect effect = .45, 95% CI = [.07, .89]), and not significant when employee voice efficacy was low (indirect effect = -.42, 95% CI = [-.95, .08]). The difference between the two indirect effects was significant (indirect effect difference = .87, 95% CI = [.08, 1.75]).

Hypothesis 5 proposed the moderating role of employee voice efficacy in the indirect relationship between leader critical thinking and employee silence frequency via employee IVT-SDS, such that it is more positive when employee voice efficacy is low but not high. The results in Table 4 support

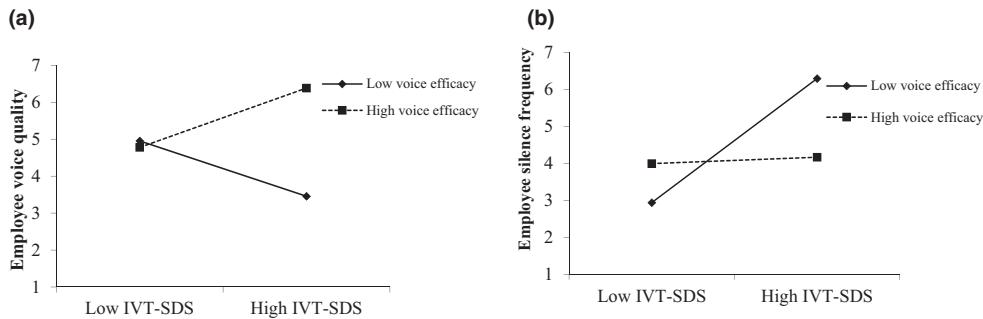


FIGURE 4 (a) Relationship between employee IVT-SDS and voice quality under high and low employee voice efficacy in Study 2. (b) Relationship between employee IVT-SDS and silence frequency under high and low employee voice efficacy in Study 2.

TABLE 4 The results of indirect and conditional indirect effects in Study 2.

Moderator: Employee voice efficacy	Indirect effect	95% CI
Leader critical thinking to employee IVT-SDS to employee voice quality		
High	.45	[.07, .89]
Low	-.42	[-.95, .08]
Difference	.87	[.08, 1.75]
Leader critical thinking to employee IVT-SDS to employee silence frequency		
High	.05	[-.037, .45]
Low	.94	[.48, 1.48]
Difference	-.89	[-1.68, -.21]

Note: N = 286 subordinates and 77 branch leaders; unstandardized coefficient were reported.
Abbreviation: IVT-SDS, implicit voice theory of the need for solid data or solutions.

Hypothesis 5. The indirect effect of leader critical thinking on employee silence frequency via employee IVT-SDS was not significant when employee voice efficacy was high (indirect effect = .05, 95% CI = [-.37, .45]) but positive when employee voice efficacy was low (indirect effect = .94, 95% CI = [.48, 1.48]). The difference between these two indirect effects was also significant (indirect effect difference = -.89, 95% CI = [-1.68, -.21]).

We also conducted an analysis without controls, for parsimony. The results without controls are reported in Appendices S3-1 and S3-2. We also report the results with controls that were significantly related to one or more of our outcome variables in Appendices S4-1 and S4-2. Our hypotheses remained supported.

GENERAL DISCUSSION

In this study, we found that leader critical thinking was positively related to employee IVT-SDS. Moreover, employee IVT-SDS was positively related to employee voice quality when employee voice efficacy was high rather than low, and to employee silence frequency when employee voice efficacy was low rather than high. Employee voice efficacy further moderated the indirect effect of leader critical thinking on employee voice quality via employee IVT-SDS, such that it was more positive at high rather than low employee voice efficacy. Employee voice efficacy also moderated the indirect relationship between leader critical thinking and employee silence frequency via employee IVT-SDS, such that it was more positive at high rather than low employee voice efficacy.

Although we did not hypothesize this, we noted that employee IVT-SDS was positively related to employee silence frequency, but not significantly related to employee voice quality. This implies that although employees with IVT-SDS could still voice ideas at times, they withheld concerns and ideas more frequently. However, employee IVT-SDS alone was insufficient to significantly boost the quality of voiced ideas. Voiced ideas were of a higher quality for employees with both IVT-SDS and high voice efficacy. Next, we discuss the theoretical and practical implications of this study.

Theoretical implications

First, we highlight the potential tradeoff between employee voice quantity and quality and the role of leader critical thinking in this tradeoff. The bulk of the literature has focused on employee voice quantity (Carnevale et al., 2020; Duan et al., 2021; King et al., 2019; Liu et al., 2015; Tangirala & Ramanujam, 2012), paying little attention to employee voice quality. Amongst the few extant studies, scholars have discussed the factors that promote voice quality (e.g., working memory capacity can predict employees' voice quality; Wolsink et al., 2019). These findings are incomplete at best and misleading at worst, because a variable may influence voice quantity but not quality, and vice versa. We provided new insight by revealing that leader critical thinking increased employee silence by fostering employee IVT-SDS and that this effect was even stronger when employee voice efficacy was lower. This finding suggests that leader critical thinking constrains the quantity of voice, especially when voice efficacy is low, by fostering employee IVT-SDS. This aligns with established research indicating that employees make decisions about voicing their opinions based on a careful calculation of costs and benefits (Detert & Edmondson, 2011; Seibert et al., 2001), including whether the content of voice meets the expectations of critical leaders. On the other hand, leader critical thinking did not significantly increase employee voice quality via employee IVT; it did so when an employee's voice efficacy was high. Therefore, we extend the voice literature by highlighting a new direction, focusing on the quantity versus quality of employee voice and the role of the leader in this tradeoff.

Second, we extend the research on leader critical thinking using employee voice as a specific outcome. Previous research has primarily focused on the positive aspects of leader critical thinking,

such as high strategic thinking competency (Dragoni et al., 2011) and little is known about employee voice-related responses to leaders with critical thinking. We expand on the extant research on the outcomes of leader critical thinking to include employee voice quality and silence frequency. Doing so also provided a novel insight, that is, leader critical thinking has a downside – it can lead to the more frequent suppression of concerns and suggestions via IVT-SDS, especially when an employee has low voice efficacy, and hence alters the prevailing positive view of leader critical thinking. Furthermore, our study of leader critical thinking and employee silence provides further insight. Previous research on employee silence has primarily investigated the effect of negative or dark leadership (e.g., abusive leadership; Lam & Xu, 2019; Xu et al., 2015), paying little attention to the role of positively viewed leader attributes. Extending this research direction, we revealed that a positively viewed leader characteristic, such as leader critical thinking, can also lead to employee silence (via employee IVT-SDS), especially when employees have low voice efficacy. To summarize, we challenge the one-sided view that leader critical thinking is positive by providing the new insight that it has an unintended negative side (i.e., increasing employee silence frequency by fostering employee IVT-SDS under certain conditions).

Finally, we extended the research on employee IVT. Detert and Edmondson (2011) developed five IVTs based on motivation for self-protection and called for research to examine each specific IVT. We focused on IVT-SDS and advanced it in three respects. First, we note that prior work has primarily focused on the big five personality traits of leaders as predictors of employee IVTs (Knoll et al., 2021), with less attention paid to the role of leader critical thinking. More importantly, with a focus on the risk of speaking up, obviously IVT should increase employee silence. Focusing on employee IVT-SDS and moving beyond employee silence, we demonstrated the potential benefits of IVT for employee voice quality, especially for those with high voice efficacy. By introducing both employee silence and voice quality, we incorporated a quantity–quality distinction and revealed the two-sided nature of IVT. Finally, we extended knowledge of IVT by demonstrating that employee IVT-SDS leads to different voice-related responses. Detert and Edmondson (2011) found no evidence that the effect of employee IVT on silence can be moderated by contextual variables (i.e., organizational centralization and leader openness). We revealed that high voice efficacy has the power to shift the function of IVT-SDS from suppressing ideas to encouraging high-value suggestions. In contrast, under low voice efficacy, employees with IVT-SDS opt for silence more frequently because they do not believe that they have the necessary capability to produce the high-quality voice expected by leaders (Kish-Gephart et al., 2009; Morrison et al., 2011). Therefore, we provide a new perspective on the boundary conditions for employee IVT-SDS and voice-related response strategies.

Managerial implications

As critical thinking can help leaders identify effective solutions or suggestions, organizations should strengthen their training in critical thinking. Leaders must use critical thinking, such as analysis, reasoning, questioning and evaluation, to identify effective solutions for business development. Our study shows that beyond the leader's effective decision-making, critical thinking also has the potential to enhance employee voice quality (by fostering employee IVT-SDS) when employee voice efficacy is high. However, organizations should be aware that leader critical thinking leads to greater employee silence frequency by fostering employee IVT-SDS, particularly when employee voice efficacy is low. Although it is discouraging that employee IVT-SDS increases the frequency of employee silence, this effect does not occur when employee voice efficacy is high. An important practical recommendation is that organizations should develop and strengthen employee voice efficacy simultaneously, as they build leader critical thinking. Doing so can enable organizations to reap the greatest benefits from leader critical thinking and the resulting employee IVT-SDS (i.e., increasing voice quality but not silence frequency).

Limitations and directions for future research

Our study has several limitations. First, although we showed employee voice efficacy to be an important moderator, there may be other moderators from other theoretical perspectives. For example, Tangirala and Ramanujam (2008) indicated that procedural justice climate – a context favourable for speaking up – could influence the effect of individual-level antecedents on employee silence. Future research should examine whether procedural justice climate moderates the effects of employee IVT-SDS on the frequency of silence and voice quality.

Second, in Study 2, we used frontline or first-level teams in which team leaders and members were relatively similar in age and education. These sample characteristics may have made our test more conservative. When leaders are older and more educated, they may hold even higher status and respect. Consequently, leader attributes such as critical thinking should be even more influential in shaping employee IVT-SDS, which, in turn, influences their voice outcomes. We encourage future research to replicate our findings using other teams in different organizational settings.

Finally, we conducted the study in China, which may have limited the generalizability of our findings. Although Chinese culture is changing, it has traditionally been characterized by high power distance (Farh et al., 2007). Due to the greater power of a leader, leaders with critical thinking skills may be particularly potent at inducing employee silence frequency through employee IVT-SDS. However, high power-distance settings exist even in low power-distance cultures, and our findings can be generalized to these settings. Nevertheless, future research should test our model in low power-distance cultures.

CONCLUSION

In conclusion, employee IVT-SDS increases employee silence frequency, and this effect is stronger under low employee voice efficacy. It only boosts employee voice quality when employee voice efficacy is high. By extension, leader critical thinking also has two sides to employee voice-related behaviours because it fosters employee IVT-SDS. We highlight the voice quantity-quality tradeoff as well as both the positive and negative sides of leader critical thinking and employee IVT in this tradeoff. We encourage more research to incorporate this tradeoff and examine the two-sided roles of leaders and employee beliefs in employee voice-related behaviours.

AUTHOR CONTRIBUTIONS

Jing Jiang: Conceptualization; methodology; investigation; funding acquisition; writing – original draft; writing – review and editing. **Yaping Gong:** Validation; supervision; writing – review and editing; methodology; resources. **Yanan Dong:** Conceptualization; methodology; investigation; writing – original draft; writing – review and editing. **Yi Han:** Validation; investigation; resources; writing – review and editing. **Yu Qin:** Investigation; validation.

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CONFLICT OF INTEREST STATEMENT

All authors do not have any conflict of interest in conducting the research.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1–S4.

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