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Within digital collaborative teams, how can leaders promote productive knowledge sharing among members with diverse settings?

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Abstract

Although value networks and virtual cross-functional teams, which serve as examples of digital collaborative organizations in the digital economy, have grown in popularity, few studies have looked at knowledge sharing in these teams. Yet lack of knowledge sharing can hurt teamwork and value creation.

So, this study integrates transactional theory of stress and coping and self-determination theory into the stimulus-organism-response model to better understand the mechanisms. We conducted an empirical analysis after surveying of 386 participants from 49 digital collaboration teams in 27 service and industrial firms.

The results indicate that the basic psychological needs and both coping strategies together mediate the correlation between diversity-oriented leadership and organizational knowledge sharing. Surprisingly, competence and autonomy needs satisfaction are necessary for organizational knowledge sharing, while perceived relatedness needs satisfaction is the icebreaker for organizational knowledge sharing.

Keywords Digital collaborate teams, Knowledge sharing, Diversity-oriented leadership, Coping strategies, Basic psychological needs

1 Introduction

The digital economy has become an important catalyst for economic expansion and an inevitable trend for social progress (Li et al. 2020). The growth of digital collaborative organizations has grown rapidly due to the need for flexible communications and cross-functional cooperation. These organizations, represented by virtual cross-functional teams and enterprise value networks, have become important organizational structures in the digital economy. The COVID-19 pandemic has accelerated the trend of digital collaboration, and this form of organization is widely used. However, the problem of inefficient collaboration due to the lack of interaction and knowledge sharing is becoming more and more prominent, except for the study by Pinjani and Palvia (2013), yet few studies have focused on the knowledge sharing among members with diverse backgrounds in digital collaborative teams. However, rapid response and efficient operation are two important factors for the survival of enterprises in the digital economy (Li et al. 2016; Petrenko 2022). For example, in some collaboration scenarios that require interactive communication, annotation, and modification, such as proposals and review meetings, the lack of interaction and knowledge-sharing can lead to a decline in collaborative efficiency (Ho and Ganesan 2013), decision-making (Chen et al. 2014) and can even lead to missed opportunities (Chedid et al. 2020). Therefore, how to attract and maintain members' participation and promote knowledge sharing has become the focus of many business managers' thinking.

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Previous scholarly investigations on knowledge sharing have yielded valuable outcomes, thus bearing significance for the advancement of the present study. Upon conducting an extensive review of the pertinent literature, it is our contention that further enhancement of the existing research is warranted. First, in the current era of the digital economy, which is marked by major changes in organizational structures, there hasn't been much research done on the reasons why members of digitally collaborative teams from diverse backgrounds don't share enough knowledge (as shown in Table 1). Second, existing research fails to adequately explain how external factors influence individuals' knowledge-sharing behavior through their internal states (Carter and Scarbrough 2001; Voelpel et al. 2005). Without understanding this mechanism, it is difficult to develop effective interventions, resulting in higher activation costs. Third, the concept of knowledge sharing as a holistic concept has it been comprehensively studied. Nevertheless, the academic community has paid scant regard to the various subcategories of knowledge sharing (For example, explicit knowledge, tacit knowledge, etc.). It is crucial to understand that knowledge sharing is a complex process influenced by various antecedents and consequences. Therefore, interventions formulated to enhance knowledge sharing may ineffective if they do not adequately differentiate between the different subcategories or dimensions of knowledge sharing.

Hence, to efficiently address the above issues, a conceptual framework was developed for this research, drawing upon the stimulus-organism-response (SOR) model as a theoretical framework (for further elaboration, please see Sect. Stimulus-organism-response model). Considering the diversity of digital collaborative team members' backgrounds and the significant impact of team leaders on members, we put diversity-oriented leadership as "stimulus" factor. To provide more insights into how external environmental factors act on an individuals' internal state, we integrated transactional theories of stress and coping with self-determination theory and then put the satisfaction of three basic psychological need-coping

strategies as "organism" factor. Organizational knowledge sharing is a subdivided type of knowledge sharing, and considering that organizational knowledge sharing enables employees to gain access to a wider range of information and expertise, which leads to a more holistic problem-solving and decision-making process, this study put organizational knowledge sharing as a "response" factor. This study aims to fill the gaps in existing theoretical research and contribute to the development of interventions that effectively address the lack of organizational knowledge sharing that exists in digital collaborative teams in order to improve teamwork efficiency and integrate innovation.

2 Literature review
2.1 Diversity and virtuality are key features of digital collaborative organizations
Digital communication technologies have triggered a change in the way organizations cooperate and communicate (Hanelt et al. 2021). One emerging organizational structure that capitalizes on this trend is the digital collaboration team, which aims to enhance collaboration, communication, integration, and value creation across diverse functional domains within or between organizations. Digital collaboration team refers to the organizational form structure wherein cross-functional collaboration occurs through interdependent tasks, guided by a shared objective and facilitated by digital communication technology.

There are two primary types of digital collaboration teams. The first type is the virtual cross-functional team, which operates within an organizational framework. The second type is the digital enterprise value network, which is prevalent in the digital supply chain management of enterprises. Virtual cross-functional teams are typically comprised of individuals with different expertise and competencies in different functional domains who rely on digital technologies to address and solve specific problems or challenges through collective collaboration. An example of this is the enterprise digital transformation team, which consists of people with different functional

Table 1 Knowledge sharing research related to virtual workplaces and team member diversity

Diversity Virtually	Members with Non-Diverse Settings	Members with Diverse Settings
Non-virtual Workplace	● Pradhan et al. (2023) ● Yi (2009) ● Zeb et al. (2020) ● Bock et al. (2005)	● Mathuki and Zhang (2022) ● Hou et al. (2021) ● Sawan et al. (2021)
Virtual Workplace	● Ko and Wei (2021) ● Pangil and Moi Chan (2014) ● Bi and Cao (2022)	● Pinjani and Palvia (2013)

backgrounds, including project leaders, strategists, risk managers, human resources professionals, operations specialists, IT staffs, finance specialists, external consultants, and industry experts (Yu 2019), who generally communicate through a blend of online and offline methods. Digital enterprise value networks are used in supply chain management, collaborative innovation, ecosystem development, customer relationship management, and business model innovation. Digital enterprise value networks a holistic view of company relationships and interactions, improving decision-making and value creation. The value network of mobile phone companies like Apple, Huawei, and Xiaomi includes semiconductors, LCD panels, cameras, batteries, casings, foundries, shipping businesses, e-commerce platforms, and other external organizations (Yu 2019). The enterprises in this network operate autonomously, but their operations, people, and information systems are well integrated, creating an efficient entity.

Digital collaborative teams are characterized by two primary features: the virtual nature of their working environment and the diversity of their members' settings. Digital collaboration teams are generally composed of professionals originating from a variety of departments and professional disciplines. The heterogeneity of the team members' backgrounds often engenders a multiplicity of perspectives, skills, and experiences. This diversity fosters a comprehensive understanding of intricate issues, enhances problem-solving capabilities, promotes agility within the organization, and facilitates the development of a wider range of skills (Lattimer 1998). Diversity can be categorized in three different ways: demographic diversity, cultural diversity and functional diversity. Demographic diversity includes gender, age, nationality, etc. Cultural diversity includes differences in individual values, beliefs, practices, mindsets, perspectives, and behaviors. Functional diversity refers to the differences in skills, job seniority, and attributed functions of team members (Lattimer 1998). The predilection for virtual workplaces among digital collaborative teams is escalating due to its benefits in terms of flexibility, cost-effectiveness, and swift responsiveness (Antoni 2023).

However, the diversity of team members and the virtuality of the workplace bring challenges to effective communication and team collaboration. Misunderstandings and breakdowns in discussion can arise throughout the communication process among cross-functional teams due to the diverse functional backgrounds and use of distinct terminology by team members (Henke et al. 1993). Also, individuals within cross-functional teams frequently possess divergent objectives, priorities, and viewpoints, so impeding the process of reaching consensus and making decisions (Henke et al. 1993). Additionally, the virtual workplace can also present challenges. This

is because a lack of face-to-face interaction may hinder trust-building, effective communication, and knowledge sharing (Gibson and Cohen 2003).

Insufficient knowledge sharing can impede efficient coordination and hinder the integration of values. A comprehensive review of the literature on knowledge sharing reveals that some studies concentrate solely on the diversity of members' backgrounds, such as Mathuki and Zhang (2022), Hou et al. (2021), and Sawan et al. (2021). Other studies have focused on the virtuality of the workplace, such as Ko and Wei (2021), Pangil and Moi Chan (2014), and Bi and Cao (2022). In addition, some studies neither involve the diversity of member background nor deal with the virtuality of the workplace, such as Pradhan et al. (2023), Yi (2009), Zeb et al. (2020) and Bock et al. (2005). Only a limited number of studies have examined knowledge sharing among diverse members of the virtual workplace, such as Pinjani and Palvia (2013). Pinjani and Palvia (2013) demonstrated that deep-level diversity (e.g., differences in attitudes, values, and preferences) is more closely associated with team mutual trust and knowledge-sharing processes than visible functional-level diversity (e.g., age, gender, or ethnicity). However, due to theoretical limitations, Pinjani and Palvia's (2013) study fails to adequately explain how external factors influence individuals' knowledge-sharing behaviors through an individuals' internal states to impact their knowledge-sharing behaviors. As shown in Table 1.

3 Theoretical background and hypotheses
3.1 Stimulus-organism-response model
The SOR model, which establishes a connection between stimulus and response while incorporating the organism as a mediating variable, offers valuable theoretical underpinnings for comprehending the inherent mechanisms through which individuals' behavior emerges. Numerous studies have used the SOR model to study individuals' behaviors, including consumer behavior (Kim et al. 2020; Liu and Zheng 2019), organizational behavior (Al-Alsaggaf and Basaffar 2022; Verma 2020) and health behavior (Yang et al. 2021). The study employed the SOR model as well, but it differs from other studies in certain aspects.

Diversity-oriented leadership as "stimulus". This is due to the consideration of the diversity of cross-functional team members and the significant impact of team leadership on individuals' behavior. Diversity-oriented leaders recognizes the importance of members with diversity setting and actively seeks to create an inclusive, fair and equitable workplaces where individuals from different backgrounds and perspectives are valued and respected, and actively encourage collaboration and teamwork among individuals with different backgrounds and experiences. By incorporating diverse

perspectives and experiences, diversity-oriented leadership enhances the quality of decision-making and problem-solving within the corporate value network.

The satisfaction of three basic psychological needs and two coping strategies together as "organism". Organism is the internal mental state of individual, including sensory, emotional, and cognitive experiences. The previous studies have identified trust (Tamjidyamcholo et al. 2013) and self-efficacy (Chen et al. 2012; Yilmaz 2016) as significant determinants that impact the process of individuals' knowledge sharing, but we believe that these single factors are not sufficient to account for the complex psycho-cognitive processes. Therefore, based on the transactional theory of stress and coping, this study divided organismic factors into two parts: the primary cognitive appraisal and the secondary cognitive appraisal. We used the three basic psychological needs mentioned in self-determination theory to measure the first cognitive appraisal, environmental stimuli determine the level of satisfaction of these basic psychological needs, and the first cognitive appraisal as psychosocial resources to influence the second cognitive appraisal. The secondary cognitive appraisal is mainly concerned with content related to the individuals' choice of coping strategies (e.g., choosing to approach or avoid, etc.). In the current study, control coping and escape coping were used. We believe that the hierarchical composite structure of "basic psychological needs fulfillment-coping strategies" considered as an "organism" in this study can explain the individuals' psychological decision-making mechanism in a more complete way compared to single factors such as trust and self-efficacy.

Organizational knowledge sharing as "response". Organizational knowledge sharing, one of the four forms of knowledge sharing, is the more formalized kind, such as sharing professional judgments, opinions, and insights at regular gatherings like conferences, seminars, talks, and presentations (Yi 2009). Members who engage in organizational knowledge sharing tend to be confident, energetic, enthusiastic, and collaborative. Organizational knowledge sharing gives employees access to a wider range of information and expertise, leading to more holistic problem-solving and decision-making processes. In addition, when employees feel valued and experience a sense of fun and accomplishment in the knowledge-sharing process, they are more likely to invest more time and energy in their work. By sharing knowledge with suppliers, customers, and other partners, firms can build stronger relationships and create more value for all parties involved. For example, sharing knowledge about new technologies or best practices can help suppliers to improve their products or services, which can in turn benefit the firm. The conceptual model is shown in Fig. 1. The hypotheses symbols, such as H1, H2, etc., represent the hypotheses that will be presented in later sections of the paper.

3.2 Diversity-oriented leadership that meets basic psychological needs

Gibson and Cohen (2003) noted that the main problem with digital collaborate teams and work is that people can't meet in person. Some members of digital collaborate teams may be less productive or satisfied as a result of their feeling of isolation and disconnection from the team's work and one another (Berry 2011). Some scholars
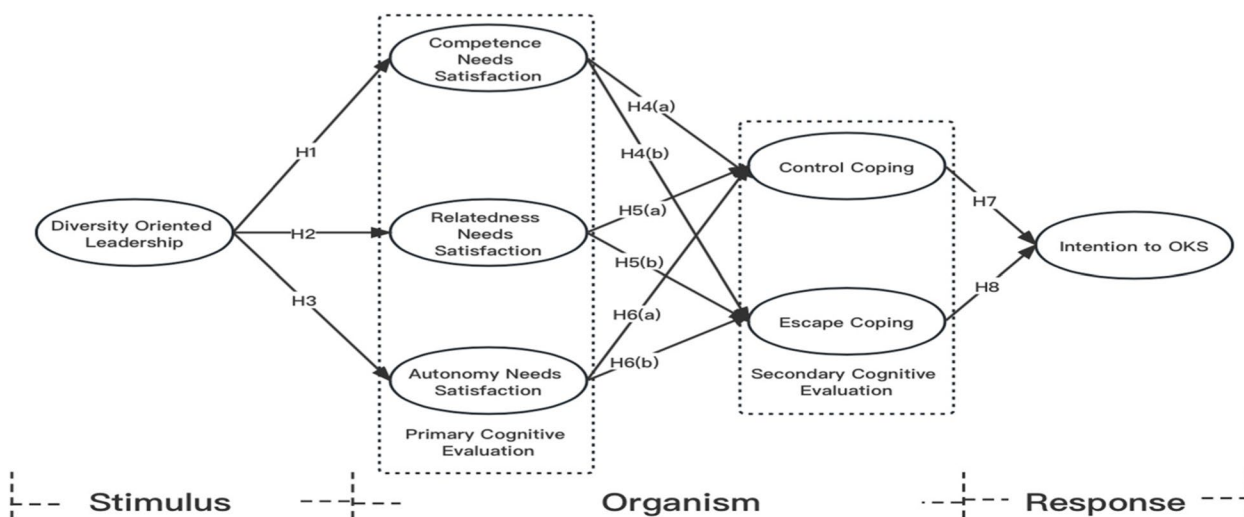

Fig. 1 The conceptual model

have suggested that when employees' basic psychological needs are fulfilled, they experience motivation, optimal development, effective functioning, and good health, rather than feeling isolated or disconnected from others (Kashdan and Rottenberg 2010). The self-determination theory posits that individuals are commonly driven by three basic psychological needs, namely competence, relatedness, and autonomy (Deci et al. 2001b; Ryan et al. 1995). The satisfaction of these basic psychological needs has resemblance to the significance of air, sunlight, and water for individuals' well-being and development (Deci and Ryan 2000). These needs represent the psychological and energetic resources of an individual, and consequently, they significantly influence personal well-being and performance. However, neglecting these needs depletes one's energy reserves, resulting in diminished performance and well-being (Deci and Moller 2005; Deci and Vansteenkiste 2003). When these three psychological needs are satisfied in digital collaborate teams, team members feel safe speaking out without worrying about being disapproved (Lechner and Tobias Mortlock 2022).

Leaders are in a special position to influence their employees' motivation and well-being. According to Bass and Riggio (2006), leadership support, motivation, and positive role modeling can facilitate the satisfaction of basic psychological needs. Intriguingly, studies on leadership reveals, that certain leadership styles are more effective than others at boosting employee motivation and well-being (Yukl and Becker 2006). Previous research has explored the correlation between different leadership styles and knowledge sharing. However, there is a scarcity of studies focusing on diversity-oriented leadership and its impact on knowledge sharing within digital collaborate teams, especially in the context of teams that are inherently diverse and operate in a virtual environment. Therefore, this study employed diversity-focused leadership. As relational leaders, diversity-oriented leaders are open, available, and accessible to team members, listen to employees' needs, and invite followers to express how they feel and their opinions (Carmeli et al. 2010), to promote collaboration among employees, it is imperative to offer constructive feedback, clarification, and invite subordinates to participate in decision-making (Nishii and Mayer 2009), recognize and value the valuable contributions created by team members from varied backgrounds. Diversity-oriented leaders provide fair, free objectives for workers from diverse social groups (Luu et al. 2019). According to Nembhard and Edmondson (2006), the implementation of these constructive initiatives by leaders can foster a sense of validation among team members, leading them to perceive that their opinions and perspectives are being acknowledged. In essence, diverse leaders builds trust and reliability in the workplace by providing equal support, resources, and opportunities to varied social groups (Luu et al. 2019).

Competence refers to the basic needs feel reflectance and mastery (Deci and Moller 2005). In other words, individual want to feel capable of functioning well in their critical life circumstances. In this study, competency needs are defined as the perceived ability of members to handle the challenges they face when interacting with the external environment. Cognitive appraisal theory suggests individuals' innate drive comes from the organism's need for competence and autonomy (Deci and Ryan 2013). External events affect intrinsic motivation by influencing perceived competence through information, and the external information provided can be positive or negative (Reeve and Deci 1996). When external information is positive, external information can increase perceived competence and intrinsic motivation. When negative, external information can reduce or impair perceived competence and intrinsic motivation. Diversity-oriented leaders listen to the needs of employees from different social groups, provide feedback to encourage participation in decision-making, and welcome and recognize the contributions of diverse employees, which contributes to individuals' perceived sense of efficacy. Managers' fair and equitable treatment of employees facilitates the development of a sense of efficacy (Gotsis and Grimani 2016; Guest 2017). Consequently, we put up the following hypotheses:

H1. Diversity-oriented leadership has a positive impact on the satisfaction of competence needs.

When describing interpersonal relationships, relatedness is most often used (Hagerty et al. 1993). Individuals possess inherent and shared needs for feelings of belonging, closeness, connection with others and a yearning to be acknowledged, esteemed by their peers (Hagerty et al. 1993; Ryan and Deci 2017). According to Rouslin (1973), relatedness is the commitment of an individual to establish a connection with another on an emotional, perceptual, and cognitive level. Relatedness can be classified as expressive relatedness or instrumental relatedness (Wynne 1984). And emphasized that the difference between the two is that instrumental relatedness emphasizes association with tasks and goals, and expressive relatedness emphasizes emotions such as sharing meaningful emotions in social interactions, including warmth and affection (Wynne 1984). Leaders who prioritize diversity and inclusion play a crucial role in fostering feelings of belonging within a team. By ensuring that every team member is treated with respect and dignity in their respective positions, these leaders create an environment that is particularly conducive to cultivating a strong sense of belonging (Carmeli et al. 2010; Randel

et al. 2018). Transformational and charismatic leadership have been linked to psychological needs for belonging in previous research (Den Hartog et al. 2007; Hetland et al. 2011). Consequently, we posit the subsequent hypotheses based on the aforementioned argument:

H2. Diversity-oriented leadership has a positive impact on the satisfaction of relatedness needs.

Autonomy refers to the feeling an individual has when his or her actions are motivated by and supported by his or her own volition and will, rather than feeling alienated and coerced (Ryan and Deci 2017). Having a great deal of autonomy in the workplace means giving workers the authority to organize their own time and workload, delegate responsibilities, make decisions, find solutions to issues, and supervise their own work (Kirkman and Shapiro 2001). The self-determination and sense of value of employees are significantly influenced by how leaders behave (Deci and Ryan 2000; Zhang and Chen 2013). For example, by delegating authority to employees, diversity-focused leaders support employees to experience a great deal of autonomy (Nishii and Mayer 2009), allowing them to determine their own work activities (Lee et al. 2021). These diversity-oriented actions provide employees the impression that their interests and independence drive the self-selection of their activities (Lee et al. 2021). This is because the leader's support and assistance helps employees feel empowered and in control of the process and outcome of their work, which contributes to the development of their autonomy and sense of competence (Spreitzer 1996). Hence, we propose the hypotheses as follows:

H3. Diversity-oriented leadership has a positive impact on the satisfaction of autonomy needs.

3.3 Effect of satisfying basic psychological needs on coping strategies

Negative life events may cause stress, so it's important for individuals to evaluate how they're affected, what resources they have, how they're using them, and what coping strategies they plan to use (Tedeschi and Calhoun 2004). Transactional theory of stress and coping proposes an insightful structure to investigate the strategies by which individuals cope with stress. Primary and secondary cognitive appraisal criteria underpin the transactional theory of stress and coping. Appraisal follows a coping process which includes seeking information and interpreting it to improve adaptive responses to stressful situations.

Primary appraisal is judging whether what is happening is worthy of attention and perhaps mobilizing. Put another way, if there is nothing else to take into consideration if the transaction is unrelated to one's wellbeing (Lazarus and Folkman 1987). The secondary appraisal depends on the primary appraisal about the judgment of personal control, and requires an evaluation of individual factors and environmental factors to determine whether action can be taken to change a troubled person-environment relationship (Lazarus and Folkman 1987). People must assess their coping alternatives, select one, then determine how to put that option into action throughout each stressful transaction, which is the secondary appraisal function (Lazarus and Launier 1978).

Coping strategies refer to the cognitive and behavioral strategies employed by individuals to effectively handle internal and external demands that typically exceed their available resources and are perceived as burdensome or stressful (Folkman et al. 1986). Coping strategies are subjectively developed and might exhibit variability based on the specific circumstances and environmental conditions. Three coping mechanisms may be identified: mental and behavioral disengagement, emotion-focused coping, and problem-focused coping (Carver et al. 1989). Problem-focused and emotion-focused coping strategies have been studied extensively (Boyd et al. 2009). For example, this study also employs Latack's (1986) taxonomy of coping strategies utilized in workplace settings, which classifies them into two main types: control coping and escape coping. Control coping involves strategies at the cognitive and behavioral levels that are primarily used to manage, control, and change stressors (Rice 2012). For example, employees adopt a positive, responsible language and attitude (Latack 1986), actively work to address problems, try to produce plans and solutions, and to take action to reduce or remove sources of stress (Fugate et al. 2008). Reducing emotional suffering brought on by stresses is the goal of escape coping. For example, employees try to adopt an escape or avoidance approach, not thinking about the problem, or trying to acknowledge that they have no solution for the problem (Lee et al. 2020). Individuals' experience of stress arises from continuous and interactive processes involving their self and the environment (Lazarus and Folkman 1987). Otherwise put, personal characteristics and environmental factors work together to influence individuals' cognitive evaluation of stress. Individuals must examine their own characteristics and their surroundings in order to select effective coping mechanisms to change stressful situations (Lazarus and Folkman 1987).

According to Ntoumanis et al. (2009) and Skinner and Edge (2002), individual's development and progress depend on their ability to meet their basic psychological needs, which can also predict how they will handle stress. For example, Yeung et al. (2016) suggested that satisfaction with basic psychological needs indicates

individuals' satisfaction with internal personal resources (e.g., competence can indicate an individuals' perceived self-efficacy; autonomy indicates whether behavior is voluntary and autonomous rather than forced) and external interpersonal resources (e.g., Relatedness can reveal how much individuals' satisfaction with the overall character of their social network). There are relatively few studies that examine how the satisfaction of basic psychological needs among organizational members affects their coping strategies. Most of these studies have focused on crisis management within corporations and public health. For example, according to Yeung's et al. (2016) analysis of 454 surveys filled out by college students who had been through traumatic events, satisfying of three basic psychological needs was positively correlated with control coping. Concerning organizational internal crisis management, it has been suggested that when individuals feel autonomous, full of competence, connected to their social environment, and feel accepted and recognized, they tend to conclude that the crisis is manageable and rarely treat it as a threat or damage that will reduce their well-being. Consequently, employees are more inclined to see the crisis they are experiencing as challenging. A crisis assessment reveals that meeting an individuals' basic psychological needs builds confidence in controlling stressful situations and motivates employees to employ control strategies for coping. In contrast, employees will feel a lack of control, powerlessness, and disconnection if the three basic psychological needs are not covered. Therefore, to temporarily separate themselves from the issue and control their emotional anguish, individuals may choose an escape coping strategy (Yeung et al. 2016). According to the interaction ritual chain theory, like the commodity market, there is also an interaction market, where individuals choose satisfying "goods" in the interaction ritual market according to different principles (Collins 2014). No matter what interaction ritual an individual participates in, a certain amount of time and energy is expected to be spent (Collins 2014). The Interaction Ritual Chain Theory argues that the real driver of interaction is emotional energy (Collins 2014). We argue that team members try to avoid or get out of stressful situations as a way to temporarily relieve stress and thus preserve more positive energy. In other words, when individuals find that an uncomfortable situation is difficult to control or difficult to change, individuals become stressed, anxious, powerless, burned out, or even depressed, and these negative emotions can seriously tax individual energy. Therefore, individuals tend to choose the interaction ritual (e.g., escape coping) with the least loss of positive energy and the greatest production, which is an emotional regulation strategy for individuals facing stressful situations. Ataşalar and Michou (2019)

examined the problematic internet usage and coping strategies of teenage students. Findings revealed a favorable correlation between the satisfying of three needs and these students' control cognitive appraisals and a negative correlation with their escape cognitive appraisals (Ataşalar and Michou 2019). Considering that basic psychological needs satisfaction influences coping strategies, we put out the subsequent hypotheses:

> *H4. The satisfaction of perceived competence is positively(a) associated with control coping, but negatively(b) associated with escape coping.*
> *H5. The satisfaction of perceived relatedness is positively(a) associated with control coping, but negatively(b) associated with escape coping.*
> *H6. The satisfaction of perceived autonomy is positively(a) associated with control coping, but negatively(b) associated with escape coping.*

3.4 Employees' coping strategies and organizational knowledge sharing

On the one hand, the effective implementation of control coping strategies requires employees to possess confidence, energy, and enthusiasm. These attributes empower individuals to discern the essential origins of stress, undertake intentional measures to alleviate these problems, and actively pursue avenues for improvement (Srivastava and Tang 2015). For example, these characteristics tend to be exhibited by salespeople who use problem-focused coping as their primary coping strategy: to identify stressors proactively, seek alternatives for problem solving, weigh the costs and benefits of solutions in terms of self and the organization (Srivastava and Tang 2015). Individuals that show significant levels of coping intelligence are inclined to utilize effective tactics in order to effectively handle and alleviate stress, resulting in positive job-related consequences such as heightened emotional involvement (Mueller et al. 1992).

On the contrary, the phenomenon of employees exhibiting passive behaviors in order to avoid, reduce, or distance themselves from difficult conditions is sometimes referred to as "escape coping strategies" (Solove et al. 2015). The utilization of escape strategies for coping might offer momentary alleviation from the emotional anguish brought on by stressors, but they have the potential to impede individuals from effectively confronting or altering the stressor. Research has demonstrated that engaging in escaping coping strategies for coping with stress or difficult situations is associated with unfavorable outcomes (Srivastava and Tang 2015). Such as, more burnout, higher intention to quit, weaker job satisfaction, and more poor job performance (Srivastava and Tang 2015). One study indicates that unemployed people

who utilize problem-solving as their primary coping method are more likely to be re-employed (Leana et al. 1998). Organizational knowledge sharing is one category of knowledge sharing that refers to formal interactions between teams or work units that convey organizational knowledge (Yi 2009), such as work or project groups often convene on a regular basis to engage in brainstorming sessions or problem-solving activities, wherein they actively seek and gather ideas. According to Campbell (2000), employees exhibit a responsible mindset and recognize that by sharing their skills, they may contribute to the overall achievement of the firm's objectives. This contribution is aimed at enhancing the success of both the group and the organization (Yi 2009). Team members may perceive that their actions are impactful when their contributions hold significance for the organization, derive personal joy from assisting others, or fulfill a sense of moral duty (Cabrera and Cabrera 2002). We suggest the following theory in light of the prior arguments:

> *H7. Control coping strategy has a positive impact on organizational knowledge sharing.*
> *H8. Escape coping strategy has a positive impact on organizational knowledge sharing.*

4 Method

4.1 Instrument development and data collection

In the present study, we utilized a questionnaire survey approach administered through the online platform Sojump. We collected a total of 386 valid responses. Sojump is the largest platform for collecting questionnaire data in China and is comparable to Amazon Mechanical Turk (Mturk). It is widely used in numerous studies for data collection. In this section, we present the research methods employed in our study, which include scale development and data collection.

First, for creating the questionnaire, we conducted an extensive literature review and combined it with feedback from two professors of marketing and consumer behavior science to determine the English version of the questionnaire. Specifically, this study relied entirely on measures derived from internationally recognized maturity scales, with all measuring items being adapted from prior studies with slight modifications applied to make them suitable to the current study. In addition to the demographic questions, unless otherwise noted, to measure the constructs, we used Likert scales with seven points, with 1 being "strongly disagree" and 7 being "strongly agree". Five items from Luu et al. (2019) were used to study diversity-oriented leadership. The assessment of the basic psychological needs was undertaken by Deci et al. (2001) using a set of five items for each need. We used the measurement items from Yi (2009) to examine organizational

knowledge sharing. Control coping strategies and escape coping strategies were measured using five-items scale development by Latack (1986).

Moreover, the technique of double-blind translation was employed in order to ensure accuracy and reliability. In this procedure, two research assistants independently translated the English versions of the questionnaires into Chinese, then two Ph.D. students in related fields translated the Chinese version into English. Through repeated discussion and revision of the ambiguous content, the primary version of the Chinese questionnaire was formed. Moreover, before formally distributing the questionnaire, we tested the primary Chinese questionnaire by organizing two small group samples and carefully revised the contents, so the final version of the Chinese questionnaire was formed. Scholars have previously highlighted the potential challenges associated with collecting high-quality questionnaires in China, emphasizing the importance of establishing trust and rapport with the target sample (Hoskisson et al. 2000). Therefore, on the one hand, to help us with the survey procedures, we hired staff from research institutions in China (who were also co-researcher in our study). On the other hand, a limited amount of money was given as an incentive to the samples who completed the questionnaire. The questionnaire was launched in mid-March 2023 and mainly distributed to a high-tech industrial park in Shenzhen City (16 enterprises) and to a new and high-tech development zone in Dongguan City (11 enterprises). Data collection was completed within three days of questionnaire distribution. After excluding 9 responses from the final sample due to obviously unreasonable response times, 386 valid surveys were used for analysis.

5 Results

5.1 Sample characteristics

In total, 386 responses were collected, with 66% being male and 34% being female. Most participants were aged between 22 and 33 (46.1%) and 34 and 45 (38.1%). Respondents were well educated, with the majority (83.7%) having a college degree or higher. Regarding the video conferencing software commonly used in the knowledge sharing process, Tencent Meeting was the most used (60.1%), followed by Ding Talk (22.8%). As for the time spent on video conferencing software, most respondents spend less than 10 h per week, comprising 28% who spend 6–10 h a week and 62.9% who spend less than 5 h a week. After counting, we totally found 49 digital collaborate teams were reported. Digital collaborate teams below 8 members have the highest proportion (91.7%). Diversity in team composition cited by 63% of respondents, including differences in gender, age, geographic location, functional distribution, reporting

managers and business unit. Over 90.9% of digital collaborate teams use both online communication and offline face-to-face meetings, rather than relying solely on one method. The digital collaborate teams were working on projects related to product development (such as a startup company developing work related to FPV (first-person view) drone replacement products in Shenzhen City) and service and process improvement (such as pre-pilot work related to the industrial robot transformation of an existing production line in Dongguan City).

5.2 Measurement model

The questionnaire data were assessed using Anderson and Gerbing's (1988) two-step approach. The first step was using confirmatory factor analysis to assess the data's reliability and validity. Following that, to verify the model and test the study hypotheses, a structural modeling analysis was performed.

We performed maximum likelihood estimation and confirmatory factor analysis to assess each construct's validity and reliability using the measurement model. The final measurement model was modified by removing an item from organizational knowledge sharing scales because its standardization factor loading was less than 0.7 (Fornell and Larcker 1981; Gerbing and Anderson 1985; Haq and Huo 2023). Several indicators were adopted to evaluate the final model, including CMIN/DF = 1.162, NFI = 0.940, TLI = 0.990, GFI = 0.918, SRMR = 0.033, and RMSEA = 0.021. CMIN/DF values less than 3 imply strong model fit. According to Hu and Bentler (1999), model fit can be considered sufficient when the values of RMSEA and SRMR are below 0.6. Hair (2009) suggests that models exhibiting NFI, TLI, and GFI values over 0.9 might be considered as adequately fitting the data. Overall, confirmatory factor analysis suggests model fit is acceptable.

Validity and reliability are crucial preconditions to ensuring the accuracy of data analysis outcomes and are the basic measures for assessing the stability and validity of the measurement. The composite reliability (CR) and Cronbach's alpha value for all structures should be more than 0.8 (Peterson and Kim 2013). All constructs had Cronbach's alpha values ranging from 0.869 to 0.933, and their composite reliability ranged from 0.870 to 0.933. Therefore, all of our study's constructs were reliable.

According to Fornell and Larcker (1981), convergent validity may be proved by proving that standardized factor loadings are above 0.7 and AVE is above 0.5. Table 2 shows all AVE and standardized factor loadings beyond 0.634 and 0.773. The discriminant validity shows the uncorrelated connection between two elements. Average variance extracted (AVE) square root

Table 2 The results of confirmatory factor analysis and reliability analysis

Construct/ Items	Factor loadings	Alpha	AVE	CR[b]
OKS1	0.808	0.933	0.665	0.933
OKS2	0.830			
OKS3	0.810			
OKS4	0.842			
OKS5	0.807			
OKS6	0.813			
OKS7[a]	n.a			
OKS8	0.799			
DOL1	0.773	0.921	0.706	0.923
DOL2	0.843			
DOL3	0.867			
DOL4	0.879			
DOL5	0.836			
ANS1	0.833	0.929	0.727	0.930
ANS2	0.811			
ANS3	0.843			
ANS4	0.904			
ANS5	0.869			
CNS1	0.826	0.896	0.634	0.897
CNS2	0.792			
CNS3	0.785			
CNS4	0.804			
CNS5	0.774			
RNS1	0.829	0.926	0.717	0.927
RNS2	0.815			
RNS3	0.896			
RNS4	0.850			
RNS5	0.842			
CCS1	0.809	0.911	0.676	0.912
CCS2	0.773			
CCS3	0.817			
CCS4	0.853			
CCS5	0.856			
ECS1	0.848	0.869	0.689	0.869
ECS2	0.834			
ECS3	0.808			

DOL Diversity-Oriented Leadership, *AES* Autonomy Needs Satisfaction, *CNS* Competence Needs Satisfaction, *RES* Relatedness Needs Satisfaction, *CCS* Control Coping Strategy, *ECS* Escape Coping Strategy, *OKS* Organizational Knowledge Sharing

[a] The items were removed

[b] Composite reliability

values were on the diagonal (Table 2). Table 3 reveals all construct correlation coefficients were smaller than AVE square roots. All model constructs have good discriminant validity. The above reasoning suggests that this study's constructs were reliable and valid.

Table 3 Discriminant validity analysis

Variable	Squared correlations						
	1	2	3	4	5	6	7
DOL	0.840[a]						
ANS	0.452**	0.853[a]					
CNS	0.473**	0.318**	0.847[a]				
RNS	0.434**	0.311**	0.301**	0.796[a]			
CCS	0.364**	0.479**	0.495**	0.430**	0.822[a]		
ECS	-0.206**	-0.283**	-0.296**	-0.254**	-0.309**	0.830[a]	
OKS	0.228**	0.332**	0.344**	0.307**	0.539**	-0.351**	0.815[a]

The numbers below the diagonal are the correlation coefficients between the constructs

[a] The square root of average variance extracted (AVE)

**p < 0.01

5.3 Structural model results

After evaluating the measurement model, we examined the hypotheses using AMOS 23.0 and structural equation modeling (SEM). According to the approach recommended by Hair (2009) and Hu and Bentler (1999), compared with the results, the structural equation modeling provided an adequate model fit: CMIN/DF = 1.180, SRMR = 0.048, GFI = 0.914, NFI = 0.938, TLI = 0.989, and RMSEA = 0.022. As reported in Fig. 2, almost all of hypotheses were supported. Employees' control coping (β = 0.505, C.R. = 9.215, $p < 0.001$) had significant positive association with organizational knowledge sharing, but employees' escape coping (β = —0.220, C.R. = -4.369, $p < 0.001$) had significant negative influence on organizational knowledge sharing, so H7 and H8 were supported. Diversity-oriented leadership had a significant effect on the three basic psychological needs satisfaction of autonomy (β = 0.490, C.R. = 8.896, $p < 0.001$), relatedness (β = 0.514, C.R. = 9.303, $p < 0.001$), and competence (β = 0.477, C.R. = 8.488, $p < 0.001$), which supported H1, H2, and H3. Competence needs satisfaction (H4a: β = 0.269, C.R. = 5.512, $p < 0.001$; H4b: β = -0.164, C.R. = -2.877, $p = 0.004 < 0.01$), relatedness needs satisfaction (H5a: β = 0.355, C.R. = 7.162, $p < 0.001$; H5b: β = -0.215, C.R. = -3.791, $p < 0.001$), and autonomy needs satisfaction (H6a: β = 0.311, C.R. = 6.408, $p < 0.001$; H6b: β = -0.193, C.R. = -3.434, $p < 0.001$). The findings suggest that the satisfaction of each of the basic psychological needs had a positive impact on control coping
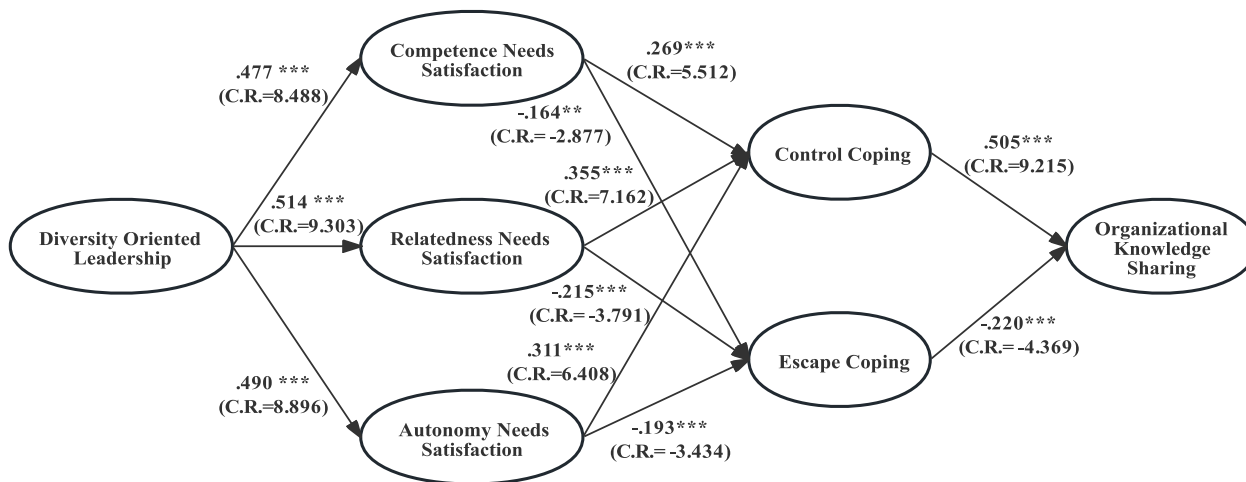
Note.
*p<0.05, **p<0.01, ***p<0.001.
critical ratio: C.R.

Fig. 2 Results of the structural model analysis (*n* = 386)

and a negative effect on escape control. These results provided support for hypotheses H4(a), H4(b), H5(a), H5(b), H6(a), and H6(b).

6 Discussion and implications

6.1 Discussion

The present study aims to clarify how diversity-oriented leadership organizational corporate knowledge sharing in digital collaborate teams. In conclusion, all theories were confirmed as anticipated. Several significant discoveries were derived from this investigation, which are outlined below:

First, the results show that diversity-oriented leadership promotes organizational knowledge sharing by satisfying three core psychological demands and two coping methods. This study is the inaugural exploration of the psychological processes linked to the act of sharing knowledge online. However, it is crucial to employ these processes in digital collaborate teams' environments, where there is a significant absence of knowledge-sharing behaviors. This study shows that diversity-oriented leadership can improve employees' satisfaction with their basic psychological needs. Three basic psychological needs and strategies for coping have been emphasized for their mediating role in the impact process. And shown meeting these needs as an invaluable psychological resource, and how such psychological resources influences employee choices about certain coping strategies, which the certain coping strategies in turn affect team members' decisions about knowledge-sharing channels.

Second, the findings suggest that competence needs satisfaction and autonomy needs satisfaction are necessary resources for efficiently coping with stress, whereas employees' perceived relatedness to the organization and receiving social support are the icebreakers for driving positive coping with stressful situations. Therefore, more social connection and social support are important in fostering employees' relatedness and facilitating problem solving. Since satisfaction of all three basic psychological needs showed positive correlations with control coping, paths revealed that relatedness needs were most significantly associated. While earlier research revealed that only relatedness needs fulfilment was significantly and positively related to posttraumatic growth (Yeung et al. 2016), we discovered high and weak relationships between the three basic psychological needs and control coping. The conflicting findings may be due to the fact that the sample (71.1%) studied by Yeung et al. (2016) had experienced a major traumatic event, such as "witnessing a serious accident; witnessing a tornado, hurricane, flood, or earthquake; being a victim of a violent crime

(such as rape, robbery, or assault); Being in an abusive relationship (physical or otherwise); Receiving news of the mutilation, serious injury or death of close others." Such severe traumatic experiences can leave the individual in deep pain, shadows, or resignation that is difficult to overcome. Acceptance resignation is more closely tied to behavioral disengagement and denial (Nakamura and Orth 2005), and thus lack of attention to external stimuli and obviously slow to respond, which leads to the different research finds between the two studies.

Third, the results confirm the conclusions of prior studies that diversity-oriented leadership as an essential organizational aspect positively impacts employee satisfaction with their three core psychological needs (Lee et al. 2020). While the path coefficients add some nuance, we found that the association between diversity leadership and relatedness needs satisfaction was the strongest of the three. This means that diversity-oriented leaders more show behaviors such as openness, being available, listening to employees' opinions, giving them autonomy in decision making, and respecting their choices, which not only meet employees' needs for autonomy and competence, but also significantly improve their relatedness needs satisfaction. This research finding are lacking from prior research (e.g., Lee et al. 2020).

Finally, our findings show that meeting three essential psychological demands negatively impacts escape coping. This means that when employees feel autonomous, competence, connected, accepted, and supported by organizational members, they tend to feel that stressful situations are manageable and do not threaten or harm them. Therefore, they tend to perceive the stressful situations they face as challenges. This finding differs from the one reported by Lee et al. (2020) about employees' coping strategies in COVID-19 crises. The reason for this is that when stress is related to individuals' health and has a significant high impact, it is inevitable that individuals will have an escape coping strategy. Typically, when the individuals' psychology is in an extremely distorted or repressed state, resulting responses to external stimuli will appear blunted, so it can be challenging to notice changes in how well the three basic psychological needs are being met as having an impact on escape coping. The initial outbreak of COVID-19 is like the situation described above. However, digital collaborate teams are not the same as COVID-19. In the digital collaborate teams, when employees feel a slight lack of control, social connectedness, nurturance, or helplessness, the idea of temporary escape from stress is comparatively easy to measure, which is why the studies differ.

6.2 Theoretical implication

This work offers some insightful theoretical conclusions that have significant practical relevance.

First, our study provides a psychological framework through SDT with transactional theory of stress and coping. The innovation is to unite factors at the basic psychological need satisfaction-coping strategy levels to form a multilevel, progressive psycho-cognitive structure, which enhances the understanding about the process of the influence of external factors on individual behavior.

Second, our study focused on three different latitudes of basic psychological needs, rather than looking at them as a holistic concept. As a result, we were able to delve deeper into the relationship between the three basic psychological needs and diversity-oriented leadership as well as the two coping strategies, and thus arrive at the important findings described above.

Finally, our research findings provide evidence that the relationship between diversity-oriented leadership and various forms of knowledge sharing, such as organizational knowledge sharing, remains present. This contributes to the advancement and enhancement of existing knowledge sharing studies.

6.3 Managerial implication

The current investigation has significant implications for organizational managers.

First, the current study places significant emphasis on recognizing the significance of valuing diversity. Leaders have the capacity to cultivate a work environment that fosters trust and dependability through the acknowledgment and appreciation of the distinct contributions made by team members from various backgrounds. This can be achieved by ensuring equitable access to opportunities, resources, and support for team members with diverse backgrounds. Within the context of a given work environment, it is anticipated that team members hailing from various backgrounds will experience a heightened sense of inclusion, thereby facilitating the optimal cultivation of their respective skills and capacities. Consequently, this inclusive environment will foster collaborative efforts among team members, leading to substantial contributions towards the overall success of the organization.

Second, this emphasizes the significance of establishing a professional setting that adequately fulfills the psychological needs of team members in terms of competence, relatedness, and autonomy. The attainment of this objective necessitates the pivotal role of the leader. Leadership entails the demonstration of an open and accessible persona, the establishment of a robust rapport with team members, the attentive consideration of their needs and emotions, and the facilitation of an environment that fosters the sharing of their perspectives. In order to address the team members' needs for a feeling of relatedness, leaders can employ various strategies. These include timely and efficient communication with employees, actively inquiring about their needs and expectations, involving subordinates in decision-making processes, and arranging team-based activities to fulfill the team members' need for connectedness. In order to address the competence needs for team members, leaders have the ability to augment team members' self-assurance and perception of competence through various means. These include establishing unambiguous tasks and objectives, acknowledging team members' viewpoints, arranging training sessions to develop skills, motivating team members to engage in industry exchanges, and furnishing essential resources and constructive feedback. In order to address the autonomy needs of team members, leaders can effectively delegate authority, demonstrate respect for their choices, facilitate the establishment of individual work arrangements, and, to a reasonable extent, enable them to independently undertake tasks and resolve problems. These methods have the potential to significantly enhance the creative and committed mindset of employees. Excessive intervention and control have the potential to impede the growth and development of employees. Hence, it is imperative for leaders to adopt a moderate approach in managing their employees, offering them essential support and guidance, while refraining from excessive intervention and control.

Finally, the current study underscores the significance of promoting knowledge sharing, particularly in the context of cross-functional knowledge sharing, as it contributes to the improvement of collaborative performance within the organization. There exist various strategies for facilitating cross-functional knowledge sharing, including the implementation of brainstorming sessions, cross-departmental multi-level symposia, the provision of monetary incentives, and the adoption of rotational shift rotations.

In summary, the current study provides a practical guide for organizational managers. By focusing on the basic psychological needs of employees, valuing diversity, and promoting knowledge sharing, organizational managers can better improve employee performance and organizational innovation and contribute to the sustainable development of their organizations.

7 Limitations and future research

While this study makes valuable contributions to the field, it is important to acknowledge and address its shortcomings in future research. First, the respondents of this study were mainly dominated using Tencent Meetings, and the proposed model was analyzed after collecting data on their experiences with the platform. Although

the empirical data overall supported our hypotheses and model, we did not consider the potential impact of the different platform types leading to the study results. Therefore, future studies should still consider whether different platforms impact the study results. For example, TikTok can be used as a knowledge sharing platform. While the style of TikTok is completely different from Tencent Meeting. Different platform features may bring different experiences to users. Therefore, results may differ from this study. Second, knowledge sharing can be divided into different types, and this study only explored organizational communication, so future research could consider exploring whether the relationship between these constructs differs with specific types of knowledge sharing. Third, our data source is from a collectivist-dominated Asian country, as Kagitcibasi (2005) mentioned, the needs for relatedness may be stronger in collectivist societies than for autonomy relative to individualistic societies. Therefore, future research could investigate whether our findings still hold by targeting users in individualistic societies. Finally, coping is a dynamic process (Lazarus and Folkman 1984). But the data we collected were cross-sectional, and future research could add the variable of time to investigate whether the relationship between diversity-oriented leadership, the three basic psychological needs satisfaction, and coping strategies differs over time.

Authors' contributions

The first author (Haidi Huang) was responsible for writing the initial draft, data collection and analysis, and participating in discussions. The corresponding author (Qiang Wang) was responsible for the planning, final draft, revision and proof read.

Declarations

Competing interests

All authors disclosed no relevant relationships. This study also had no funding support.

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