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Integrating the Bright and Dark Sides of Communication Visibility in Enterprise Social Media for Knowledge Management and Creativity: The Moderating Role of Regulatory Focus

Abstract

Drawing on communication visibility theory, we examine how message transparency and network translucence influence employees' knowledge sharing and hiding, and in turn how those are associated with employees' creativity. Applying regulatory focus theory, we further examine how promotion and prevention focus moderate the effects of message transparency and network translucence on knowledge sharing and hiding. Data collected from 208 enterprise social media (ESM) users indicate that message transparency is positively related to knowledge sharing, while it has no association with knowledge hiding. In turn, network translucence is positively related to both knowledge sharing and hiding. Promotion focus positively moderates the relationship of message transparency with knowledge sharing, but it exerts no moderating effect on the relationship between network translucence and knowledge sharing. Prevention focus negatively moderates the relationship of message transparency with knowledge hiding, but it positively moderates the association between network translucence on knowledge hiding. Finally, knowledge sharing is positively associated with employee creativity, whereas knowledge hiding is negatively related to employee creativity. Our findings advance the understanding of communication visibility theory and regulatory focus theory in ESM contexts. For employees, the findings suggest that they should share knowledge with other coworkers to improve their creativity. For organizations, the findings recommend that they should implement different policies that highlight the regulatory focus of employees to facilitate their knowledge sharing and to avoid knowledge hiding.

Keywords: enterprise social media, communication visibility, regulatory focus, knowledge sharing, knowledge hiding, creativity

1. Introduction

Organizations are implementing Enterprise social media (ESM) to facilitate workplace communication, coordination, and collaboration (Beck et al., 2014; Chen & Wei, 2019; Chen, Wei, Sun & Liu, 2019). ESM is defined as "web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited, and sorted by anyone else in the organization at any time of their choosing" (Leonardi et al., 2013, p. 2). Examples include IBM's Beehive, SAP's Harmony, HP's Watercooler, Kaiser-Permanente's Ideabook, Beisen's Tita, Wanqimingdao's Mingdao, and Kingdee's Yunzhijia (Chen, Wei, Davison & Rice, 2019; Moqbel et al., 2013; Le-Nguyen et al., 2017; Rode, 2016).

As indicated by previous researchers (Leonardi, 2014; Rice et al., 2017), an important ESM affordance is communication visibility, whereby third-parties are able to easily see what content people exchange with one another (message transparency) and with whom they share it (network translucence) (Leonardi, 2015; Treem & Leonardi, 2012). Emerging studies on ESM have long focused on the "bright side" of communication visibility enabled by ESM. For example, prior researchers have proposed that increased communication visibility facilitates knowledge sharing in organizations by helping employees make inferences about coworkers' expertise and their networks (Ellison et al., 2014; Leonardi & Meyer, 2014). Enhanced knowledge sharing that may be fostered by ESM visibility can lead employees to more effectively recombine existing ideas into new ideas, which has implications for employee creativity (Leonardi, 2014).

However, some researchers have questioned the belief that communication visibility is uniformly beneficial, instead arguing that it may have a "dark side" (Gibbs et al., 2013). For example, communication visibility may inadvertently introduce risks that would detrimentally affect engagement, such as influencing employees to hide some relevant knowledge (Ellison et al., 2014; Gibbs et al., 2013). If employees decide to be selective about what they present, or to withhold some information, work duplication could increase and knowledge of relevant resources could decrease, which should reduce employee creativity. These two streams of research highlight a dialectical tension between the bright side and dark side of ESM-based communication visibility.

Because individual differences in how people assess communication visibility may affect the extent to which the outcomes of communication visibility are positive or negative (Gibbs et al., 2013), a more specific question is suggested: For whom is communication visibility good or bad, and why? Arazy and Gellatly (2012) called for future research to explore the relationships between ESM openness and transparency, regulatory focus, and knowledge management behavior. Regulatory focus, as a personal trait, posits that individuals' motivated behavior serves two survival needs: nurturance and security, or promotion and prevention (Ke et al., 2012; Liang et al., 2013). To the extent that knowledge sharing and hiding are influenced by concerns about nurturance and security, regulatory focus should, therefore, affect relationships between communication visibility and knowledge management behavior.

Thus, the present research addresses the above-mentioned gaps in the existing literature by investigating (1) the effect of communication visibility (i.e., message transparency and network translucence) on knowledge management behavior (i.e., knowledge sharing and hiding); (2) the regulatory focus (promotion or prevention) that moderates the relationship between communication visibility and knowledge management behavior; and (3) the effects of knowledge sharing and hiding on employee creativity.

The current study also provides three important contributions. (1) It argues that although communication visibility via ESM can be beneficial, it may also have drawbacks, in particular for employee creativity, through its relationship with knowledge sharing and hiding. (2) Prior research has generally only focused on either knowledge sharing (Chai et al., 2011) or knowledge hiding (Tsay et al., 2014); see also Heinz and Rice (2009), and Rice, Heinz, and Van Zoonen (2019), for online knowledge exchange models. However, the present research considers knowledge sharing and hiding in one theoretical model. (3) We argue that some beneficial or detrimental aspects of ESM communication visibility depend at least partially on the regulatory focus of employees. By integrating the theories of communication visibility and regulatory focus, the present research illuminates that individual differences may affect the extent to which communication visibility is beneficial or detrimental.

2. Literature review

2.1. *Communication visibility theory*

Workplace communication among employees has long remained private, or, more accurately, invisible to those not directly involved (Leonardi, 2015). However, ESM facilitates greater employee awareness about the activities – both the content, or messages, and the connections, or networks – of their coworkers (Leonardi, 2014; Treem & Leonardi, 2012). ESM enables this awareness by affording visibility into routine communication among employees, including third parties, even if those third parties are not directly involved with that communication (Leonardi & Meyer, 2014). For instance, the communicative exchanges occurring between two employees on an ESM technology often appear on the newsfeed or wall of a third party who has an online relationship with one or both of the employees (Jarrahi & Sawyer, 2013). Employees can articulate their social networks and tag images and documents produced by coworkers within ESM, thus giving other employees further visibility into the communication content and connections (Kane et al., 2014).

From these insights, communication visibility theory indicates that once the content and networks of EMS users become visible to third parties, the third-party observers can improve their knowledge of "who knows what" and "who knows whom", central factors in successful organizational transactive memory systems (Leonardi, 2014; Leonardi, 2015). When people can observe what others do, or with whom they do it, there will be more interpersonal trust (Cramton et al., 2007), reduced duplication of work (Lapré & Van Wassenhove, 2001), and more product and process creativity (Majchrzak et al., 2004). The emerging theory of communication visibility makes intuitive sense (Flyverbom et al., 2016). However, few researchers have empirically tested it.

Leonardi (2015) terms these two dimensions (content and network) of visibility as *message transparency* and *network translucence*. *Message transparency* enabled through ESM allows employees to literally see the content of the exchanged messages among their coworkers (Leonardi, 2014). Routine communication among employees, including project

updates and facts regarding work assignments, is not only beneficial for employees directly involved in the communication but is also advantageous for third parties (Leonardi, 2015). The resulting metaknowledge reduces their search efforts and knowledge duplication and gaps, and improves employees' awareness, ability to recombine knowledge, and their creativity. *Network translucence* refers to ESM affording employees the ability to make their communication networks viewable and public to others, or, more generally, EMS allowing third parties to observe, and make inferences from, linkages among (some) other employees (Leonardi, 2014). Translucence helps employees better understand who knows what, and how people and activities are interrelated. As Leonardi (2015) further indicated, the social networks of other coworkers made visible through ESM are only translucent, rather than transparent, because employees of ESM can see a tie existing between one coworker with someone else, but they cannot clearly determine the strength or nature of the tie.

2.2. *Knowledge sharing vs. knowledge hiding*

The extant research on the consequences of communication visibility has mainly focused on its benefits for employees. For example, Ellison et al. (2014) indicated that communication visibility leads to enhanced knowledge sharing by helping employees to easily identify distributed expertise and to build social ties across boundaries. Although communication visibility may be beneficial to employees by enhancing *knowledge sharing*, extant literature also suggests that it may cause *knowledge hiding*. Indeed, Leonardi (2015) noted explicitly that awareness of the potential of ESM for communication visibility may motivate employees to hide some knowledge in order to keep certain skills and competitive knowledge from being made public, or to avoid public awareness of possible errors.

By *knowledge sharing*, we mean providing the opportunity to exchange knowledge, in either direction, i.e. contributing/donating and collecting, providing and receiving (Heinz & Rice, 2009; Rice et al., 2019; Schlagwein & Hu, 2017). Knowledge sharing is generally seen as positive (Arazy et al., 2016; Peng, 2013,). Not sharing relevant information prevents successful knowledge transfer, and contributes to communication gaps and reduced shared understanding, among and between information system developers and stakeholders (Corvera Charaf et al., 2013). However, while the knowledge management literature typically frames knowledge sharing/transfer as a positive organizational activity, often encouraged or required through policies and knowledge management systems, unmanaged sharing has negative implications as well (Rice et al., 2019). Studies discuss, for example, how effective software development teams learn what information to discuss or share (or not), in what form (informal/formal, face-to-face/documentation, direct/indirect), and at what time (e.g., Hummel et al., 2015). External organizational knowledge sharing can facilitate innovation, but high amounts of intentional and accidental knowledge leakage negatively affect this relationship (Ritala et al., 2015). Thus some instances of not sharing have positive motivations and effects, such as maintaining confidentiality or protecting others' interests.

Knowledge hiding refers to intentional attempts by an employee to conceal or withhold knowledge that has been requested by others (Connelly et al., 2012; Peng et al., 2018). Connelly et al. (2012) identified three separate strategies of knowledge hiding: playing dumb, evasive hiding, and rationalized hiding. Playing dumb involves feigning ignorance of the knowledge that someone else has requested. Evasive hiding involves offering incorrect information or a misleading promise of a complete answer in the future, with no intention of

actually doing so. Rationalized hiding involves providing a justification for failing to offer the requested knowledge by either providing reasons or by blaming someone else. Hiding may be caused by distrust, prior unreciprocity, negative personal relationships, prior interactions, threat to one's reputation or status, topic complexity, time and effort constraints, task-relatedness, organizational climate, etc. (Connelly et al., 2012). Intentionality is a major conceptual indicator of knowledge hiding (Černe et al., 2014; Ford & Staples, 2008). For example, an employee may ask his/her coworker for a copy of a report. This coworker may not disclose the said report and provide a reply that the report is confidential. In this case, although no deception is involved, the requested knowledge is declined. Alternatively, this coworker may only offer some of the knowledge that has been requested; in which case deception may be involved. Knowledge hiding does not incorporate cases where an employee is unable to share knowledge, due to accident, mistake, or lack of knowledge (Connelly et al., 2012). Although knowledge hiding may be beneficial in a few contexts, such as keeping organizational secrets or protecting the feelings of other parties (McGrenere & Ho, 2000), it is typically viewed as harmful to organizations (Černe et al., 2014; Connelly & Zweig, 2015).

Knowledge sharing and hiding are two conceptually distinct constructs, rather than opposite ends of continuum (Lin & Huang, 2010; Rhee & Choi, 2016; Tsay et al., 2014). Behaviorally, the underlying mechanisms and motivations between an absence of knowledge sharing and the existence of knowledge hiding are different (Connelly et al., 2012; Peng, 2013). However, field observations have indicated that employees may simultaneously engage in both knowledge sharing and hiding (Ford & Staples, 2008). Recently, researchers have also suggested that knowledge sharing and hiding can be studied in one theoretical model (Rhee & Choi, 2016). Thus, we simultaneously investigate knowledge sharing and hiding, and further examine their antecedents and consequences in ESM contexts.

2.3. *Regulatory focus theory*

Regulatory focus theory proposes that human behavior is motivated by two different forms of approach: promotion and prevention focus (Higgins, 1997). *Promotion focus* is driven by growth and development needs and involves striving for gains, ideals, and accomplishments (Arazy & Gellatly, 2012; Wallace et al., 2013). Promotion-focused individuals are more sensitive to positive outcomes, such as gains or nongains (Arazy & Gellatly, 2012). By contrast, *prevention focus* is driven by security and safety needs and involves fulfilling obligations, duties, and responsibilities (Liang et al., 2013; Wallace et al., 2013). Prevention-focused individuals are more sensitive to the negative outcomes, such as loss or nonloss (Arazy & Gellatly, 2012).

Promotion and prevention focus have distinct motivational states (Arazy & Gellatly, 2012; Higgins, 1997). Further, empirical evidence has demonstrated the conceptually orthogonal nature of these two dimensions of regulatory focus (Wallace & Chen, 2006). Thus, simultaneously experiencing high levels in both focus, in only one focus, or in neither focus is possible (Byron et al., 2016; Wallace & Chen, 2006).

Regulatory focus theory has gained increasing popularity in the management and organizational psychology literature and has been found to help researchers understand motivated behavior in work settings (Johnson et al., 2011; Neubert et al., 2008). However, regulatory focus theory has been rarely employed by IS researchers (for exceptions, see Arazy & Gellatly, 2012; Ke et al., 2012; Liang et al., 2013), despite the argument of Liang et

al. (2013) that it can contribute to an in-depth understanding of the IS behavior of individuals. Knowledge management by employees is a typical motivated behavior in work contexts.

3. Research framework and hypothesis development

Based on the discussion in sections 1 and 2, we develop the research model portrayed in Figure 1. On the one hand, communication visibility can help employees to easily know who is the expert within the organization and to build and maintain social network ties among employees, which is beneficial for knowledge sharing (Ellison et al., 2014). On the other hand, communication visibility can also lead to knowledge hiding because employees can thereby retain some competitive knowledge and skills (Ellison et al., 2014; Leonardi, 2015). Accordingly, based on communication visibility theory, we first examine how message transparency and network translucence influence knowledge sharing and hiding, respectively. Moreover, knowledge sharing and hiding are differentially related to employees' creativity because of distinct social exchange implications (Rhee & Choi, 2016). In this view, we further investigate how knowledge sharing and hiding influence employee creativity. Drawing upon regulatory focus theory, we then contend that promotion and prevention focus moderate the relationships of message transparency and network translucence with knowledge sharing and hiding.

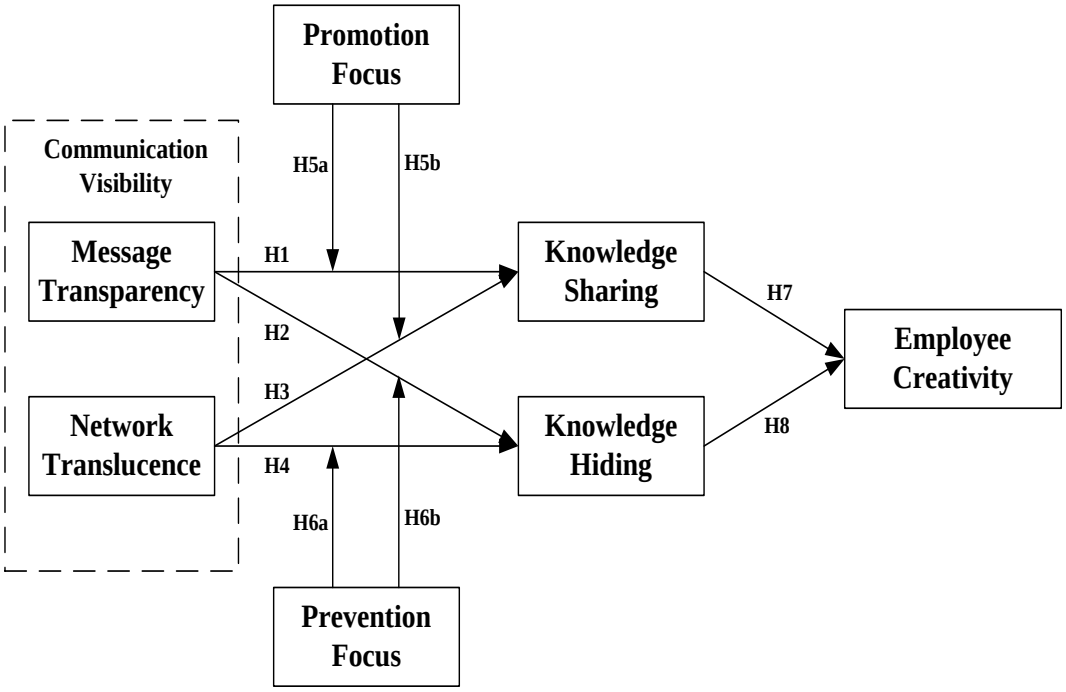

Figure 1. Research model.

3.1. *Relationships of message transparency with knowledge sharing and hiding*

Seeing the messages of coworkers helps employees learn more regarding the expertise, interests, and activities of their coworkers and enables linkages among like-minded people, thus fostering the creation of communities of practice that are crucial for knowledge sharing (Leonardi et al., 2013; Treem & Leonardi, 2012). Message transparency provides cues for employees to develop awareness of what other coworkers know, what kind of knowledge they possess, and when and how they work. Increased awareness should reduce ambiguity (Leonardi, 2015; Leonardi & Meyer, 2014), suggesting that employees are more

confident about their ability to provide the necessary knowledge for knowledge seekers, as well as to understand how to seek and interpret knowledge obtained from others. In addition, through observation of the actions of other coworkers, employees may be able to determine how to interact with the knowledge seeker in appropriate ways to promote knowledge sharing. Ellison et al. (2014) proposed that employees who share knowledge on ESM are motivated by similar visible activities by their coworkers and managers or visible feedback, indicating that message transparency may induce social norms and pressures that ultimately motivate employees to share knowledge with their coworkers.

H1. Message transparency is positively related to knowledge sharing.

Message transparency can also be associated with knowledge hiding. Message transparency may encourage lurking behavior because employees can obtain knowledge through unobtrusively observing the communicative activity among other coworkers and seek knowledge without any interaction (Gibbs et al., 2013; Heinz & Rice, 2009). If messages become transparent on ESM, employees may prefer to remain incognito and hide knowledge to avoid potential embarrassment from negative appraisals of their contribution (due to inaccurate or inappropriate content). Furthermore, employees are often sensitive to the loss of knowledge advantage they held privately (Ellison et al., 2014), so may hide some information in order to maintain their competitive advantage (Leonardi, 2015). More generally, hiding knowledge would be appropriate and in line with policy in areas that might compromise proprietary and strategic organizational knowledge (McGrenere & Ho, 2000).

H2. Message transparency is positively related to knowledge hiding.

3.2. *Relationships of network translucence with knowledge sharing and hiding*

Awareness of the communication networks of one's coworkers can help employees find common ground (Ellison et al., 2014), which is critical for knowledge sharing. Knowing the structure of one's social networks may also offer a form of identity warranting, thus providing signals of credibility and trust (Walther et al., 2009). When a trusted coworker seeks knowledge from other employees, they are more likely to share their knowledge. In addition, by allowing employees to see the communication network connections of their friends and coworkers, ESM serves as a "social lubricant" for interpersonal relationships (Leonardi & Meyer, 2014), making it easier for employees who do not know each other to request and share knowledge.

H3. Network translucence is positively related to knowledge sharing.

Network translucence can also be related to knowledge hiding. Visible communication networks may foster self-preservation behaviors of employees in which employees do not share the true nature of their work while withholding some information (Treem & Leonardi, 2012). Leonardi et al. (2013) argued that network translucence enabled by the use of ESM can result in a subgrouping tendency with too little interaction or knowledge sharing among employees in general (Connelly et al., 2012). In addition, employees may also hide knowledge from group members in order to avoid losing their competencies, reputation, or competitive positioning.

H4. Network translucence is positively related to knowledge hiding.

3.3. *Moderation effect of regulatory promotion focus*

Employees with a promotion focus are motivated to satisfy their needs for advancement, growth, and accomplishment (Koopman et al., 2015). Employees tend to share

knowledge with other coworkers in the presence of potential gains. A message transparency environment increases awareness of such possible gains (Arazy & Gellatly, 2012). Indeed, when the level of promotion focus is high, employees are particularly sensitive to positive outcomes of sharing (Ke et al., 2012; Liang et al., 2013). They may also be more likely to believe that knowledge sharing provides an opportunity for them to expand their resources (Rhee & Choi, 2016; Wang & Noe, 2010,), as well as gain trust and respect (Flynn, 2003; Rhee & Choi, 2016), due to the visibility of their and others' messages.

Moreover, Liang et al. (2013) used regulatory fit to explain why employees exhibit different IS behaviors deriving from the same incentive. Regulatory fit occurs when individuals' aims to pursue desires or goals match their regulatory focus. In the ESM context, network translucence "fits" promotion-focused employees well because it can be used to help meet their desires for recognition and reputation in the workplace (Majchrzak et al., 2013). Promotion-focused employees are more likely to perceive network translucence as more attractive because there exists a fit between the strategic approaches through which the desired goals are obtained and their regulatory orientation. Therefore, as promotion focus increases, network translucence tends to exert a stronger positive influence on knowledge sharing.

H5a. Promotion focus positively moderates the positive relationship between message transparency and knowledge sharing.

H5b. Promotion focus positively moderates the positive relationship between network translucence and knowledge sharing.

3.4. *Moderation effect of regulatory prevention focus*

Prevention-focused employees, however, are more sensitive to the potential negative outcomes and fear of making mistakes and errors (Arazy & Gellatly, 2012; Ke et al., 2012; Liang et al., 2013). Prevention-focused employees are more likely to maintain the current situation, fulfill their in-role obligations, duties, and responsibilities at work, and avoid unexpected experiences (Koopman et al., 2015; Lanaj et al., 2012). Message transparency might evoke employees' concerns about losing their competitive positioning or their competencies, resulting in knowledge hiding, These concerns may be particularly strong for employees with prevention focus because they tend to avoid the loss of competitiveness otherwise embedded in privately held knowledge. Accordingly, for prevention-focused employees, message transparency is more likely to generate knowledge hiding behavior.

When prevention-focused employees obtain goals by vigilantly avoiding unexpected or undesired situations, they experience regulatory fit (Higgins, 2000; Liang et al., 2013). The more that their network relationships to others become visible (translucent), the more that others may identify their resources, bypass them, or weaken group boundaries. Due to this regulatory fit, employees with a prevention focus may feel a stronger motivation to avoid exposure to translucent communication networks. Consequently, as prevention focus increases, network translucence exerts a stronger influence on knowledge hiding behavior.

H6a. Prevention focus positively moderates the positive relationship between message transparency and knowledge hiding.

H6b. Prevention focus positively moderates the positive relationship between network translucence and knowledge hiding.

3.5. *Relationship of knowledge sharing with creativity*

Sharing knowledge can enable deep learning because participants must organize, understand, conceptualize, and analyze their knowledge in order to share it (Zhu et al., 2018) contributing to mental model building (Rice et al., 2019). When employees share knowledge with other coworkers, they may need to see things from different perspectives; thus their knowledge base can be expanded (Cropanzano & Mitchell, 2005). In addition, when employees prepare for knowledge sharing, they are more likely to catch up on related ideas or concepts that they are not familiar previously (Zhu et al., 2018). Van den Hooff et al. (2003) proposed that one primary public good associated with sharing knowledge to shared knowledge repositories is the availability of a pool of knowledge available for generalized reciprocity and for combining information to produce new solutions. Therefore, the sharer may experience improvements in creativity through knowledge sharing.

H7. Knowledge sharing is positively related to employee creativity.

3.6. *Relationship of knowledge hiding with creativity*

Employees who hide knowledge and are known to do so may be labeled as free riders, thereby intensifying distrust among coworkers (Černe et al., 2014). Knowledge hiding behavior may produce negative reciprocity and retaliation from other coworkers, leading to a low quality or level of social exchange relationship (Brandts & Solà, 2001; Cropanzano & Mitchell, 2005). Thus, employees who hide knowledge may become locked in their own knowledge and perspective, and cannot as easily gain access to collective knowledge or potentially relevant creative ideas (Černe et al., 2014; Rhee & Choi, 2016), because of their limited personal capacity (Reiter-Palmon & Illies, 2004). The more that employees engage in knowledge hiding, the more likely they should experience decreases in creativity (Peng et al., 2018).

H8. Knowledge hiding is negatively related to employee creativity.

4. Research methodology

4.1. *Measurement development*

A survey was conducted to test the hypotheses. We adapted previously validated scales as appropriate. When developing and finalizing the questionnaire, we followed the commonly accepted advice on wording questions (de Vaus, 1995). All questionnaire items were measured on a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Appendix A lists the final concepts, item wording, and their sources.

Because the survey was conducted in China, all items originally in English were translated into Chinese following the translation committee approach (Van de Vijver, 1997). To do so, we invited three researchers from different backgrounds – management, information systems, and computer science – to independently translate the questionnaire from English to Chinese. Next, we hired a professional translator, unfamiliar with the present research project, to translate the Chinese questionnaire back into English. After a careful comparison of the translated English questionnaire and the original English version, no significant semantic discrepancies were found. Finally, two professionals in the surveyed companies were invited to further complete and review the original Chinese questionnaire and offer feedback.

4.2. *Data collection*

The data were collected at Chinese Software (a pseudonym), a large maker of business management software with over 7000 employees headquartered in Southern China.

In late 2011, Chinese Software began to use an ESM technology only for internal communication among employees. The ESM technology, called “Circle,” looked nearly identical to publicly available social media technologies such as Twitter and Weibo. “Circle” included news feeds, algorithms for suggesting new contacts and profile pages.

The online survey hyperlink was sent to 1000 randomly selected users in the organizational user list provided by Chinese Software. We also provided RMB15–20 (approximately US$2.17–2.89) as an incentive for each participant to encourage responses. A total of 263 usable responses were received over a period of two months, a 26.3 percent response rate. No missing or incomplete responses were found because the respondents were required to answer all the questions before submitting the questionnaires. However, 55 questionnaires were removed from the pool, because all the items were answered with the same value, resulting in 208 usable responses.

Previous literature suggested that gender, age, education, position, and tenure may affect the knowledge management behavior and creativity of employees (Rhee & Choi, 2016). Thus, we controlled for these variables in the research model. Table 1 displays the demographics of the sample.

Variable	Response Choices	Percent
Gender	Male	59.1
	Female	40.9
Age	18-25	40.9
	26-30	38.9
	31-35	15.9
	36-40	2.4
	41 and above	1.9
Education	High school or below	10.6
	College	30.3
	University	52.4
	Graduate school or above	6.7
Position	Non-management employee	66.3
	Manager	22.1
	Senior or executive manager	3.8
	Others	7.7
Tenure	Under 1 year	14.4
	1–2 years	25.5
	3–5 years	41.8
	6–10 years	11.1
	Over 10 years	7.2
Note: N = 208		

Table 1
Demographics

5. Data analysis

5.1. *Power analysis*

Prior to data collection, an *a priori* statistical power analysis was conducted. The maximum number of predictors in the research model was eleven. Assuming a medium effect size ($f^2 = 0.150$), a minimum sample size of 89 to enable an alpha level of 0.05 and a power of 0.95 was required for the research model (Cohen 1988). The sample size of the present

study was 208, thereby adequate for analysis. Furthermore, we used the GPower 3.1.9.2 software to perform a *post-hoc* statistical power analysis (Faul et al. 2007). The average effect size for the relationships presented in the research model was 0.12, which with alpha level of 0.05 and power of 0.999, higher than the threshold value of 0.800.

5.1. *Non-response bias*

We used the method suggested by Armstrong and Overton (1977) to test for a possible nonresponse bias. A two-tailed t-statistic was used to compare the responses to all constructs between the first 25% and the last 25% of respondents. There were no significant differences among any of the construct means, indicating that nonresponse bias was not a serious concern.

5.2. *Common method bias*

We tested for common method bias because all the data were collected from a single source simultaneously and were perceptual. First, we applied Harman's single-factor method to the seven conceptual variables in the research model (Podsakoff & Organ, 1986). The results revealed that seven constructs had eigenvalues greater than 1.0, explaining 67.4% of the total variance. The first construct explained 13.0% of the variance. Therefore, the threat of the common method bias was minimal. Second, following the suggestions of Podsakoff et al. (2003), we included a common method factor, which is associated with all the principal indicators of the constructs, in the partial least squares (PLS) model. We calculated how all principal constructs and the method factor substantively accounted for the variances of each indicator. The results show that the substantive constructs explained, on average, 65 percent of the variance, whereas the average method-based variance of the indicators was 1 percent. Most of the method factor loadings were insignificant, again indicating no meaningful common method bias.

5.3. *Measurement model*

We examined the reliability and validity of the constructs to test the measurement model (Carmines & Zeller, 1979). Table 2 shows that Cronbach's alpha ranged from .83 to .96, and the composite reliability ranged from 0.88 to 0.97, all above the benchmark value of .7 (Fornell & Larcker, 1981). The values of AVEs for all constructs ranged from .51 to .87, which was higher than the recommended value of 0.5 (Fornell & Larcker, 1981). The values of all the loadings of the retained items were greater than the recommended .6 cutoffs (Bagozzi & Yi, 1988). These tests demonstrated the good reliability and convergent validity of the measurement model.

Construct	Item Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Message Transparency (MT)	.82, .89, .83, .81	.86	.90	.70
Network Translucence (NT)	.84, .89, .83, .83	.87	.91	.72
Knowledge Sharing (KS)	.82, .85, .84, .83	.85	.90	.70

Knowledge Hiding (KH)	.92, .94, .93, .94, .92	.96	.97	.87
Promotion Focus (PROF)	.70, .64, .79, .72, .71, .76, .65	.83	.88	.51
Prevention Focus (PREF)	.72, .77, .78, .69, .72, .70, .69, .78, .74	.89	.92	.55
Employee Creativity (EC)	.85, .84, .76	.75	.89	.72

Table 2

Results of Confirmatory Factor Analysis

We used multiple techniques to examine the discriminant validity. First, the chi-square difference test demonstrated that the correlations between each pair of the constructs were significantly different from unity (i.e., 1.0) (Anderson & Gerbing, 1988, Jöreskog, 1993). Second, the square roots of the AVEs for all the constructs on the diagonal row were higher than the inter-construct correlations (Fornell and Larcker, 1981). Third, the correlation matrix in Table 3 reveals that the largest correlation between constructs was .65, less than the recommended level of .71 (MacKenzie et al., 2011). All of these test results demonstrated good discriminant validity of the measurement model.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. MT	5.95	.82	**.84**									
2. NT	5.70	.98	.62**	**.85**								
3. KS	5.84	.84	.39**	.41**	**.84**							
4. KH	5.11	1.54	.06	.22**	.14*	**.93**						
5. PROF	6.09	.63	.42**	.42**	.37**	.02	**.71**					
6. PREF	6.07	.66	.49**	.43**	.47**	-.04	.65**	**.74**				
7. EC	5.95	.73	.39**	.44**	.52**	.00	.49**	.57**	**.85**			
8. Gender	NA	NA	-.05	-.10**	-.06	-.27**	-.09	-.05	-.16*	**NA**		
9. Age	NA	NA	-.04	-.07	-.09	.04	-.20	-.14*	-.21**	-.10	**NA**	
10. Education	NA	NA	.02	-.04	-.05	-.08	.01	-.01	-.09	-.13	-.08	**NA**
11. Tenure	NA	NA	.02	-.03	.07	.08	-.01	-.01	-.09	-.08	.74	.01

Table 3

Descriptive Statistics and Correlation Matrix

However, two inter-construct correlations were above .6, suggesting potential multicollinearity. Thus, we analyzed the variance inflation factors (VIFs) and the tolerance value. Multicollinearity exists when a VIF value is higher than 10 or a tolerance value is below 0.1 (Mason & Perreault, 1991). As the highest VIF was 2.12, multicollinearity was not an issue.

6. Results: Structural model

We used hierarchical ordinary least squares regression analysis (via SPSS) to test the research model for two reasons. First, hierarchical regression analysis is more suitable than SEM for models with multiple moderating effects and multiple moderators (Chen et al., 2015), which is the case here. Second, when conducting interaction analysis, hierarchical regression analysis using the product of the centered sums of the indicators as the interaction

term is considered more appropriate than using PLS with the product of the indicators, because the strength of the relationships in PLS is overestimated, and their significance is underestimated (Chen et al., 2015). We mean-centered the independent and moderator variables to minimize the possible issue of multicollinearity (Aiken et al., 1991).

Table 4 shows results for three sets of incremental models, explaining, respectively, knowledge sharing, knowledge hiding, and employee creativity. The control variables were included in Step 1, followed by the independent and moderator variables in Step 2, and the interaction terms in Step 3.

Figure 2 summarizes the results of all the hypotheses. The model explained 29.8% of the variance in knowledge sharing, 16.1% of the variance in knowledge hiding, and 34.3% of the variance in employee creativity.

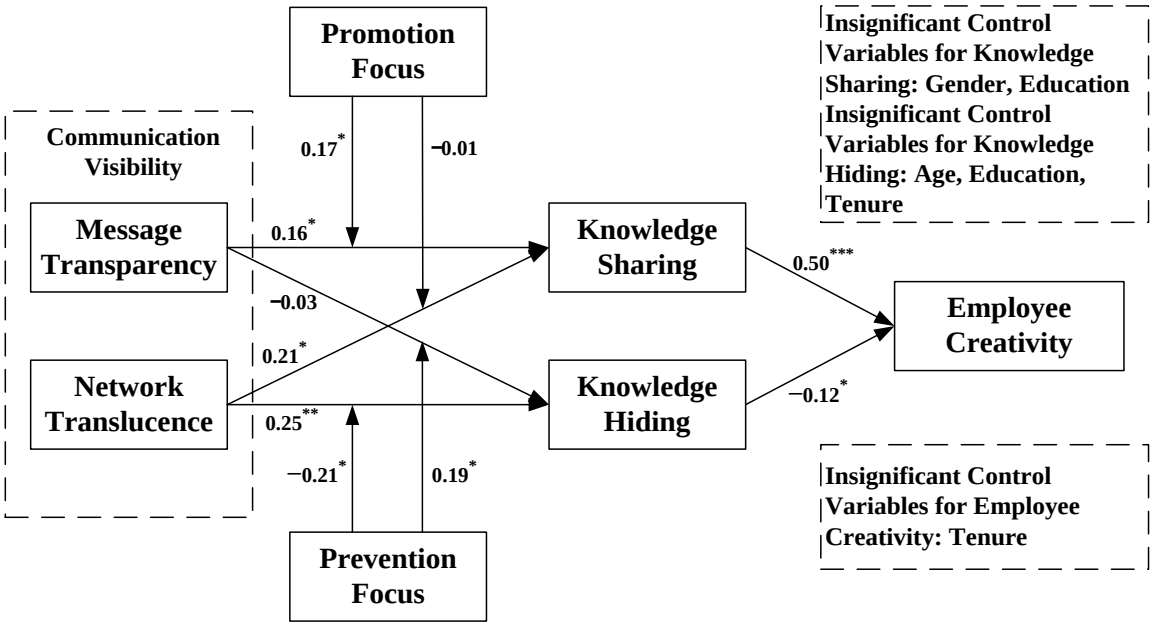

Figure 2. Research model results.

The path from message transparency to knowledge sharing was positive and significant (β = .16, $p < .05$), supporting H1. The path from message transparency to knowledge hiding was insignificant, rejecting H2. The relationship between network translucence and knowledge sharing was positive and significant (β = .21, $p < .05$), as was the relationship between network translucence and knowledge hiding (β = .25, $p < .01$). Hence, H3 and H4 were supported.

Promotion focus positively moderated the relationship between message transparency and knowledge sharing (β = .17, $p < .05$), supporting H5a. Figure 3 displays this moderating effect. Knowledge sharing increased rapidly, as predicted, at high levels of promotion focus as message transparency increased. However, knowledge sharing did not increase at low levels of promotion focus, regardless of the level of message transparency.

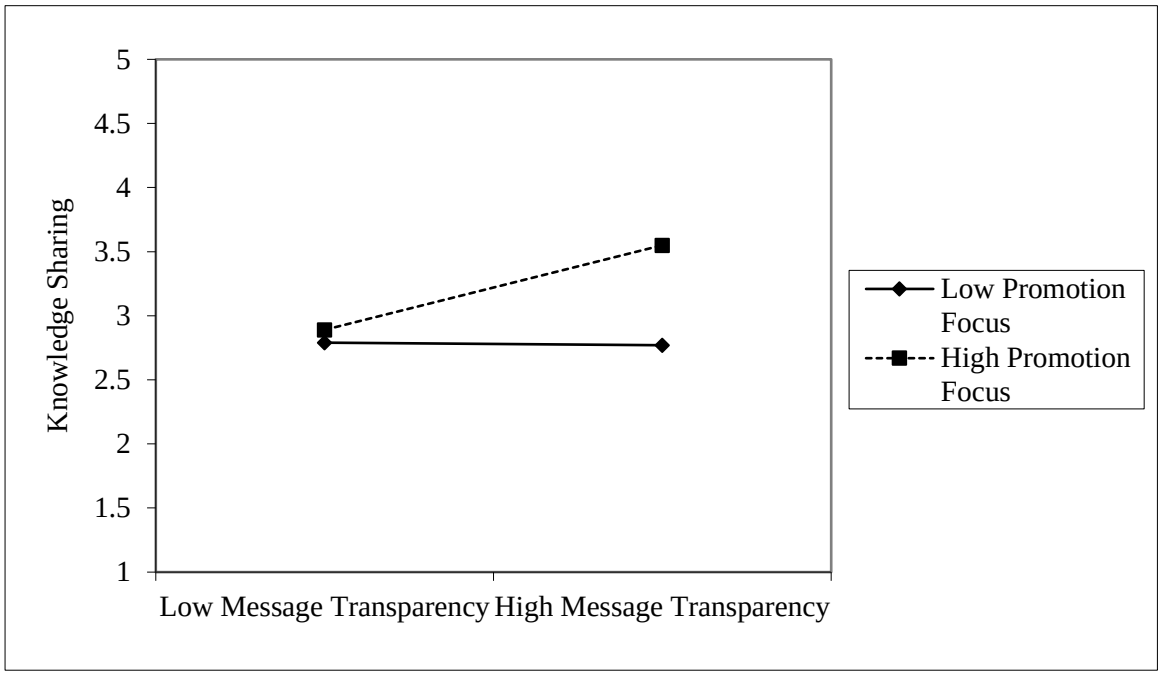

Figure 3. The moderating effect of promotion focus on the relationship between message transparency and knowledge sharing.

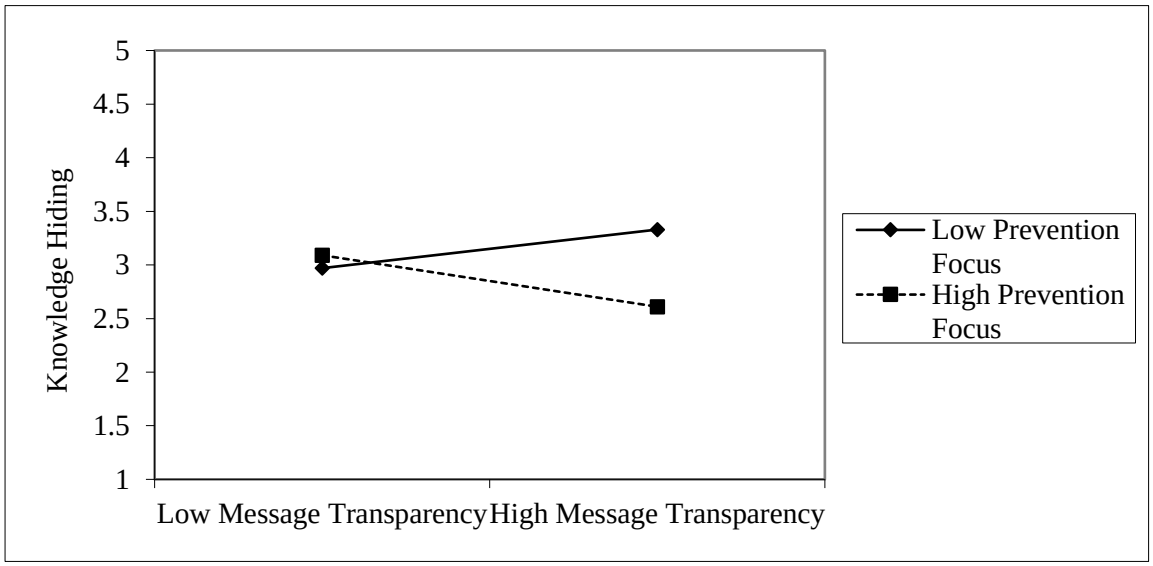

Figure 4. The moderating effect of prevention focus on the relationship between message transparency and knowledge hiding.

The moderating effect of promotion focus on the relationship between network translucence and knowledge sharing was insignificant, rejecting H5b.

The moderating effect of *prevention focus* on the relationship between message transparency and knowledge hiding was negative ($\beta = -.21$, $p < .05$), rejecting H6a. Figure 4 presents this moderating effect. At low levels of prevention focus, knowledge hiding increased when message transparency increased. At high levels of prevention focus, knowledge hiding decreased rapidly when message transparency increased.

The positive moderating effect of prevention focus on the relationship between network translucence and knowledge hiding was significant (β = .19, $p < .05$), supporting H6b. As depicted in Figure 5, the effect of network translucence on knowledge hiding was significant under high and low levels of prevention focus as expected, but stronger under high prevention focus.

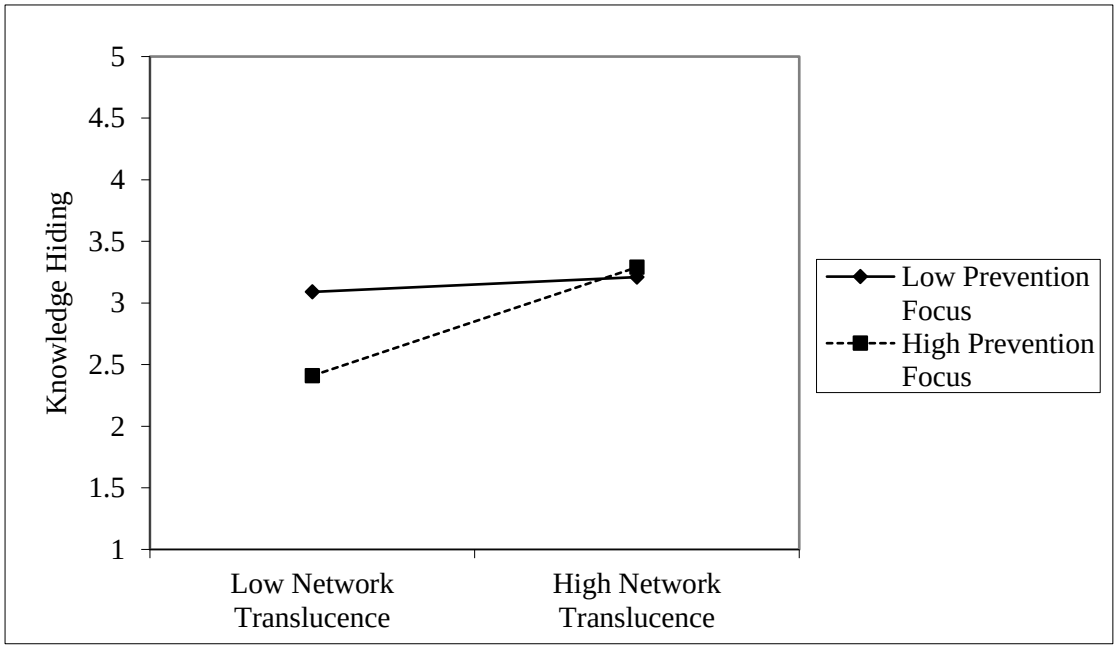

Figure 5. The moderating effect of promotion focus on the relationship between network translucence and knowledge hiding.

The path from knowledge sharing to employee creativity was (positively) significant (β = .50, $p < .001$), and the path from knowledge hiding to employee creativity was also (negatively) significant (β = −.12, $p < .05$). Therefore, H7 and H8 were supported.

Concerning the control variables, only age and tenure were significantly related to knowledge sharing, while only gender was significantly associated with knowledge hiding. Furthermore, gender, age and education were significantly related to employee creativity.

Variables	Knowledge Sharing			Knowledge Hiding			Employee Creativity	
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2
Control Variables								
Gender	−.07	−.00	.01	−.28***	−.24***	−.25***	−.20**	−.20**
Age	−.34**	−.28**	−.28**	−.08	−.10	−.09	−.37***	−.21*
Education	−.08	−.07	−.06	−.13	−.11	−.13*	−.15*	−.12*
Tenure	.32**	.29**	.30***	.12	.14	.11	.17	.02
Main Effects								
Message Transparency	--	**.16***	.16*	--	−.03	−.11	--	--
Network Translucence	--	**.21***	.19*	--	**.25****	.29**	--	--

Knowledge Sharing	--	--	--	--	--	--	--	**.50*****
Knowledge Hiding	--	--	--	--	--	--	--	**−.12***
Promotion Focus	--	.22**	.22**	--	--	--	--	--
Prevention Focus	--	--	--	--	−.15	−.13	--	--
Interaction Effects								
Message Transparency X Promotion Focus	--	--	**.17***	--	--	--	--	--
Network Translucence X Promotion Focus	--	--	−.01	--	--	--	--	--
Message Transparency X Prevention Focus	--	--	--	--	--	**−.21***	--	--
Network Translucence X Prevention Focus	--	--	--	--	--	**.19***	--	--
R^2	6.0%	27.3%	**29.8%**	9.2%	13.8%	**16.1%**	10.7%	**34.3%**
ΔR^2		21.3%	2.5%		4.6%	2.3%		23.6%
F	3.21*	10.71***	9.33***	5.14**	4.58***	4.23***	6.07***	17.50***
Effect Size (f^2)		.23	.03		.05	.03		0.26

N = 208.
Reported values are standardized regression coefficients.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 4

Hierarchical Regression Results

To further assess the significance of the moderating effects of promotion and prevention focus, we calculated the overall effect size (f^2) by comparing the R^2 value changes between the main and the interaction effects (Carte & Russell, 2003). [Note 1] Message transparency and network translucence significantly increased the R^2 of knowledge sharing by 21.3% ($F = 10.71$, $p < .001$), indicating a medium effect size ($f^2 = .23$). The moderating effect of *promotion focus* with message transparency significantly increased the R^2 of knowledge sharing by 2.5% ($F = 9.33$, $p < .001$), indicating a small effect size ($f^2 = .03$).

Message transparency and network translucence significantly increased the R^2 of knowledge hiding by 4.6% ($F = 4.58$, $p < .001$), indicating a small effect size ($f^2 = .05$). When including the interaction effect of *prevention focus*, the R^2 of knowledge hiding was significantly increased by 2.3% ($F = 4.23$, $p < 0.001$), again indicating a small effect size ($f^2 = .03$). Thus, the F-test results verified that these two moderation effects significantly increased the R^2 (Carte & Russell, 2003), though mostly with small effect.

7. Discussion and implications

7.1. *Discussion*

The results yield several interesting observations. First, *network translucence* is positively related to knowledge sharing *and* hiding. *Message transparency* is also positively related to knowledge sharing, but is not related to knowledge hiding. One possible explanation is that message transparency might expose employees' online behavior to others (Leonardi, 2014), making it difficult to hide some knowledge. Further, it seems that awareness of others' network connections (translucence) is a much more salient influence on knowledge hiding than is awareness of others' content (transparency); that is, hiding is motivated more by relationships than by content.

Second, the results confirm that *promotion focus* positively moderates the relationship between message transparency and knowledge sharing. But it has no significant moderating effect on the relationship between network translucence and knowledge sharing. This result indicates that a tendency to take a positive perspective towards risk and achievement leads to more positive interpretations of visible messages, increasing the involvement of employees in knowledge-sharing (Ou et al., 2016). However, employees who value their network-based knowledge sharing relationships (translucence) are more likely to help others (through knowledge sharing) if they request knowledge, regardless of whether promotion focus is high or low. In this sense, communication visibility may overcome one's individual promotion concerns when ESM connections instead of content are the main concern.

Third, the findings also confirm that *prevention focus* positively moderates the positive relationship between network translucence and knowledge hiding. But it negatively moderates the relationship between message transparency and knowledge hiding. One possible explanation is that employees who are prevention-focused, and aware of the transparency of ESM messages, are less likely to hide knowledge, perhaps out of concern of being negatively evaluated by others who do observe and share relevant knowledge when requested to share.

Furthermore, as expected, knowledge sharing has a significant positive relationship with employee creativity, whereas knowledge hiding has a significant negative effect on employee creativity. Prior research showed a negative effect of knowledge hiding on employee creativity in offline and organization situations (Černe et al., 2017; Peng et al., 2018); our results reaffirm those findings in the new organizational context of ESM.

7.2. *Theoretical implications*

The present study makes several key theoretical contributions. First, most investigations of communication visibility predominantly highlight its positive outcomes (Leonardi, 2014; Leonardi & Meyer, 2014). However, recently, researchers have argued that examining the negative sides of communication visibility is also needed (Gibbs et al., 2013; Leonardi, 2015), in line with the general growing focus on paradoxical implications of social

media use in organizations (Rice et al., 2019). The two current streams of research lack consensus on whether communication visibility is beneficial or detrimental. The present research simultaneously considers the bright and the dark sides of communication visibility and thus offers a more comprehensive test of the theory of communication visibility; more generally, there is a false dichotomy between the two research streams. Thus, the findings of the present study contribute a more holistic perspective of how communication visibility may influence employee creativity.

Second, the present research provides a novel view of knowledge management behavior in the ESM contexts. Previous research on knowledge management behavior has focused only on either knowledge sharing (Beck et al., 2014; Chai et al., 2011) or (much less frequently) knowledge hiding (Černe et al., 2014; Tsay et al., 2014). The mixed findings in previous knowledge management behavior research imply that only considering one or the other is inadequate. Indeed, Rhee and Choi (2016) also explained that the failure to distinguish different knowledge-handling behaviors (here, sharing and hiding) may result in contradictory research findings From a theoretical standpoint, positioning knowledge sharing and hiding as a dual mechanism, representing the typically bright and the dark sides of communication visibility on employee creativity, is an important way to make sense of prior inconsistent results about the effect of individual knowledge exchange on creativity (Flynn, 2003; Haas & Hansen, 2005; Kane et al., 2005).. Furthermore, the present research also empirically demonstrates the validity of investigating knowledge sharing and hiding in one theoretical model, because the two types of knowledge-sharing behavior perform differently in terms of their links with their antecedents (here, communication visibility) and consequences (here, creativity). We do also note, however, that there may be justifiable benefits from knowledge hiding in some contexts.

Third, communication visibility theory has assumed that all ESM users are equally likely to share knowledge. However, those characteristics or boundary conditions have been overlooked, leading to oversimplification of the understanding of the context under which communication visibility operates. Prior research has suggested that whether communication visibility is good or bad depends on individual characteristics (Gibbs et al., 2013). In accord, the present study takes individual differences into consideration by hypothesizing that individuals engage in different knowledge management behaviors related to the affordance of communication visibility. The findings thus extend communication visibility theory through a perspective of individual-differences. Thus, the present research offers a more nuanced and situated theoretical understanding of the role of communication visibility in the ESM context.

Fourth, the present research contributes to regulatory focus theory. Although the majority of the existing literature on regulatory focus theory considers organizational settings in general (Ke et al., 2012; Liang et al., 2013), we extend the applicability of this theory to ESM contexts. While scholars have investigated the effect of the motivational dynamics of knowledge-contributing behavior based on regulatory focus theory (Arazy & Gellatly, 2012), the exact relationships among the ESM affordance of visibility, regulatory focus, and knowledge management behavior have until now not been explored. Identifying regulatory focus as a boundary condition of communication visibility theory also provides possible ways to reconcile some confounding results in the ESM literature. For example, empirical evidence for the effect of communication visibility in the ESM literature is highly mixed (Ellison et al.,

2014; Gibbs et al., 2013; Leonardi & Meyer, 2014). The current research can offer a possible explanation for such inconsistency by specifying regulatory focus as a moderator, thereby opening an avenue for future studies for further investigate regulatory focus in original contexts in which the theory develops.

Finally, the he present study also contributes to the current debate on the extent to which organizations can benefit, or suffer, from implementing ESM. The current literature indicated that organizations are often concerned about what true value can be derived from ESM and conclude that ESM use might not generate significant benefits (Ali-Hassan et al. 2015). The present study show that ESM use can actually result in improvements in knowledge sharing among employees and their final creativity.

7.3. *Practical implications*

The current study has three practical implications. First, knowledge sharing remains the primary positive factor in comparison to knowledge hiding, in being related to employee creativity. Employees should recognize that "what goes around comes around." Employees who share knowledge with others can expand their available knowledge base and consequently increase their own creativity. Thus, organizations that have not yet implemented ESM should introduce it to facilitate their employees' knowledge sharing, and organizations that have already implemented ESM should make sure their employees use relevant affordances in the workplace regularly to improve ESM's benefits.

Second, organizations might consider that promotion focus positively influences the relationship between message transparency and knowledge sharing. Organizations can adopt two measures to stimulate knowledge sharing among employees on their ESM. On one hand, organizations should be aware that only improving the message transparency of the ESM is not enough to induce knowledge sharing activities, as, apparently, one's direct and indirect (translucent) network connections on ESM are much more salient influences. In addition, organizations may implement policies that highlight the promotion focus of their employees. For example, managers who want to increase the benefits of message transparency may aim to induce a promotion focus by their employees by highlighting gains, learning, and advancement associated with ESM knowledge sharing. However, regulatory focus is trait-like in nature and thus cannot be easily changed. Approaches that consider regulatory focus should be made to fit individual employees to obtain more positive outcomes. Accordingly, for employees who are promotion-focused, organizations should make the default setting for the ESM unchanged, allowing anyone who uses it to view the content of messages occurring between other users.

Third, organizations might also consider that prevention focus negatively affects the relationship between message transparency and knowledge hiding, whereas it positively influences the relationship between network translucence and knowledge hiding. Therefore, for employees who are prevention-focused, organizations should make the content of the messages exchanged on the ESM more open while masking the users' networks displayed on the ESM, making them less translucent. If organizations do not want to change the default setting of ESM network translucence, then they can also benefit by providing employees with appropriate training that would temporarily reduce the initiation of prevention focus that might reduce the knowledge-hiding activities of employees. For example, managers may avoid inducing a prevention focus by reducing the feeling of anxiety among employees when

making errors and mistakes at work, through building an open and risk-tolerant organizational culture (Ke et al., 2012). Thus, the significance of prevention focus will be deemphasized, and employees will likely reduce their knowledge hiding intentions. However, as noted earlier, there may be valid and rational reasons for individual decisions to hide knowledge (McGrenere & Ho, 2000).

7.4. *Limitations and suggestions for future research*

The limitations of the present research may serve as opportunities for future research. First, future studies can include other theoretically relevant factors. For example, knowledge diffusion in organizations involves multiple social dimensions, so exploring what additional factors might influence employees' different knowledge management behavior in the ESM contexts would be useful.

Second, in the current study, knowledge sharing and hiding behaviors are measured with reference to (recalled) specific knowledge-related interactions. Knowledge management behaviors of responding to knowledge requests by sharing or hiding may vary event-by-event depending on who the requester is, what is being requested, the nature of the task, and other contextual factors (Heinz & Rice, 2009). Thus, future researchers can empirically test the relationships between ESM communication visibility, regulatory focus, and knowledge management behavior across a theoretically meaningful array of contexts.

Third, the data are collected via self-report (although common method bias is not an issue in the present study). Future researchers should undertake the collection not only of data from multiple sources but also objective system-usage data and content analysis of postings related to knowledge behavior.

Fourth, the participants of the present research are the employees of one Chinese organization. Thus, the findings may be influenced by the cultural characteristics of the participants, and the knowledge management practices in the organization. For example, Chinese culture nurtures an interdependent self-view, which exaggerates the moderating role of prevention focus (Ke et al., 2012). Thus, researchers should be cautious when generalizing the findings of the present research to other national or organizational contexts. Future studies can further investigate how the interaction between national cultures and communication visibility and regulatory focus in influencing employee behavior in the workplace.

Finally, the validity of the results of the present study may be limited due to the relatively small sample size. However, the power analyses and the effect sizes suggest that the sample size of 208 was acceptable. It would be much better for future studies to have a bigger sample size for research model with multiple constructs to assure external validity.

8. Conclusion

Although an increasing number of organizations have begun to use ESM in the workplace, the exact role of communication visibility afforded by ESM is still under-investigated. The findings of the present research are crucial in addressing the nuances of debating about the bright and sides of communication visibility. The present research investigates the effects of communication visibility (message transparency and network translucence) enabled by the ESM on employees' knowledge behavior (sharing and hiding), and subsequently implications for their creativity. We also consider the boundary condition of the theoretical relationships by incorporating regulatory focus (promotion and prevention). The research model is verified through surveying 208 ESM users, and has strong theoretical

and practical implications. Our study not only adds to the growing ESM literature by simultaneously considering the bright and dark sides of communication visibility, but also enriches the regulatory focus literature by extending it to a new context.

Notes

1. Effect size f^2 = [R^2 (interaction effect model) − R^2 (main effect model)] / [1 − R^2 (main effect model)]. The f^2 of 0.02–0.14, 0.15–0.34, and above 0.35 are called small-, medium-, and large-effect sizes, respectively, following Cohen (1988).

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Construct and Source	Items
Message Transparency (Leonardi, 2015)	Enterprise social media enables me to... 1. notice the things other coworkers say to one another when they exchange messages on enterprise social media. 2. notice the titles of documents other coworkers post in enterprise social media. 3. carefully read the messages exchanged between my coworkers on enterprise social media. 4. read the documents others post on enterprise social media in detail.
Network Translucence (Leonardi, 2015)	Enterprise social media enables me to... 1. review the list of connections appearing on other coworkers' profile pages in enterprise social media. 2. read others' communications on enterprise social media so as to identify the names of coworkers they might know. 3. notice the names of other coworkers' communication partners when I am on enterprise social media. 4. notice who is listed as a coworker's workgroup members on enterprise social media.
Intro to Knowledge Sharing and Hiding Items	*Knowledge encompasses the information, ideas, and expertise relevant to tasks performed by organizational members. Please think of recent interactions with coworkers who requested knowledge from you and how you responded to them on enterprise social media:*
Knowledge Sharing (Rhee & Choi, 2016)	1. I looked into the request to make sure my answers were accurate. 2. I explained everything very thoroughly. 3. I answered all his/her questions immediately. 4. I told my coworker exactly what he/she needed to know.
Knowledge Hiding (Rhee & Choi, 2016)	1. I agreed to help him/her but never really intended to. 2. I pretended that I did not know the information. 3. I said that I did not know even though I did. 4. Explained that I would like to tell him/her, but was not supposed to. 5. I tried to hide innovative solutions and achievement.
Promotion Focus (Koopman et al., 2015; Neubert et al., 2008)	1. If I had an opportunity to participate in a high-risk, high-reward project I would definitely take it. 2. If my job did not allow for advancement, then I would likely find a new one. 3. A chance to grow is an important factor for me when looking for a job. 4. I focus on accomplishing job tasks that will further my advancement. 5. I spend a great deal of time envisioning how to fulfill my aspirations. 6. My work priorities are impacted by a clear picture of what I aspire to be.

	7. At work, I am motivated by my hopes and aspirations.
Prevention Focus (Koopman et al., 2015; Neubert et al., 2008)	1. I concentrate on completing my work tasks correctly to increase my job security. 2. At work, I am often focused on accomplishing tasks that will support my need for security. 3. Job security is an important factor for me in any job search. 4. At work, I focus my attention on completing my assigned responsibilities. 5. Fulfilling my work duties is very important to me. 6. At work, I strive to live up to the responsibilities and duties given to me by others. 7. I do everything I can to avoid the loss at work. 8. I focus my attention on avoiding failure at work. 9. I am very careful to avoid exposing myself to potential losses at work.
Employee Creativity (Rhee & Choi, 2016)	1. I am a good source of highly creative ideas. 2. I demonstrate originality in my work. 3. I suggest radically new ways of doing things at work.

Appendix A

Measurement Items