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The Effect of Socializing via Computer-mediated Communication on the Relationship between Organizational Culture and Organizational Creativity

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Abstract:

An organization's culture plays a strong role in its creating new knowledge, but, as organizations become more dispersed and technologies more advanced, many come to rely on computer-mediated communication (CMC) for employees to engage in all levels of knowledge management. Researchers have conducted little work to understand the effectiveness of socializing via CMC on organizational creativity, particularly as it relates to organizational culture. Some organizations tend toward a group culture, while others lean toward a rational culture. We investigate how both face-to-face (FTF) and computer-mediated socializing influence the relationship between organizational culture and organizational creativity at each cultural extreme. We surveyed 186 knowledge workers to investigate these relationships. Organizational culture interacted with socializing such that creativity in rational cultures benefited from using CMC to socialize, while group cultures appeared to be agnostic to different socializing types.

Keywords: Knowledge, Socialization, Creativity, Face-to-face, Computer-mediated Communication.

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1 Introduction

Creativity is organic and often unexpected. A casual conversation may spark the next big idea, which is why companies such as HP and Yahoo are bringing their employees back into the office; they want to foster environments that are more collaborative and innovative (Hesseldahl, 2013). Social interactions—that is, socializing—often leads to organizational creativity, such as the generation of novel ideas (Woodman, Sawyer, & Griffin, 1993; Leonard & Sensiper 1998; Gold, Malhotra, & Segars, 2001; Lee & Choi, 2003), because it allows two or more individuals to share (both formally and informally) their tacit knowledge, which includes their personal experiences, feelings, emotions, and mental models (Nonaka, 1994). Formal interactions are characterized by standard protocols that specify who, what, and when of information exchange, while informal interactions are more spontaneous (Kraut, Fish, Root, & Chalfonte, 1990; Conrad & Poole, 2011).

The knowledge management (KM) literature has argued that individuals can share tacit knowledge only through physical proximity and direct face-to-face (FTF) communication (Nonaka, Toyama, & Konno, 2000; Tiwana, 2003; Lewis, 2004), but, with the unprecedented development in computer-mediated technologies, the need for individuals to be physically present at the same time and space has become less necessary (Hammer & Mangurian, 1990; Haag & Cummings, 2008). Eisenberg (1994) suggests that computer-mediated communication (CMC) has completely transformed the traditional means of interaction by eliminating the historical barrier of distance. Individuals use forms of CMC such as email, instant messaging, wikis, blogs, texting, and video conferencing to globally interact with others in both personal and professional ways. Moreover, socializing via computer-mediated methods can be as effective as socializing FTF (Walther, 1996; Walther, 2011) and has generated a substantial amount of research. Research has found information technology as a communication enabler to be useful in certain new product teams depending on whether the task involves exploring, exploiting, or exporting (Ancona & Caldwell, 1990). CMC has had a positive impact on product development teams in supply chain collaboration (Banker, Bardham, & Asdemir, 2006). In their study on social processes and mechanisms that foster a strong online community, Silva, Goel, and Mousavidin (2009) considered factors such as increasing personal reputation, identity, and knowledge sharing that draw communities of practice into weblogs.

Research has shown that the macrostructural properties of electronic networks of practice, including CMC, influence participants' strength of ties in knowledge contributions so that, as long as knowledge workers perceive value is created in the network, they continue to engage with it (Wasko, Faraj, & Teigland, 2004). Though research has investigated the relationship between information technology (IT) and knowledge creation (Lee & Choi, 2003, Choi, Lee, & Yoo, 2010, Dunaway & Sabherwal, 2012), it has generally focused on the extent to which IT is available in an organization for collaboration, communication, storing, indexing, and accessing knowledge (Lee & Choi, 2003) and has not considered organizations' culture.

Organizational culture has presented a major obstacle to the creation of new knowledge (De Long & Fahey, 2000), yet it is also the key to successful knowledge management (Janz & Prasarnphanich, 2003). It can both positively and negatively influence the degree to which individuals socialize with each other (De Long, 1997; De Long & Fahey, 2000; Gold et al., 2001; Pirkkalainen & Pawlowski, 2014). When an organization's culture focuses more on learning, then communities of practice that create knowledge will benefit, which will also positively influence individuals' propensity to use computer-mediated communications (Bell, Lai, & Li, 2012). However, Bell et al. did not consider CMC's influence on how individuals create knowledge. We know little about how computer-mediated socializing affects organizational creativity. Specifically, research has primarily concentrated on the relationship between organizational culture and FTF socializing and, to our knowledge, has not considered how organizational culture influences knowledge creation when influenced by technology. For example, Whelan, Golden, and Donnellan (2013) found that technology can amplify social networking practices by enabling digital gatekeepers of information but that technology cannot replace the human ingenuity necessary for translating and sharing information. While they focused on the creative process of research and development (R&D), they did not consider the culture of the organization and its interaction with technology for creativity.

Technology continues to change the way individuals and organizations interact. It affects firms' boundary-spanning practices by deteriorating interpersonal ties by decoupling personal interactions and object sharing (Levina & Vaast, 2006). As organizations adopt CMC for non-proximate team interaction, we need

to understand its efficacy in organizational creativity. Socializing FTF remains important in enhancing organizational creativity, but organizational members are increasingly using CMC to engage in socializing that creates knowledge (Sproull & Kiesler, 1991, 1992; Bordia, 1997). Therefore, we examine computer-mediated socializing's impact on organizational culture and its role in organizational creativity.

As such, we address the following research questions:

RQ1: How do social interaction types influence organizational culture's role in creativity?

RQ2: Specifically, do FTF social interactions positively influence group cultures' role in creativity, and do computer-mediated social interactions positively influence rational cultures' role in creativity?

We define these specific types of culture in more detail later. Figure 1 shows the research model.

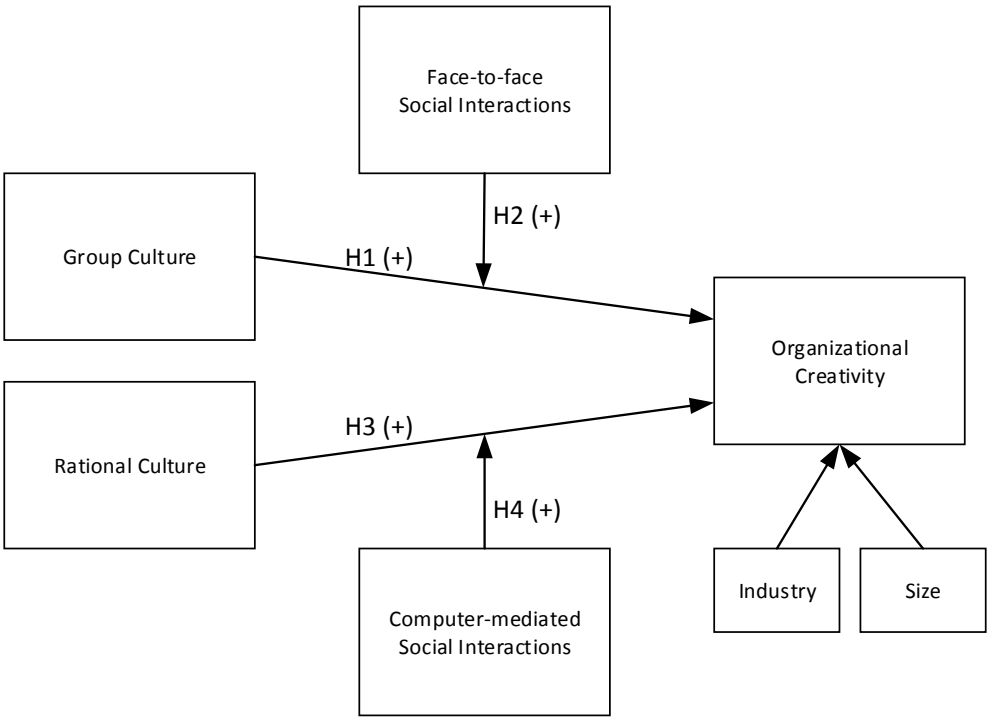

Figure 1. Research Model

This study serves two purposes. First, while scholars have devoted considerable attention to developing theories and models of CMC (e.g., media richness, channel expansion, and media synchronicity (Daft & Lengel, 1986; Carlson & Zmud, 1999; Dennis, Fuller, & Valacich, 2008)) and of KM (e.g., the KM success model, the knowledge repository systems success model, and the theory of organizational knowledge creation (Nonaka, 1994; Kulkarni, Ravindran, & Freeze, 2007; Bock, Sabherwal, & Qian, 2008)), little work pertains to the intersection of KM and CMC. By focusing on computer-mediated socializing, we bring together the disparate research streams of CMC and KM. Second, by concentrating on socializing that creates knowledge (whether via FTF or technology), this research contributes to the tacit dimension of knowledge creation, which, despite its importance to organizations' innovation and creativity, has gathered less attention from scholars compared to more easily codified explicit knowledge (Leonard & Sensiper, 1998).

This paper proceeds as follows: in Section 2, we review relevant literature pertaining to knowledge, knowledge dimensions, organizational culture, and the importance of socializing in organizational knowledge creation. In Section 3, we present our hypotheses and describe our research methods and data analysis. In Section 4, we discuss our findings and their implications for practice and research.

2 Theory and Hypotheses

2.1 Knowledge and Knowledge Dimensions

The KM literature has traditionally defined knowledge as "justified true belief" (Nonaka & Takeuchi, 1995, p. 21). Further, it has classified knowledge into several types (see Alavi & Leidner, 2001, for a detailed review), but tacit and explicit represent the two commonly accepted knowledge types (Nonaka & Takeuchi, 1995; Nonaka & Konno, 1998). Explicit knowledge refers to ideas that one can articulate as words or concepts. Documents, specifications, manuals, databases, and patents are different ways through which individuals express knowledge (Von Krogh, Nonaka, & Rechsteiner, 2012). In contrast, tacit knowledge is not codified, often highly personal, and primarily acquired through experiential learning (Nonaka & Konno, 1998). Tacit knowledge encapsulates a person's experiences, feelings, emotions, and mental models, and, consequentially, cannot be completely represented in words or numbers (Spender, 1996; Leonard, 1995).

According to Nonaka (1994), continuous exchanges between explicit and tacit knowledge create knowledge. These continuous exchanges lead to the four intertwined knowledge-creation steps (see Figure 2): 1) socializing (i.e., sharing tacit knowledge through interactions); 2) externalizing (i.e., explicating tacit knowledge in form of words, numbers, or diagrams); 3) combination (i.e., capturing, disseminating, and processing existing explicit knowledge); and 4) internalizing (i.e., converting explicit knowledge into tacit knowledge). While all of the four steps are critical for creating organizational knowledge, we focus on the first process (socializing) because Nonaka (1994) considered interactions between individuals as the foremost step for creativity. For example, given knowledge's dynamic nature (Nonaka et al., 2000; Nonaka & Von Krogh, 2009), Grant (1996) and Sabherwal and Becerra-Fernandez (2003) argue that individuals need to interact with others to develop organizational knowledge. Andreeva and Ikhilchik (2011) assert that individuals in a social setting create new knowledge rather than a single individual alone and that, through socializing with others, individuals realize the true potential of exchanged knowledge and how to use it in new ways (Gold, Malhotra et al. 2001, Kulkarni et al. 2007). These social interactions allow individuals to put forward their perceptions, views, and ideas, which often translate into interesting and novel outcomes (Csikszentmihalyi & Sawyer, 2014; Von Krogh, Ichijo, & Nonaka, 2000). Badaracco (1991) calls knowledge a social product because one can only transfer tacit knowledge through informal, interpersonal interactions (Nonaka, 1994; Schulze & Hoegl, 2006). Organizational members need to socialize to develop original knowledge because it allows them to share tacit knowledge.

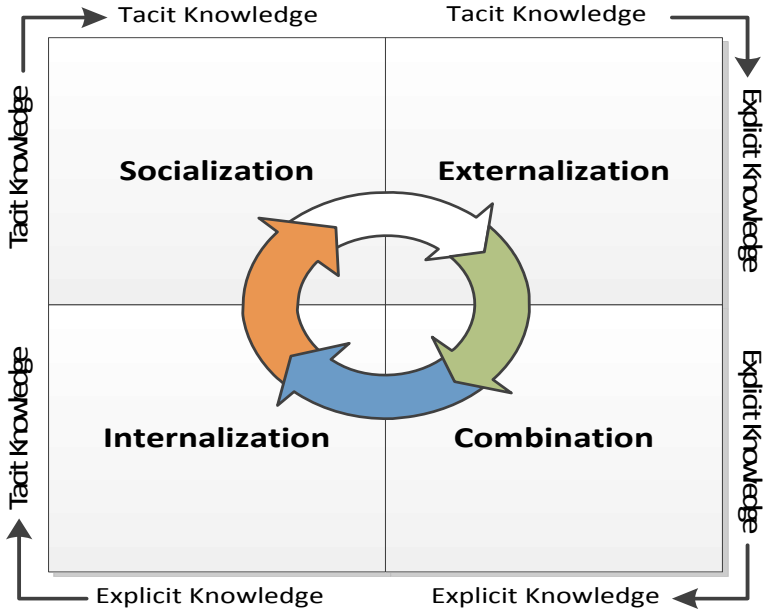

Figure 2. SECI Model

Given its personal nature, one cannot easily explicate tacit knowledge, and KM and organizational literature demonstrates that individuals can only share tacit knowledge through FTF interactions (Howells, 2000). As Nonaka et al. (2000, p. 16) put it:

> *An individual face-to-face interaction is the only way to capture the full range of physical senses and psycho-emotional reactions, such as ease or discomfort, which are important elements in sharing tacit knowledge.*

Though they acknowledge the role of different media including email and teleconferencing in employee interactions, Nonaka and Konno (1998) and Nonaka et al. (2000) recommend FTF interactions for exchanging tacit knowledge and computer-mediated interactions for circulating existing explicit knowledge across an organization. Howells (2000) affirms the view that CMC cannot substitute for FTF communication, but this view is not unanimous. For example, Lee and Choi (2003) envision that future developments in information technology should enable rich interactions among individuals, and, as technology continues to improve, the gap between physically proximate FTF and CMC (e.g., video conferencing) narrows.

Although the research so far has yielded useful insights, there is disconnect between KM and CMC regarding knowledge creation. Unquestionably, FTF interactions best facilitate the sharing of tacit knowledge, and CMC may never completely replace FTF communication. However, with recent developments in technology, CMC can be as effective as FTF communication in certain cases. Joseph B. Walther (1996, p. 4) in his seminal paper said:

> *Although novice users and the uninitiated still seem to suspect that CMC may be impersonal, growing numbers of reports are appearing that reflect more personal CMC interaction, sometimes just as personal as face-to-face (FtF) interaction, or even describing interaction that surpasses FtF in some interpersonal aspects.*

Because of the varying perspectives among scholars pertaining to CMC's capability to create knowledge, we discuss the underlying differences between FTF communication and CMC in Section 2.2.

2.2 Face-to-face vs. Computer-mediated Communication

CMC describes a variety of Internet-based communications media. Some research indicates that, with the rapid development of Internet-based technologies, CMC can substitute for FTF communication (Nguyen, 2008); thus, it is not surprising that much research compares CMC with FTF communication (Sproull & Kiesler, 1992; Walther, 1996; Bordia, 1997). Further, two well-recognized media theories, media richness and media synchronicity, allow researchers to classify a wide selection of CMC technologies.

Media richness theory (MRT) categorizes different media based on their ability to allow instant feedback, support a variety of social-context cues, permit the use of natural language, and establish a conversation that is personally focused (Daft & Lengel, 1986; Daft, Lengel, & Trevino, 1987; Trevino, Lengel, & Daft, 1987). Based on these four criteria, FTF communication is the richest medium, and CMC is less rich (Daft et al., 1987). MRT made significant contributions early in the research developments of CMC, but researchers have since criticized it for not considering the impact of social processes that may affect individuals' media use (Markus, 1994). Moreover, MRT has gathered only limited empirical support (Valacich, Mennecke, Wachter, & Wheeler, 1994).

Moving beyond MRT, Dennis et al. (2008) have proposed media synchronicity theory (MST). While they derived MST from MRT (Steizel & Rimbau-Gilabert, 2013), MST is based on the principle of synchronicity, which describes the extent a medium allows individuals to simultaneously work toward developing a shared understanding (Carlson & George, 2004; Dennis et al., 2008). MST proposes five media capabilities: 1) transmission velocity (i.e., how quickly a message can be transmitted), 2) parallelism (i.e., how many messages from multiple individuals can be sent concurrently), 3) symbol sets (i.e., a medium's ability to convey a variety of cues), 4) rehearsability (i.e., the ability to review or edit a message before sending), and 5) reprocessability (i.e., a medium's ability to store a message for later use or reference). While a medium with high transmission velocity and more symbols is highly synchronous, other media capabilities, such as parallelism, rehearsability, and reprocessability, make a medium less synchronous. Simply put, one can explain the inherent difference between FTF communication and CMC in terms of synchronicity (Tanis & Postmes, 2003).

2.3 Organizational Culture

Organizational culture is a complex construct, and, not surprisingly, no general agreement about its definition exists (Barney, 1986). Dowling (1993) defines organizational culture as a glue that holds an organization together, while Iivari and Huisman (2007) indicate that organizational culture embodies almost everything in an organization.

We follow Schein (1990) who calls the notion of organizational culture "ambiguous" and describes three levels of organizational culture: artifacts, values, and assumptions. Artifacts refer to the most observable aspects of organizational culture. They include the office layout, the way individuals dress, the ambience of the place, stories, myths, organizational symbols, and so on. Schein (1990) suggests that, while artifacts are highly visible characteristics of organizational culture, one cannot directly interpret them without complete understanding of their relationship with each other and their basic underlying assumptions. Unlike artifacts, assumptions reflect the intangible elements of organizational culture such as feelings, thoughts, and behaviors, and they require immersion into organizational history to discover their true meaning (Schein, 1990). The third level of organizational culture is espoused values (Schein, 1990, 1996, 2006), which lie between artifacts and assumptions. Thus, espoused values, though more visible than deep-rooted assumptions, are less obvious than artifacts. Bansal (2003) describes values as taken-for-granted rules through which people perform their day-to-day organizational tasks.

Due to the likelihood of misinterpretation, artifacts do not reliably indicate organizational culture (Schein, 1990). Conversely, assumptions are deeply hidden in an organization and require one to intensively probe them to draw them to the surface (Schein, 1990). For this reason, some widely used cultural frameworks (Hofstede, 1980; Quinn & Rohrbaugh, 1981; Cooke & Szumal, 1993) conceptualize organizational culture in terms of values (Alavi, Kayworth, & Leidner, 2006). Unlike artifacts and assumptions, one can study values via surveys and questionnaires (Schein, 1990). Thus, consistent with the extant KM research (Alavi et al., 2006; Shao, Feng, & Liu, 2012), we take the values-based perspective of organizational culture and use Quinn and Rohrbaugh's (1983) competing values framework (CVF) to examine culture at the organizational level.

According to CVF, organizations differ in terms of the two competing values of flexibility and stability. These values help one differentiate between organic and mechanistic organizations (Burns & Stalker, 1961; Denison & Spreitzer, 1991). Organic organizations tend to more flexible, while mechanistic organizations strive for authority. In other words, this dimension highlights an organization's emphasis on stability, order, and control as opposed to change, diversity, and dynamism (Quinn & Rohrbaugh, 1981; Cameron & Quinn, 2011). Moreover, organizations also individuate by focusing on tasks rather than people (Quinn & Rohrbaugh, 1981, 1983; Denison & Spreitzer, 1991). While a task-oriented organization tends to evaluate everything from the organization's perspective and primarily focuses on accomplishing the task, a people-oriented organization values its employees and concentrates on giving them a workplace environment that best suits their needs rather than emphasizing standardization.

The intersection of these competing CVF values—people versus task and flexibility versus stability—generate four cultural forms: group culture, developmental culture, rational culture, and hierarchical culture. We investigate group and rational cultures to understand the relationship between organizational culture and FTF and CMC interactions. By doing so, we can focus on two entirely opposite forms of organizational culture. Table 1 depicts the foci and character traits of the two competing cultures.

Table 1. CVF: Group and Rational Cultures (Denison & Spreitzer, 1991)

Group culture	Rational culture
• Internal focus • Flexible (change) • Discussion / participation / openness • Concern / commitment / morale	• External focus • Stable • Goal clarification / direction / decisiveness • Accomplishment / productivity / impact/profit

2.4 Organizational Creativity

Creativity refers to the generation of novel ideas, and scholars have studied it at multiple levels (Woodman et al., 1993; Drazin, Glynn, & Kazanjian, 1999). For example, Slappendel (1996) studied creativity at the individual level, while Kurtzberg and Amabile (2001) examined the creativity of groups. Vicari and Troilo (2000) argue that one should consider it at the organizational level. Further, Woodman et

al.'s (1993) theoretical framework connects individual, group, and organizational-level creativities with each other. Consistent with the other constructs in our own study, we examine knowledge workers' perceptions of creativity in their organizations.

Woodman et al. (1993) defines organizational creativity as the process of generating new and constructive ideas (or products) in organizations' complex social settings. Creativity and innovation share a close link, and, while organizations need creativity for innovation, creativity does not necessarily lead to innovation (Amabile, 1996; Zhou & Shalley, 2007; Luo, Zhang, Xu, & Ling, 2013). Amabile (1996) argues that creativity is the process of inventing ideas or products that are somewhat unique from their existing substitutes. However, uniqueness or newness does not always translate into being creative. To call a novel idea or a product creative, experts in the concerned field need to scrutinize and verify it (Amabile, 1996). In contrast, innovation is the process of effectively applying creative ideas in an organization. According to Rogers (1998), organizations innovate to increase their performance and are not concerned with whether the creative idea was invented internally or externally (Amabile, 1996). Since creativity is a necessary but not sufficient antecedent to innovation, research considers creativity a subset of innovation (Woodman et al., 1993).

Next, we derive hypotheses pertaining to the relationship between organizational culture and FTF and computer-mediated socializing.

Flexibility and an internal focus reflect group culture, which points to the importance of human relations in organizations. A group culture-oriented organization considers its employees as its most valuable asset. Managers act as mentors and encourage openness and group cohesion. Employees often consider their coworkers as extended family and have high levels of mutual trust and respect. Group culture creates a sense of belonging among employees, which fosters member commitment and loyalty. This form of culture encourages employee participation and endorses achieving consensus during discussions.

De Long and Fahey (2000) suggest that organizations' culture definitively shapes knowledge-creating socializing. Therefore, a culture that inhibits the free flow of information and constrains employee participation is likely to discourage its employees from sharing knowledge through interactions (De Long and Fahey 2000). Socializing is critical for creating knowledge in organizations because it facilitates the exchange of knowledge among not only individuals who work in the same team or department but also those who may not be co-located (O'Dell & Grayson, 1998; Gold et al., 2001). As people interact, ideas often cross-pollinate. Organizational culture also affects how individuals socialize (De Long & Fahey, 2000; Watson-Manheim & Bélanger, 2007). Given that a group culture-oriented organization provides an open environment in which norms and practices focus on encouraging employee participation rather than exercising authority and control, there should not be any predefined guidelines about using media; instead, the organization should see media as a tool to facilitate participation and share knowledge. A group culture-oriented organization is likely to endorse both FTF and CMC interactions. However, the greater the number of FTF interactions, the greater the influence group culture organizations will have on creativity. Therefore, we propose:

Hypothesis 1: Group culture has a positive influence on organizational creativity.

Hypothesis 2: Face-to-face social interactions positively influence the effect group culture has on organizational creativity.

While group culture emphasizes flexibility, its primary focus remains on organizational members. In contrast, a rational organization promotes stability while focusing on achieving efficiency in its tasks (Cameron & Quinn, 2011). In this sense, rational and group culture are polar opposites. Rational organizations tend to be highly aggressive, their employees need to meet goals and objectives, and managers invoke workplace competitiveness. In other words, a rational culture is highly production oriented with a primary focus on getting the job done in an efficient manner (Cameron & Quinn, 2011). Unlike group culture, which often provides a family-like environment, decisiveness and competitiveness drive rational cultures. A rational organization emphasizes selecting the most profitable outcome rather than achieving consensus in discussions. Given rational organizations' goal-oriented and decisive nature, we expect that they will value organizational creativity and pursue it as an objective. Therefore, we propose:

Hypothesis 3: Rational culture has a positive influence on organizational creativity.

While the role of FTF interactions is well recognized in the KM and organizational literature, the relationship between the computer-mediated socializing and creativity has received comparatively little

attention because CMC, compared to FTF communication, lacks richness and synchronicity (Daft & Lengel, 1986; Dennis et al., 2008). Due to the delay in conveying a message to a sender and the inability to transmit a variety of social-context cues, CMC is often considered impersonal (Walther, 1996). However, the recent advances in communication technologies have revolutionized the ways individuals interact in organizations and society (Tassabehji & Vakola, 2005; Walther, 2011). As such, it is not surprising that research in communication has increasingly advocated using CMC for interpersonal interactions (Walther, 1996; Parks & Roberts, 1998, Walther, 2011).

Though different in nature, CMC does hold certain advantages over FTF communication. For example, Robertson, Swan, and Newell (1996) argue that, since individuals in the same teams or departments likely possess similar information, interactions across teams, organizational departments, or organizations will likely produce fresh ideas. CMC allows individuals to interact and share knowledge with each other regardless of their physical location, and it can perform an important role in enhancing organizational creativity. Moreover, certain CMC may overcome the temporal barrier and, thereby, increase the amount of knowledge exchanged between individuals (Alavi & Leidner, 2001). Additionally, several studies have found that CMC minimizes social influences such as status or power and fosters equal member participation (Sproull & Kiesler, 1991; Sproull & Kiesler, 1992; Walther, 1996; Croson, 1999).

Research has compared the role of CMC and FTF communication in reaching agreement during dialogues (Croson, 1999). Kiesler and Sprull (1992) found that CMC discussions were slower than FTF in building consensus among groups. Certainly, CMC's slowness to provide immediate feedback and the inability to transmit an array of social cues or symbols introduces a delay in discussions and prolong interactions. However, the delay caused by rehearsability and reprocessability can foster critical thinking by providing individuals additional time to intelligently express their thoughts and allowing them to decode or reexamine past conversations before responding (Aylward & MacKinnon, 1999; Dennis et al., 2008).

Rational organizations are likely to consider computer-mediated socializing as efficient for several reasons. First, certain CMC media allow multiple individuals to share knowledge in parallel (Dennis et al., 2008). In this way, for a given time period, more knowledge can be shared through computer-mediated socializing in contrast to traditional FTF (Burgoon et al., 1999). Second, rehearsability provides extra time for people to thoughtfully craft their messages (Dennis et al. 2008). Thus, CMC media that support rehearsability facilitate the effective sharing of complex information, especially between those who do not have prior understanding about the communication context or do not share the same lexicon (Dennis et al., 2008). Finally, CMC media with reprocessability permit individuals to review and evaluate past interactions before responding to or engaging in new communication (Dennis et al., 2008). Reprocessability is particularly desirable when knowledge is complex and voluminous. Rational organizations tend toward the mechanistic (Quinn & Rohrbaugh, 1981) and will likely encourage individuals to use CMC to socialize due to its quantifiable nature (i.e., number email messages sent or time spent in Web conferencing), which is useful for evaluating employee productivity and efficiency. Also, one can ignore and queue CMC, which allows a rational culture's members to more efficiently use their time and energy by postponing interactions with others until a more appropriate time. Thus, we propose:

Hypothesis 4: Computer-mediated social interactions positively influence the effect group culture has on organizational creativity.

3 Methodology

To test our hypotheses, we surveyed knowledge workers about their perceptions of their organizational culture, social interactions, and organizational creativity. We sent the survey, which used a seven-point Likert agreement scale, to 900 knowledge workers who we randomly selected from a LinkedIn-based online KM community. In total, we obtained 186 responses (20.7% response rate). Job titles of the participants included knowledge manager, knowledge management leader, knowledge strategist, knowledge officer, knowledge analyst, and knowledge architect. Further, respondents represented knowledge workers in a variety of industries including computers/software, financial/insurance, government, services, retail, and manufacturing and had an average of over eight years of work experience (see Table 2 for respondents' characteristics).

Table 2. Sample Characteristics (N = 186)

Industries	
Computers/Software, Electronics, & Internet	28%
Services, Communication, & Utilities	14%
Government & Non-profit	14%
Finance, Insurance, Real Estate	11%
Manufacturing, Construction, Agriculture, & Mining	9%
Retail & Wholesale	3%
Others (Chemicals, Publishing, Healthcare, Transportation, etc.)	21%
Total experience	
Less than 5 years	13%
5 to 10 years	20%
More than 10 years	67%
Number of employees in the organization	
Fewer than 1,000	50%
1,000 to 10,000	18%
More than 10,000	32%

3.1 Construct Measures

We drew measures from the existing literature on knowledge management and organizational culture. We measured organizational creativity using five items that Lee and Choi (2003) propose. We measured group and rational cultures using the scales that Iivari and Huisman (2007) suggest (themselves based on the instrument that Yeung, Brockbank, and Ulrich (1991) develop). We measured FTF and CMC interactions using three items that Schulze and Hoegl (2006) propose. We specifically focused on the three types of interactions: intra-team interactions to discuss ideas, cross-department interactions to discuss ideas, and cross-department interactions to create a common understanding of a problem. See Table 3 for constructs and measurement items.

To test for nonresponse bias, we used Armstrong and Overton's (1977) method of comparing the responses of early respondents (first 40) and late respondents (last 40) on all variables. The analysis revealed no statistically significant differences. Further, given that we measured all the variables in the present study using an online survey, we conducted Harman's single-factor test to check whether common method variance was a major concern (Podsakoff & Organ, 1986). We conducted exploratory factor analysis on all of the five variables using principal components analysis, and we examined the unrotated factor solution. According to Harman's single-factor test, if there is considerable common method variance, then one single factor will explain the majority of covariance in the latent variables (Podsakoff & Organ, 1986). The analysis generated five factors with first factor explaining 30.3 percent of the variance, and no single factor stood out. To test for inherent bias in our sampling design, we performed post hoc analysis to further analyze responses of FTF or CMC against the alternate culture.

3.2 Data Analysis

We analyzed the data using PLS-SEM (version 3.2.4) and, subsequently, conducted hierarchical regression in SPSS (version 21). We first assessed the measurement model using PLS by following the guidelines set by Hair, Black, Babin, and Anderson (2010) and Hair, Hult, Ringle, and Sarstedt (2013). All items had outer loadings above 0.5 (see Table 5), which is the cutoff criteria that Hair et al. (2013) suggest. Internal consistency reliability (ICR) values between 0.70 and 0.90 are generally considered satisfactory (Hair et al., 2013). Additionally, average variance extracted (AVE) values above 0.50 demonstrate convergent validity. The values reported in Table 4 demonstrate sufficient reliability (all ICR values > 0.70) and convergent validity (all AVE values > 0.50). Thus, we retained all items for group culture (three -items), rational culture (three items), FTF socializing (three items), computer-mediated socializing (three items), and organizational creativity (five items). We assessed discriminant validity using Fornell and Larcker's (1981) criterion that the square root of the AVE values of each latent variable should

be greater than its correlation with any other construct. As Table 4 shows, the diagonal elements were greater than the construct's correlations with any other constructs. We further assessed discriminant validity by examining items' cross loadings (Table 5), which were smaller than their intended factor loadings (Hair et al., 2010, 2013). In sum, our measurement model demonstrated satisfactory reliabilities, discriminant validity, and convergent validity.

Table 3. Constructs And Measurement Items

Group culture* (ICR = 0.792, AVE = 0.564) (Iivari & Huisman, 2007)			
		Mean	S.D.
G1	The glue that holds the organization I work in together is loyalty and tradition.	4.80	1.56
G2	The organization I work in is a very personal place.	4.75	1.62
G3	The organization I work in emphasizes human resources.	4.68	1.63
Rational culture* (ICR = 0.752, AVE = 0.511) (Iivari & Huisman, 2007)			
		Mean	S.D.
R1	The glue that holds the organization I work in together is the emphasis on tasks and goal accomplishment.	5.31	1.38
R2	The organization I work in is a very production-oriented place.	5.44	1.30
R3	The organization I work in emphasizes competitive actions, outcomes and achievement.	4.73	1.46
Organizational creativity* (ICR = 0.945, AVE = 0.773) (Lee & Choi, 2003)			
		Mean	S.D.
OC1	Our organization has produced many novel and useful ideas (services/products).	5.68	1.30
OC2	Our organization fosters an environment that is conductive to our own ability to produce novel and useful ideas (services/products).	5.45	1.48
OC3	Our organization spends much time for producing novel and useful ideas (services/products).	4.95	1.54
OC4	Our organization considers producing novel and useful ideas (services/products) as important activities.	5.55	1.41
OC5	Our organization actively produces novel and useful ideas (services/products).	5.26	1.51
FTF Social interactions** (ICR = 0.917, AVE = 0.786) (Schulze & Hoegl, 2006) Describe the extent to which members of your organization use face-to-face communication for:			
		Mean	S.D.
FTF1	Personal interactions aside from organized meetings with other people in the team to discuss suggestions, ideas, or solutions.	4.63	1.32
FTF2	Personal interactions aside from organized meetings with people from other departments in the company in order to discuss suggestions, ideas, or solutions.	4.77	1.33
FTF3	Conscious creation of a common understanding of a problem with people from other departments in the company.	5.08	1.37
CMC social interactions** (ICR = 0.918, AVE = 0.789) (Schulze & Hoegl, 2006) Describe the extent to which members of your organization communicate via computer for:			
		Mean	S.D.
CM1	Personal interactions aside from organized meetings with other people in the team to discuss suggestions, ideas, or solutions.	4.75	1.34
CM2	Personal interactions aside from organized meetings with people from other departments in the company in order to discuss suggestions, ideas, or solutions.	4.26	1.44
CM3	Conscious creation of a common understanding of a problem with people from other departments in the company.	3.96	1.52
** We measured items using a seven-point Likert-type scale (1 = never, 2 = very rarely, 3 = rarely, 4 = occasionally, 5 = frequently, 6 = very frequently, 7 = always).			

Table 4. Correlation Matrix

Construct	ICR	AVE	Correlation of constructs				
Group culture	0.792	0.564	**0.751**				
Rational culture	0.752	0.511	0.291	**0.715**			
FTF social interactions	0.917	0.786	0.272	0.089	**0.887**		
CMC social interactions	0.918	1.26	0.157	0.162	-0.273	**0.888**	
Creativity	0.945	0.773	0.476	0.344	0.181	0.203	**0.879**
* The diagonal elements in **bold** represent the square root of the AVE of each latent variable							

Table 5. Cross-loadings

	Group	Rational	FTF Soc	CMC Soc	Creativity
G1	**0.77**	0.07	0.23	0.10	0.38
G2	**0.61**	0.29	0.19	0.10	0.23
G3	**0.86**	0.32	0.21	0.15	0.43
R1	0.15	**0.77**	0.05	0.15	0.26
R2	0.08	**0.52**	-0.02	0.19	0.13
R3	0.33	**0.82**	0.12	0.07	0.31
F1	0.23	0.08	**0.89**	-0.21	0.17
F2	0.28	0.05	**0.93**	-0.28	0.18
F3	0.21	0.12	**0.84**	-0.25	0.12
C1	0.11	0.12	-0.24	**0.88**	0.16
C2	0.16	0.16	-0.24	**0.91**	0.19
C3	0.15	0.15	-0.25	**0.87**	0.18
OC1	0.26	0.26	0.06	0.19	**0.82**
OC2	0.51	0.29	0.22	0.20	**0.89**
OC3	0.39	0.35	0.20	0.14	**0.89**
OC4	0.43	0.32	0.19	0.15	**0.88**
OC5	0.46	0.29	0.09	0.22	**0.92**

While each measure satisfied tests for discriminant and convergent validity and we are confident in continuing the analysis of the relationships between the measures, some relationships that Table 4 shows deserve attention. In particular, we found a fairly strong correlation between group culture and rational culture. A possible explanation for this correlation is that organizations may have elements of both cultures. That is, few purely group and purely rational culture organizations may exist; instead, organizations may blend both in varying degrees. The organization's size and industry could also influence this correlation; thus, we controlled for these factors in our analysis. We also found a negative correlation between FTF and CMC social interactions. While we would expect a blend of these types of interactions in organizations, our subjects may have inadvertently anchored their responses based on recent communications or on the type of communication they recalled most quickly. These two apparent relationships do not obstruct our research questions, but they are cause for caution in interpretation and application. We further checked variance inflation factors (VIF) to rule out multicollinearity. The VIF values for CMC social interactions (1.17), FTF social interactions (1.22), group culture (1.22), and rational culture (1.11) were below the 3.3 cutoff value (Petter, Straub, & Rai, 2007), which suggests that the significant correlations between variables in the study were not multicollinear.

After evaluating the measurement model, we then examined the structural model using the bootstrapping procedure in SmartPLS. Because of the directional nature of the hypotheses, we performed one-tail t-tests. Figure 3 shows the relationships between organizational cultures, interaction types, and organizational creativity controlling for organizational size and industry.

3.3 Results

The model generated an R^2 = 30.6 percent. We found support for three of the four hypotheses (see Figure 3 and Table 6 for the results). The effect of group culture on organizational creativity was significant, but the effect of FTF social interactions was not significant in role of group cultures on organizational creativity. Thus, we found support for H1 but not H2. We also found that rational culture was positively related with organizational creativity, which supports H3. Furthermore, computer-mediated socializing significantly influenced rational culture's relationship role in organizational creativity, which supports H4.

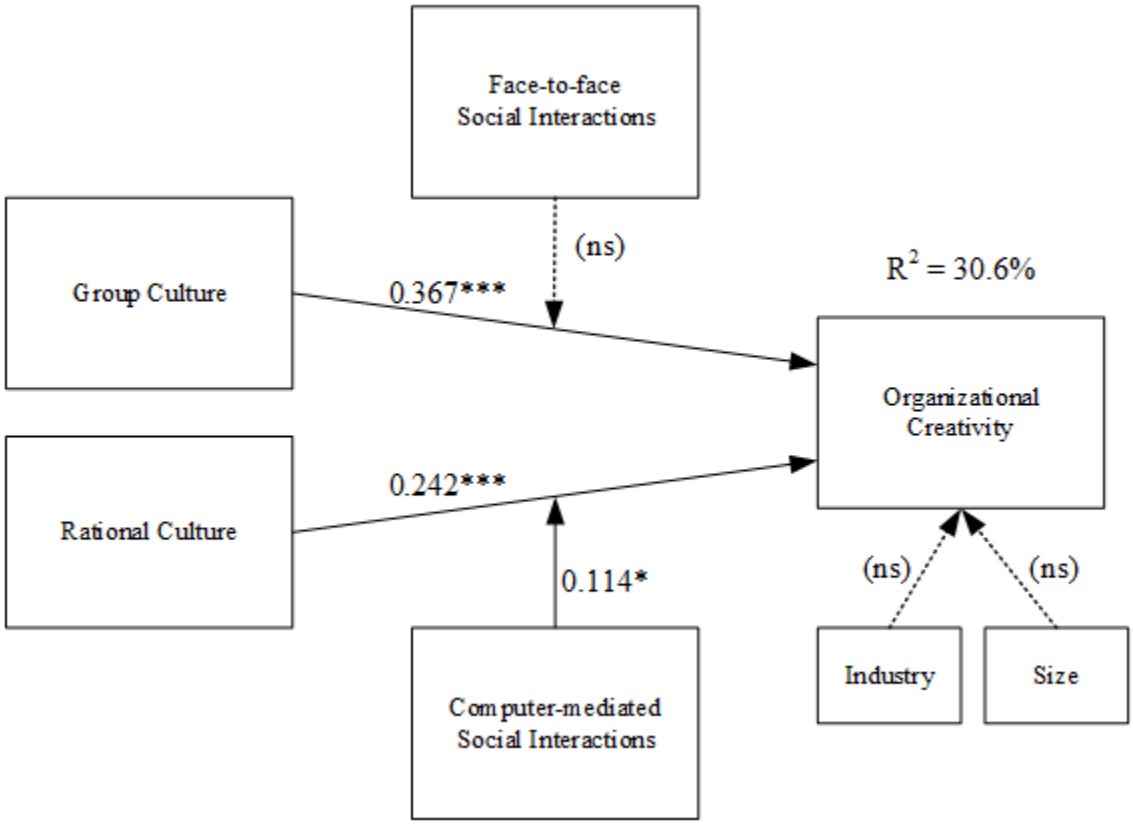

Figure 3. Results (* p < 0.05, *** p < 0.001, ns = not significant)

Table 6. Results

Independent variables	Hypotheses	Results	Results
Group culture	H1: Group culture has a positive influence on organizational creativity.	Supported	0.367***
Group culture	H2: Face-to-face social interactions positively influence the effect group culture has on organizational creativity.	Not supported	-0.024
Rational culture	H3: Rational culture has a positive influence on organizational creativity.	Supported	0.242***
Rational culture	H4: Computer-mediated social interactions positively influence the effect group culture has on organizational creativity.	Supported	0.114*
Notes: * p < 0.05; ** p < 0.01; *** p < 0.001.			

4 Discussion

To gain a richer understanding of our findings, we next conducted two separate regression analyses using SPSS so that we analyzed each culture and interaction type distinctly from the other culture and interaction. As Table 7 shows, in the first step, we examined the effects of the control variables on the

dependent measures. In step two, we examined the effects of the control variables and the independent variables culture and social interactions on organizational creativity. Finally, in step three, we added the interaction between organizational culture and social interactions.

4.1 Group Culture's Influence on Socializing

We initially found that group culture positively influenced organizational creativity (H1). An open workplace environment with no strict rules and regulations is apt to encourage member participation and, thereby, stimulate creativity. The change in R^2 increased from .000 to .216 when we added group culture in step two. When adding the interaction variable to the model in step three (Table 7), we found no significant change in either R^2 or F. Thus, we did not find support for the proposed interaction between group culture and FTF socializing (H2) possibly because group culture is highly people oriented with an atmosphere that already emphasizes socializing, which makes it difficult to separate culture and socializing. In other words, group culture organizations are agnostic to the manner in which socializing occurs.

Table 7. Group Culture Model Summary

Step	R	R square	Adjusted R square	Std. error of the estimate	Change statistics				
					R square change	F Change	Df1	Df2	Sig. F change
1	.016	.000	-.010	1.27663	.000	.026	2	192	.975
2	.465	.216	.200	1.13619	.216	26.199	2	190	.000
3	.466	.217	.196	1.13886	.000	.108	1	189	.743
Step 1: predictors: (constant), industry, size Step 2: predictors: (constant), industry, size, GrpCult, FTFSoc Step 3: predictors: (constant), industry, size, GrpCult, FTFSoc, GCXFTF									

4.2 Rational Culture's Influence on Socializing

We also expected that rational culture would positively influence organizational creativity (H3), which was supported. Rational organizations tend to be highly mechanistic, which suggests they primarily focus remain on achieving productivity in organizational tasks. Rational organizations are likely to consider CMC as highly efficient for socializing and encourage it because of the three capabilities suggested by MST: parallelism, reprocessability, and rehearsability. We found support for this hypothesis (H4). Furthermore, while the R^2 had the greatest change in step two when we introduced rational culture to the model, there was still significant F change with the introduction of the interaction in step three (Table 8).

Table 8. Rational Culture Model Summary

Step	R	R square	Adjusted R square	Std. error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
1	.016	.000	-.010	1.27663	.000	.026	2	192	.975
2	.364	.133	.114	1.19542	.132	14.487	2	190	.000
3	.399	.160	.137	1.17978	.027	6.069	1	189	.015
Step 1: predictors: (constant), industry, size Step 2: predictors: (constant), industry, size, RatCult, CMCSoc Step 3: predictors: (constant), industry, size, RatCult, CMCSoc, RCXCMC									

4.3 Interaction of Computer-mediated Socializing and Rational Culture

Computer-mediated socializing interacted with rational culture to influence creativity. We plot this interaction in Figure 4, which shows that computer-mediated socializing interacted with rational culture such that high computer-mediated socializing yielded higher organization creativity than low computer-mediated socializing when rational culture was high. However, when rational culture was low, there appeared to be little or no difference between high and low computer-mediated socializing

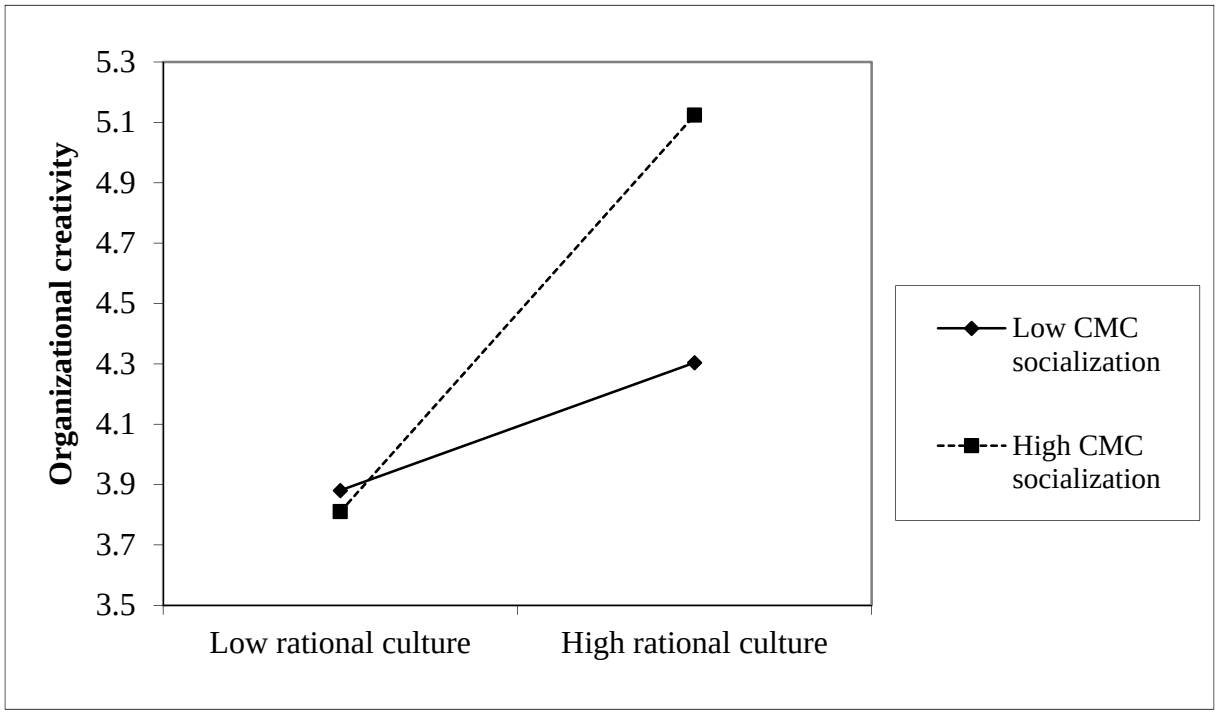

Figure 4. Two-way Interaction between Rational Culture and Computer-mediated Socializing

4.4 Post Hoc Analysis

After analyzing the hypotheses, we analyzed FTF socializing with rational culture and computer-mediated socializing with group culture to ensure that the other forms of socializing would not interact with the different cultures. Neither analysis generated any significant interactions. This post hoc analysis increases our confidence that potential inherent bias in the knowledge workers' response was minimal. Had the KM professionals been biased toward CMC, we would expect to see significance regardless of culture. Since only rational culture significantly interacted with CMC, we cannot definitively conclude our data lacked bias, but we are satisfied its role was not statistically significant.

4.5 Implications for Practice

This study yields practical insights including the need for knowledge managers to understand how different organizational cultures interact with different forms of socializing. Specifically, if an organization's culture elevates rationality over the group, managers should consider employing computer-mediated forms of socializing because doing so will assist them increase organizational creativity. Since culture is often the foremost hindrance to creating organizational knowledge, which our results confirmed (see results for H1 and H3), promoting CMC for sharing knowledge in an organization with a people-oriented culture may not be effective since members are more likely to engage in any form of social interaction. Conversely, our results suggest that knowledge managers of rational organizations should invest in computer-mediated technologies because their organizational members are comfortable using technology to socialize. Second, knowledge managers should not underestimate the potential of computer-mediated socializing because it can increase creativity for certain organizational cultures.

4.6 Implications for Research

While scholars have made significant contributions to KM and CMC, little research has linked the two, specifically in the area of knowledge creation. Given CMC's phenomenal growth, we need to examine the role of CMC technologies in sharing knowledge between organizational members. Through insights from the established theories of media and knowledge management (Nonaka, 1994; Dennis et al., 2008), we provide a new perspective that underscores CMC's role in knowledge creation by showing it influences organizational culture's role in creativity. We employed organizational creativity as the main dependent variable, which addresses concerns that Tiwana and McLean (2003) raise about the lack of focus on

creativity in the information systems literature. Finally, while the present study describes organizational culture as a critical factor that affects creativity, it indicates that technologically enhanced social communications interact with rational culture to generate even greater creativity. Thus, we extend our understanding of organizational culture in the KM literature.

4.7 Limitations and Future Research

While our findings are insightful, our study has several limitations. First, the sample included primarily U.S.-based firms. According to Hofstede (1993), Western and non-Western organizations have clear and significant cultural differences. Thus, a worthwhile avenue for future research would involve testing and extending our findings by including a broader sample of organizations from different countries, especially non-Western nations such as Japan, China, India, and Russia. It would also be worthwhile to collect data on the degree of co-location of organizations' team members because an increase in team distribution and virtualization causes fewer FTF interactions and increase CMC's importance. Third, since all of the participants were part of the same online community, one could question our finding's generalizability even though the participants represented a variety of industries, had considerable work experience, and held job titles such as knowledge manager, knowledge architect, and knowledge officer. Also, we could not collect multiple responses at each organization and, thus, the unit of analysis was not truly organizational but the perceptions of knowledge workers in various organizations. As such, our findings are limited to the perceptions of knowledge management professionals, and, as Table 5 demonstrates, their responses were likely biased. Therefore, one should apply caution when considering the results, and we do not advise wholesale movements toward any communication method based on perceived organizational culture. Fourth, while Harman's single-factor test did not suggest any indication of mono-method bias, we reiterate that we collected all data in this study using self-reported survey-based measures. Fifth, we did not address specific computer-mediated media such as emails, teleconferencing, or videoconferencing; neither did we address specific technological hardware, such as personal computers, tablets, smartphones, and so on. Instead, we focused primarily on the distinction between FTF and computer-enabled communication and their impact on organizational creativity. Consequently, another interesting avenue for future research would involve exploring the use of different computer-mediated media for socializing that creates knowledge. Lastly, we chose group and rational cultures to demonstrate the distinction of opposite cultures because of their appropriateness to the communication forms under investigation. We did not investigate developmental versus hierarchical culture because of the likelihood of multicollinearity of those with group and rational cultures. However, it may also be beneficial to see how communication would affect developmental versus hierarchical cultures.

5 Conclusion

Culture is often a major barrier to organizational creativity (De Long, 1997; De Long & Fahey, 2000; Alavi & Leidner, 2001; Gold et al., 2001; Alavi et al., 2006). One method to overcome this barrier is improved communication, and, fortunately, technology has opened new and enhanced avenues for communication through CMC. We examine two competing cultural forms on FTF and computer-mediated socializing and their interactions in order to better understand their influence on creativity. Specifically, we demonstrate the importance of CMC for creativity in rational organizational cultures. The results provide interesting insights. Organizational culture plays the strongest role in influencing creativity, and different forms of organizational culture uniquely interact with socializing to influence creativity. When the organization is group cultured, there is no difference between FTF and computer-mediated socializing on creativity, but, when the culture is rational, it behooves the organization to employ computer-mediated socializing tools to positively influence creativity.

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