Teamwork During a Global Pandemic:

Communication, Relationship Building and Outcomes when Working Face-to-Face vs Videoconferencing in U.S. and China

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ABSTRACT

Due to the global pandemic vast numbers of employees globally are videoconferencing from home, creating challenges for team communication and relationship building that may be unique in different parts of the world. We develop and validate a scale measuring communication behavior in videoconferencing (VC) and face-to-face (FTF) meetings. A proposed model linking communication behavior to team coordination and efficiency through relationship building is tested with a field survey of employees in U.S. and China. Results confirm that distinct communication behaviors predict relationship building for Chinese vs U.S. employees in VC vs FTF settings, and relationship building predicts team efficiency across all conditions. We discuss contributions to teamwork and cross-cultural communication literatures as well as implications for practice and future directions.

INTRODUCTION

The coronavirus pandemic has affected work life across the globe like no other event in modern history. Working remotely skyrocketed in China in the wake of the virus, with 200 million people working from home after Chinese New Year (Reuters 6/23/2020). And in just three weeks, from mid-March to early April 2020, the percentage of U.S. employees working mainly remotely doubled from 31% to 62% (Gallup, 5/22/20). As of September, 40% of all full-time employees in the U.S were working entirely from home, versus 4% pre-pandemic (Gallup 10/30/20) and two-thirds of these people say they would like to continue working remotely once the pandemic subsides (Gallup 10/13/20). This move to remote workplaces raises a myriad of questions for both employers and employees that depend on productive work teams. For example, how do members best communicate with each other when they cannot interact in-person, how do group members build relationships virtually, and certainly, how productive will the teams be (McKinsey 3/23/2020)?

The upheaval in workplaces in response to COVID-19 compelled us to investigate what happens to communication as interactions between individuals and their group members move from in-person exchanges to online interactions. Specifically, the goal of our research is to examine how the pandemic has affected communication patterns among full-time employees in China and the United States. Through an online survey we identify the patterns of communication that are most common among Chinese and U.S. working adults when meeting face-to-face (FTF) versus meeting virtually through platforms such as Zoom, Microsoft Teams, or WeChat (VC). Using path analyses we investigate the mediating role of team relationship building on the connection between these communication patterns and perceived team outcomes. We also analyze the moderating role of national culture on the connection between communication patterns and relationship building. Finally, we explore what communication behaviors are more or less important in team relationship building in FTF meeting and VC, respectively for Chinese versus U.S. workers.

THEORIES AND HYPOTHESES

As more employees across the globe work from home using virtual interfaces for meetings and group work, it is paramount to understand the intricacies of team processes as they relate to performance when using contemporary videoconferencing platforms. Previous research establishes consensus on the importance of relationship building and effective communication on performance for both virtual and face-to-face teams (e.g., Mathieu & Taylor, 2008; Mesmer-Magnus, DeChurch, Jimenez-Rodriguez, Wildman & Shuffler 2011). And while the media richness of videoconferencing creates channels for nonverbal communication akin to face-to-face interaction (e.g., Marlow, Lacerenza & Salas, 2017), we do not know how well team members attend to communication and build relationships in this virtual medium, particularly given competing home obligations and stressors during a pandemic. Given these challenges, we propose that employees who are savvy nonverbal communicators, namely employees from high context (versus low context) cultures (Hall, 1960), are in the best position to build relationships and achieve equivalent team performance in videoconferencing and face-to-face interaction.

Communication Medium, Team Relationship Building, and Team Outcome

Communication has been demonstrated to be a crucial foundation of team effectiveness both in traditional face-to-face and virtual teams (Gibson, 2001; Jarvenpaa & Leidner, 1999; Mathieu & Taylor, 2008; Pitts, Wright & Harcabus, 2012). However, there is disagreement as to the effectiveness of virtual communication in promoting workgroup productivity relative to that enabled through in-person interactions. Much of this disparity is due to differences in the extent of virtuality examined in various studies - whether in the lab or out in the field, utilizing the context of email exchanges or more immersive technologies allowing for a wider scope of interaction (Maslow, Lacarenza & Salas, 2017). Early studies demonstrated that with virtual communication the quality of communication is lower, thus hampering team performance (Baltes, Dickson, Sherman, Bauer, & LaGanke, 2002). But later studies show that the relationship between information sharing and team performance in virtual interactions may be a function of team member's prior familiarity with one another (Purvanova, 2014) and depend on the type of information shared (Mesmer-Magnus, DeChurch, Jimenez-Rodriguez, Wildman & Shuffler 2011).

Ultimately in more recent research, highly virtual teams show performance levels similar to those who were interacting face-to-face (Marlow et al., 2017). These inconsistent findings suggest that there are many potential boundary conditions for certain effects to occur and also call for an understanding of the different mechanisms that may be involved in explaining the influence of communication medium (FTF or VC) on team outcomes.

The Influence of Communication Medium on Relationship Formation

We propose that how people develop relationship is highly related to how they communicate with each other, which influences team functioning. According to Kayworth and Leidner, "regardless of the environment, effective communication is essential to group functioning" (2000, p. 186). Because of the centrality of communication to group relations, it is crucial that we examine the ability to form relationships when using a virtual means of communication as opposed to when in the same room talking with people face-to-face. Participant comments from a study on virtual teams suggest that people have a bias against using online meetings to form relationships because such interactions lack the "human touch" (Purvanova, 2014). A meta-analysis by Mesmer-Magnus et al. (2011) shows that virtual meetings seem to prompt more sharing of unique information, critical to problem-solving and discovering novel solutions, but face-to-face interactions prompt more openness in information sharing. And it is precisely this openness of sharing that promotes positive affective outcomes among team members such as cohesion, cooperation, and trust (Jarvenpaa & Leidner, 1999; Mesmer-Magnus et al., 2011). Therefore it is likely that in virtual interactions, relationship formation will be more difficult than when communicating in-person (Mesmer-Magnus et al. 2011).

The Role of Relationship Formation on Team Outcomes

Team outcomes can manifest in numerous ways. Conventional outcomes include team performance (e.g., team effectiveness and efficiency), team process outcomes such as team conflict, team coordination, team cohesion, and team satisfaction (for a review, see Mathieu, Maynard, Rapp, & Gilson, 2008). In this paper, we examine team outcomes - team coordination and team efficiency. Teams with high levels of coordination are more likely to share norms of behavior, develop an esprit de corps, and

work closely together (Stewart & Barrick, 2000). Furthermore, members having good team relationships are more likely to establish group identity (Zhang, Chen, Chen, Liu, & Johnson, 2014), which increases team cooperation and reduces social loafing (Dawes, van de Kragt, & Orbell, 1988). Because cooperation is essential to teamwork, members with good relationships will more easily coordinate effort and share information and knowledge to complete work tasks. Additionally, having members who do not slack off but work closely together also facilitates team efficiency.

Taken together, we propose

Hypothesis 1: It will be more difficult for teams using videoconferencing to build relationships among members than for teams interacting face-to-face.

Hypothesis 2: Team relationship building will mediate the effects of communication medium (videoconferencing versus face-to-face meeting) on team outcomes, manifested by team coordination and team efficiency.

The Moderating Role of Culture

Videoconferencing allows people to send vocal and non-verbal cues that can enhance informational richness (Marlow, et al. 2017). Yet, the virtuality of interaction makes it more difficult to process and aggregate information, particularly when it is uncodified (Gibson & Gibbs, 2006). Communication context theory specifically addresses how people attend to, interpret and send non-verbal cues and uncodified messages (Hall, 1967). People who are from low context cultures such as that which has typically been dominant in the United States and Northern Europe, tend to send very direct, explicit messages and rely on the specific words used to interpret a communication's meaning. For people from high context cultures such as that typically found in Asia, South America and the Middle East, the words used convey only a portion of communication's meaning; full understanding is found through non-verbal cues and understanding the uncodified language between the lines.

Previous research has indicated that the U.S. is a low-context culture and China is a high -context culture (e.g. Wang, 2008). Low context communication norms in the United States include direct statements, questions, and persuasion. In contrast, high context Chinese communication norms emphasize

indirectness and attention to information contained in nonverbal cues (Hall, 1967). These differences are apparent not only for information exchange but also relationship building, as U.S. employees focus on tasks and information whereas Chinese employees also attend to relational cues and team members' affect (Gesteland, 2005; Sanchez-Burks, 2002; Sanchez-Burks, Lee, Nisbett, Zhao & Koo 2003). Based on this cross-cultural communication literature, we infer that in high-context cultures, people pay much attention to non-verbal cues but in low-context cultures, it is not a conscious process. As noted above, the open communication that is commonplace in face-to-face teamwork may facilitate relationship building in both U.S. and Chinese teams. However, when videoconferencing, U.S. employees may not be as sensitive to nonverbal communication as Chinese employees, thus hindering team relationship building.

Hypothesis 3: National culture will moderate the effect of communication medium on team member relationship building such that compared to Chinese workers, U.S. workers will experience more difficulty building relationships in videoconferencing than in face-to-face meetings.

METHODS

Participants and Procedure

We collected data from U.S. and China. For the U.S. sample, we collected the data from several companies, as well as through Amazon mechanical turk (MTurk). The final sample consists of 382 U.S. working adults (average age = 38.92 with SD = 11.15, 46.6% female). For the China sample, we collected the data through Wenjuanxing, an online platform for survey research (comparable to MTurk). The final sample consists of 209 Chinese working adults (average age = 30.25 with SD = 4.18, 44% female). The combined sample include 591 working adults (average age = 35.45 with SD = 9.99, 45.6% female). Researchers' investigations into MTurk and Wenjuanxing as a data collection source for psychological and social science studies show that "the data obtained are at least as reliable as those obtained via traditional methods" (Buhrmester, Kwang, & Gosling, 2011: 3).

Participants were asked to rate the extent to which the statements in the survey reflect what they do when they attend a video conference or a FTF meeting. We randomized the order of the statements related to VC and FTF meeting to mitigate the order effect.

Communication Scale Development of Videoconferencing and Face-to-Face Meetings

To test our hypotheses, we first developed a communicative behavior scale that reflects the components crucial for team relationship building in both videoconferencing and face-to-face meetings. We started with items from the context dependent communication scale (Adair, Buchan, Chen, & Liu, 2016), modified a few items to fit the situation, dropped a few that did not apply to our study context, and added items that captured the characteristics of virtual meetings. The initial scale included 24 items for videoconferencing and FTF meeting, respectively, with all four communication contexts (message, relationship, time, space) represented. Following widely accepted practices in scale development and validation (Ang et al., 2007; DeVellis, 1991; Hinkin, 1995, 1998), we developed and validated a new scale measuring people's communication behavior in a video conference setting versus comparable behavior in a face-to-face meeting setting.

Exploratory factor analysis (EFA). The initial EFA revealed that 15-item in each scale had low factor loadings (below 0.40) or serious cross-loadings (above 0.40). We thus removed these items and re-conducted EFA, which generated a 3-factor, 9-item scale for VC and FTF respectively (see Table 1). Specifically, the three factors are: (a) Understanding Non-Verbal Cues (4 items, $\alpha = .814$ and .767 respectively for VC and FTF), (b) Engaged Listening (2 items, $\alpha = .703$ for both VC and FTF), and (c) Maintaining a Professional Image (3 items, $\alpha = .710$ and .704 respectively for VC and FTF).

[Insert Table 1 about here]

Confirmatory Factor Analyses (CFA). We then used the combined sample to conduct a series of confirmatory factor analyses (CFA) using Mplus 7.11 (Muthén, & Muthén, 2012). All model fit tests and comparisons were based on the final sample of $N = 533$. The hypothesized six-factor model was specified by loading indicators on their respective latent variables, and the correlations among latent variables were freely estimated. Results showed that the six-factor (three for VC and three for FTF) model fit the data

well, χ^2 = 324.082, df = 120; CFI = .937; SRMR = .043; RMSEA = .056. Indicators all significantly loaded on their respective latent factors. Measures

In addition to communication behaviors, we also asked participants to report their Team Relationship Building and perception of team outcomes (i.e., Team Coordination and Team Efficiency) when members communicate via video conferencing and FTF meetings, respectively.

Team Relationship Building was measured with one item, "Time spent in videoconferencing (or meetings in person) for work provides ample opportunity for relationship building."

Team Coordination was measured with a 5-item scale adapted from Tesluk and Mathieu (1999). Sample items included "Scheduling meetings in our work group is easier than before the pandemic", "Dividing work tasks in our work group is more difficult than before the pandemic (R)", and "Communicating with one another in our work group is easier than before the pandemic." The Cronbach alpha is .72 for this scale.

Team Efficiency was measured using a 5-item scale adapted from Van der Vegt and Bunderson (2005). Sample items included "Our work group makes more effective use of time", "Our work group makes less effective use of member's expertise (R)", and "Our work group makes more effective use of other resources." The Cronbach alpha for this scale is .71.

RESULTS

Descriptive Statistics

Table 2a and Table 2b present the means, standard deviations, and intercorrelations of all variables, including demographics age and gender, in the FTF meeting and VC settings, respectively.

[Insert Tables 2a and 2b about here]

It can be seen from these two tables that the communicative behaviors are significantly correlated with relationship building in both VC (r ranges from .28 to .55) and FTF (r ranges from .34 to .38) settings. Team Relationship Building is positively related to team coordination (r = .35 and .09 respectively in VC and FTF) and Team Efficiency (r = .34 and .17 respectively in VC and FTF). Finally,

team coordination and efficiency are positively correlated with all three communitive behaviors (r ranges from .09 to .42). These results provide preliminary support for our hypotheses.

Hypotheses Testing

Hypothesis 1 predicted a main effect of communication medium on Team Relationship Building. Regression analyses revealed that Team Relationship Building achieved a significant higher level in FTF meetings (b =.60, p = .000) than in videoconferencing (b = .22, p = .000). These results fully support Hypothesis 1.

Hypothesis 2 proposed a mediation effect of Team Relationship Building on the relationship between communication medium and team outcomes—Team Coordination and Team Efficiency. A path analysis using Mplus 7.11 (Muthén, & Muthén, 2012). The results are shown in Figure 1. To test the mediation effects (H2), we used Monte Carlo analysis (Edwarsds & Lambert, 2007). The results revealed that video conferencing has a positive indirect effect on Team Coordination (indirect effect =.027, 95% CI = [.005, .056], excluding 0) and Team Efficiency (indirect effect = .024, 95% CI = [.003, .051], excluding 0) via relationship building. FTF conferencing has a positive indirect effect on Team Coordination (indirect effect =.072, 95% CI = [.015, .132], excluding 0) and Team Efficiency (indirect effect = .064, 95% CI = [.011, .119], excluding 0) via relationship building. Thus, H2 was supported.

[Insert Figure 1 about here]

Hypothesis 3 proposed a moderating effect of national culture on the relationship between communication medium and Team Relationship Building. Regression analyses showed that the interaction effect of national culture X communication medium on Team Relationship Building is significant (b = .69, p = .000). Figure 3 presents the interaction pattern.

[Insert Figure 2 about here]

It can be seen from Figure 2 that the Team Relationship Building opportunity was equally high in FTF meetings for both Chinese and American workers, but in the videoconferencing setting, Chinese workers reported significantly higher level of Team Relationship Building than did American workers. These results provide strong support for Hypothesis 3.

Supplementary Analyses

To reveal more nuances about the cultural moderating effect, we also looked into the three communicative behaviors (Understanding Non-Verbal Cues, Engaged Listening, Professional Image) in their relative importance for in China and US, and in FTF and in videoconferencing, respectively. In addition, we examined how culture moderated each of the three communicative behaviors to influence Team Relationship Building, and in turn Team Coordination and Team Efficiency in the videoconferencing and FTF meetings, respectively. Below are the two exploratory hypotheses we wanted to test with the supplementary analyses.

Exploratory Hypothesis 1: In the videoconferencing setting, national culture will moderate the effects of the three communicative behaviors (Understanding Non-Verbal Cues, Engaged Listening, maintaining Professional Image) respectively to influence Team Relationship Building and in turn Team Coordination and Team Efficiency.

Exploratory Hypothesis 2: In the FTF meeting setting, national culture will moderate the effects of the three communicative behaviors respectively to influence Team Relationship Building and in turn Team Coordination.

Cultural moderating effects in the video conferencing setting. We used path analysis (Mplus 7.11, Muthén, & Muthén, 2012) that allows to test the full mediation model at one time, and thereby produces more accurate estimations.

Results in Table 3 shows that among the three communicative behaviors in videoconferencing, Understanding Non-Verbal Cues ($b = .65$, $p = .001$) and Engaged Listening ($b = .18$, $p = .009$) significantly influenced Team Relationship Building whereas Professional Image did not ($b = .08$, $p = .36$). Moreover, Team Relationship Building was positively related to both Team Coordination ($b = .11$, $p = .008$) and Team Efficiency ($b = .09$, $p = .01$). These results suggest a full mediation effect of Team Relationship Building on the relationship between the two communicative behaviors (non-verbal and listening) and team outcomes.

[Insert Table 3 about here]

To test our Exploratory Hypothesis 1, we conducted moderated mediation analyses using Mplus 7.11 (Muthén, & Muthén, 2012). Results in Table 3 show that national culture only moderated the effect of one communicative behavior, i.e., Understanding Non-Verbal Cues on Team Relationship Building (b = .38, p = .007), which was positively related to Team Coordination and Team Efficiency. These results provide some support for this hypothesis. To explicate the effect, we present the interaction pattern in Figure 3.

[Insert Figure 3 about here]

It can be seen from Figure 3 that for Chinese workers in videoconferencing, Understanding Non-Verbal Cues did not influence their Team Relationship Building significantly, which remained a high level; but for American workers, being able to understand non-verbal cues had a significant impact on their relationship building. These results suggest that the videoconferencing setting poses much difficulty for American workers to engage in Team Relationship Building because it is much harder to observe non-verbal cues in videoconferencing than in FTF meetings.

Cultural moderating effects in the FTF meeting setting. We again used path analysis (Mplus 7.11, Muthén, & Muthén, 2012) to examine our Exploratory Hypothesis 2.

Table 4 shows the path analysis results. In FTF meetings, all three communicative behaviors, Understanding Non-Verbal Cues (b = .23, p = .009), Engaged Listening (b = .26, p = .007) and Professional Image (b = .25, p = .008) significantly influenced Team Relationship Building. However, Team Relationship Building was not significantly related to any team outcomes (Team Coordination, b = .02, p > .10; Team Efficiency, b = .04, p > .10) and Team Efficiency (b = .09, p = .01). These results suggest that Team Relationship Building did not mediate the relationship between communicative behaviors and team outcomes in FTF meetings.

Results in Table 4 further show that national culture only moderated the effect of one communicative behavior, i.e., Engaged Listening, on Team Relationship Building (b = .35, p = .007). But again, relationship building did not have significant impact on Team Coordination and Team Efficiency. These results demonstrate that national culture moderated the effect of Engaged Listening on Team

Relationship Building, but does not support a moderated mediation model predicted by Exploratory Hypothesis 2. To explicate the effect, we present the interaction pattern in Figure 4.

[Insert Table 4 and Figure 4 about here]

It can be seen from Figure 4 that for Chinese workers in FTF meetings, Engaged Listening did not influence their Team Relationship Building significantly, but for American workers, Engaged Listening had a significant impact on their relationship building. These results suggest that explicit coded messages (words) may not be critical in Team Relationship Building for Chinese workers when meeting in person, but for American workers, listening to what others have to say is critical in FTF meetings for Team Relationship Building.

More Supplementary Results

U.S. and Chinese Samples in Videoconference setting. Figures 5a and 5b present results for the U.S. and China samples, respectively in Videoconferencing setting.

[Insert Figures 5a and 5b about here]

These results suggest that in videoconferencing nderstanding Non-Verbal Cues and Engaged Listening are both important in Team Relationship Building in the U.S. But for Chinese workers, Understanding Non-Verbal Cues is the single important communicative behavior for Team Relationship Building. Meanwhile, for both samples, Team Relationship Building has significant positive effects on Team Coordination and efficiency.

U.S. and Chinese Samples in FTF meetings. Figures 6a and 6b display how the three communicative behaviors influence Team Relationship Building and team outcomes in FTF meetings for American and Chinese workers, respectively.

[Insert Figures 6a and 6b about here]

These results suggest that in FTF meetings, it is Engaged Listening and Maintaining a Professional Image that had significantly positive effect on Team Relationship Building in the U.S. But for Chinese workers, the single most important factor for Team Relationship Building is Understanding Non-Verbal Cues.

Meanwhile, the mediation effect of Team Relationship Building on team outcomes was similar across the two samples.

Additional results. We also compared the U.S. and Chinese samples on the three communicative behaviors and found that (a) Chinese scored significantly higher on Engaged Listening than U.S. workers during videoconferencing; (b) U.S. workers scored higher on Understanding Non-Verbal Cues than Chinese in FTF meetings; and (c) Chinese scored higher on both Team Coordination and Team Efficiency than U.S. workers did.

DISCUSSION

Universal "work from home" orders in response to the global pandemic mean employees are working via videoconference (VC) more than ever. But existing models of teamwork and empirical research do not offer a complete picture of how communication and relationship building influence team outcomes when communication is done virtually. By demonstrating a full mediation model linking team communication medium to relationship building to outcome, the current research offers a novel theoretical contribution to the literature on team processes and outcomes. Further, because the mediation model is moderated by culture (U.S. vs China), the findings advance our understanding of the role of communication behaviors for videoconferencing (VC) versus face-to-face (FTF) teamwork in different cultural contexts.

Theoretical Contributions

The current study identifies novel communication behaviors that inform Relationship Building, Team Coordination and Team Efficiency in teams working FTF versus VC. Our findings extend existing team research that has investigated types of communication, such as information sharing or conflict management (De Wit, Greer, & Jehn, 2012; Hülsheger, Anderson, & Salgado, 2009; Tsai & Bendersky, 2016), but not communication style. Our research informs existing work on virtual teams that has examined interpersonal processes such as trust and emergent states such as cohesion, but in the absence of communication factors (Breuer, Hüffmeier, & Hertel, 2016; Gilson, Maynard, Jones Young, &

Vartiainen, Hakonen, 2015). Lastly, we integrate culture because low versus high context communication norms vary greatly across culture groups (Hall, 1967), demonstrating how the rapid shift to VC during a global pandemic impacts communication, relationship building, and team outcome in different parts of the world.

We developed and validated a scale to measure communication behaviors in VC and FTF meetings. The scale demonstrates consistent factor loadings in both VC and FTF settings and is valid in both U.S. and China. Understanding Nonverbal Cues, a communication behavior we expected to be more common in high context cultures (e.g., China) than low context cultures (e.g., the U.S.), showed more importance for U.S. workers to build relationships in the VC setting. Engaged listening - signifying the importance of explicit and coded message in communication - which was expected to be more common in a low context culture (i.e., the U.S.) than in a high context culture (i.e., China), showed its prominent influence for U.S. workers to building relationships in the FTF setting. All other results went beyond a simple main effect of culture, confirming our predictions that both communication medium and culture matter on Team Relationship Building.

In the FTF setting, U.S. employees reported higher Understanding Nonverbal Cues than Chinese employees. And while both Chinese and U.S. employees reported it was essential for relationship building in the VC setting, for Chinese employees, it was also critical for relationship building in FTF contexts, demonstrating that attention to nonverbal cues is an essential communication ingredient among Chinese for relationship building regardless of communication medium. For U.S. employees, while Understanding Nonverbal Cues is less culturally normative than for Chinese employees, in the VC setting it had a greater positive impact on relationship building than for Chinese employees. In other words, and very importantly, U.S. employees who do pay attention and understand nonverbal cues report more successful relationship building.

Engaged Listening was critical for relationship building for U.S. employees in both VC and FTF. Engaged Listening is a component of active listening, an essential business communication skill taught in the U.S., so its role in relationship building is not surprising. Chinese employees scored significantly

higher on Engaged Listening than U.S. respondents, with lower variance, suggesting a potential ceiling effect in the Chinese sample. Furthermore, this behavior did not positively impact their relationship building, raising a question for future research: Is Engaged Listening so commonplace in high context cultures that it is not a predictor of team process or performance?

Interestingly, Team Relationship Building was also a function of Maintaining a Professional Image when working FTF for both U.S. and Chinese employees. Descriptive data show that across cultures, women were more likely than men to report engaging in Professional Image maintenance. Why this would impact relationship building in FTF but not VC is a question for future research.

Together the results for the three-factor communication behavior scale contribute to existing literature on team processes that focuses almost exclusively on openness and information sharing. Our research uncovers components of active listening (Engaged Listening), high context communication (Understanding Nonverbal Cues), and impression management (Maintaining a Professional Image) that impact relationship building and subsequent team outcome differentially depending on culture and communication medium.

Limitations

Virtuality is a multi-facted concept, as research has shown (Gibson & Gibbs, 2007). Our study does not account for each of the facets – geographic dispersion, electronic dependence, dynamic structure and national diversity - which could potentially influence our results. Yet, by conducting the research with workers using virtual communication platforms such as Zoom, Microsoft Teams, or WeChat our participants were interacting at quite high levels of media richness (Hertel et al., 2005) thus we believe that there was fairly low variance in the levels of electronic dependence among our participants. However, we do not know the level of geographic dispersion in the teams our survey participants were referring to. This dispersion could affect relationship formation as global virtual teams have been shown to develop “swift” but fragile and temporary trust (Jarvenpaa & Leidner, 1999). Yet, by focusing on workers in China and the United States, we were able to isolate differences associated with variance in communication patterns by national culture and how those differences affected relationship building.

In this research we did not measure the type of information shared which we know can influence the level of workgroup productivity (Mesmer-Magnus, 2011). We focused instead on how workers interacted with their group members when in-person or communicating virtually and demonstrated the connection to relationship building and team outcomes. We need to be open to the possibility that more unique information sharing or greater openness of sharing may have occurred in either the face-to-face or virtual communication contexts, influencing the degree of relationship formation and team outcomes observed. Exploring more deeply not only how workers are communicating with their team members but what is said, and what information is shared is certainly a fruitful avenue for future research.

Finally, because our study employed a single-wave, single-source correlational design, our study suffers the common method error (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), our findings need to be interpreted with caution. These design and data collection limitations should be addressed in subsequent studies.

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Table 1.

A three-factor, nine-item scale for communication behavior for video conferencing and face-to-face meetings

	Understanding Non-Verbal Cues	***** Video Conferencing**	***** Face-to-Face Meeting**
1	When *** for work, I can understand what others mean through their tone of voice, body language, etc., even if they do not say it directly.	.814	.767
2	When *** for work, I am very good at knowing the feelings other people are experiencing by paying close to their tone of voice, body language, etc.		
3	When *** for work, I can tell from my counterpart's reactions that my messages are understood.		
4	I am able to process verbal and non-verbal cues by participants in ***in order to give an immediate response.		
	Engaged Listening		
1	I stay engaged in the conversation during ***.	.703	.703
2	When *** for work, I listen very carefully to people when they talk.		
	Maintaining a Professional Image		
1	When *** for work, I tend to be rather formal when addressing someone of a higher rank than me.	.710	.704
2	When *** for work, if my counterpart(s) are of higher rank than me, I am sure to dress and look professional.		
3	When *** for work, I pay attention to how I look on screen.		

Table 2a. Means, Standard Deviations, Correlations, and Reliabilities of Measures (Video conferencing setting).

		Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Gender	0.54	0.50	—									
2	Age	35.49	10.00	-.12**	—								
3	Nation	1.65	0.48	-.03	.43**	—							
4	Non-verbal communication	3.56	0.81	-.06	.05	.04	***(.81)***						
5	Engaged listening	4.05	0.80	-.03	.04	-.13**	.49**	***(.70)***					
6	Professional Image maintenance	3.89	0.80	-.14**	.03	-.02	.40**	.33**	***(.71)***				
7	Relationship building	3.47	1.14	.00	-.17**	-.30**	.55**	.40**	.28**	—			
8	Coordination	3.43	0.76	-.02	-.08	-.34**	.23**	.28**	.11*	.35**	***(.72)***		
9	Efficiency	3.69	0.72	-.08	.01	-.18**	.32**	.42**	.23**	.34**	.63**	***(.71)***	

Note. N = 591(China sample = 209; US sample = 382). Gender (1 = male, 0 = female). Nation (1 = China; 2 = US). Coefficient alphas are reported along the diagonal. $^{*}p < .05$. $^{**}p < .01$.

Table 2b. Means, Standard Deviations, Correlations, and Reliabilities of Measures (FTF conferencing setting).

		Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Gender	0.54	0.50	1									
2	Age	35.49	10.00	-.12**	1								
3	Nation	1.65	0.48	-.02	.43**	1							
4	Non-verbal communication	4.13	0.64	-.10*	.18**	.10*	***(.77)***						
5	Engaged listening	4.33	0.69	-.06	.07	-.03	.51**	***(.70)***					
6	Professional Image maintenance	4.08	0.70	-.12**	-.01	-.08	.39**	.36**	***(.70)***				
7	Relationship building	4.09	0.87	-.06	.06	.00	.37**	.38**	.34**	1			
8	Coordination	3.43	0.76	-.02	-.08	-.34**	.09*	.14**	.09*	.09*	***(.72)***		
9	Efficiency	3.69	0.72	-.08	.01	-.18**	.21**	.28**	.24**	.17**	.63**	***(.71)***	

Note. N = 591(China sample = 209; US sample = 382). Gender (1 = male, 0 = female). Nation (1 = China; 2 = US). Coefficient alphas are reported along the diagonal. $^{*}p < .05$. $^{**}p < .01$.

Table 3. Path analysis results (Video conferencing setting).

	Mediation effect				Moderated mediation effect		
Variables	Relationship building (B/SE)	Coordination (B/SE)	Efficiency (B/SE)		Relationship building (B/SE)	Coordination (B/SE)	Efficiency (B/SE)
Intercept	1.36***(.30)	2.92***(.24)	2.09***(.22)		3.47***(.04)	2.84***(.24)	2.13***(.23)
Age	-.01*(.00)	.01(.00)	.01(.03)		-.01*(.00)	.01(.00)	.01(.00)
Gender	.05(.08)	-.01(.06)	-.07(.06)		.05***(.08)	-.02(.06)	-.07(.06)
Nation	-.58***(.09)	-.48***(.07)	-.21**(.06)		-.58***(.09)	-.47***(.07)	-.21**(.07)
Non-verbal communication	.65***(.06)	.08(.05)	.06(.05)		.63***(.06)	.08(.05)	.06(.05)
Engaged listening	.18**(.06)	.13**(.04)	.26***(.04)		.17**(.06)	.14**(.04)	.26***(.04)
Professional Image maintenance	.08(.05)	-.02(.04)	.06(.04)		.06(.05)	-.02(.06)	.06(.04)
Team Relationship building		.11**(.03)	.09**(.03)			.11**(.03)	.09**(.03)
Non-verbal communication*Nation					.38**(.12)	.01(.09)	-.05(.09_
Engaged listening*Nation					.16(.12)	-.04(.09)	.11(.09)
Professional Image maintenance*Nation					.01(.11)	-.16(.09)	-.02(.08)

Note. N = 591(China sample = 209; US sample = 382). $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .000$. B = unstandardized coefficient estimate; SE = standard error.

Table 4. Path analysis results (FTF meeting setting).

	Mediation effect				Moderated mediation effect		
Variables	Relationship building (B/SE)	Coordination (B/SE)	Efficiency (B/SE)		Relationship building (B/SE)	Coordination (B/SE)	Efficiency (B/SE)
Intercept	4.09***(.03)	3.32***(.28)	2.24***(.27)		4.10***(.03)	3.18***(.28)	2.30***(.27)
Age	.00(.00)	.00(.00)	.01(.00)		.00(.01)	.01(.00)	.01(.00)
Gender	-.02(.07)	-.00(.06)	-.06(.06)		-.01(.07)	-.01(.06)	-.06(.06)
Nation	.00(.08)	-.57***(.07)	-.30***(.07)		-.01(.08)	-.57***(.07)	-.30***(.07)
Non-verbal communication	.23***(.07)	.08(.06)	.08(.06)		.20**(.07)	.10(.06)	.09(.06)
Engaged listening	.26***(.06)	.11*(.06)	.20*(.05)		.29***(.06)	.09(.07)	.18**(.05)
Professional Image maintenance	.25***(.05)	-.01(.05)	.11*(.05)		.24***(.05)	.00(.05)	.10*(.05)
Relationship building		.02(.04)	.04(.04)			.04(.04)	.04(.04)
Non-verbal communication* Nation					-.15(.14)	.07(.12)	.20(.12)
Engaged listening*Nation					.35**(.12)	-.24*(.11)	-.15(.11)
Professional Image maintenance*Nation					.03(.12)	-.20(.11)	.06(.10)

Note. N = 591(China sample = 209; US sample = 382). $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .000$. B = unstandardized coefficient estimate; SE = standard error.

Figure 1: Path analysis of the mediating role of relationship building on the relationship between communication medium (FTF vs VC) and team outcomes

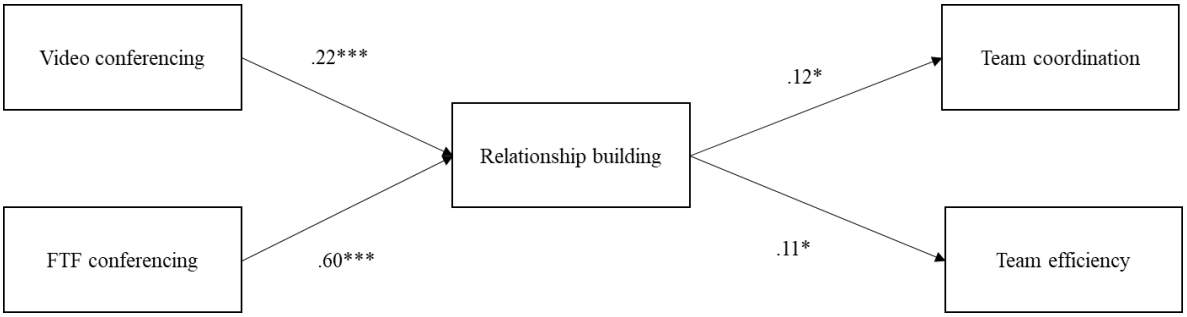

Figure 2: The moderating role of national culture on the relationship between communication medium and team relationship building

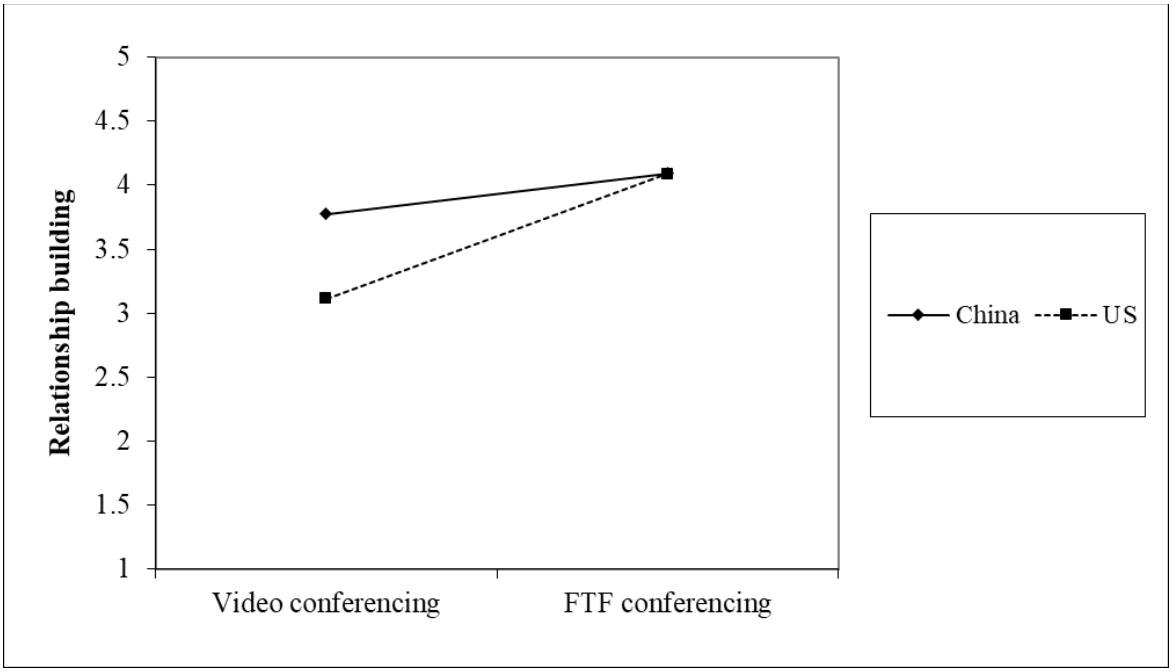

Figure 3. Moderating effect of nation on the relationship between non-verbal communication and relationship building (Video conferencing setting).

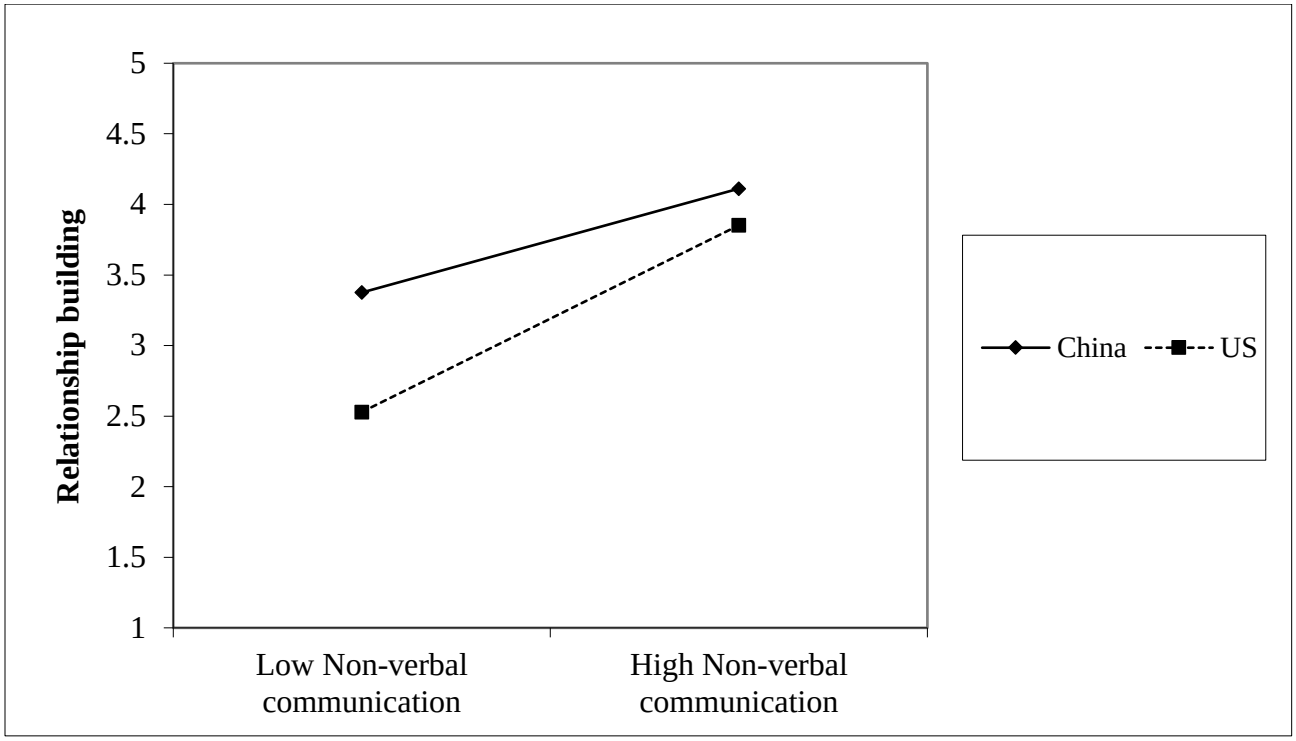

Figure 4. Moderating effect of nation on the relationship between engaged listening and relationship building (FTF conferencing setting).

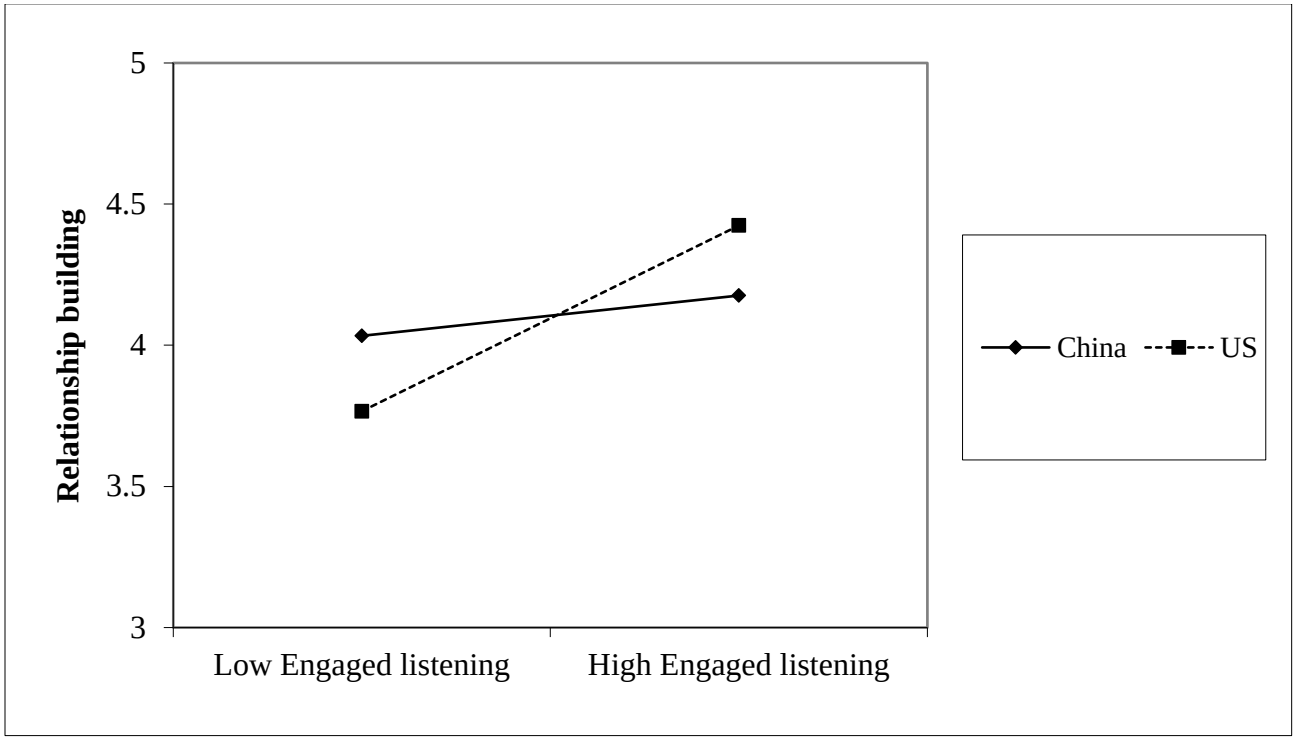

Figure 5a: Mediation results for the relationship between the three communicative behaviors and team outcomes in Videoconferencing (U.S. Sample)

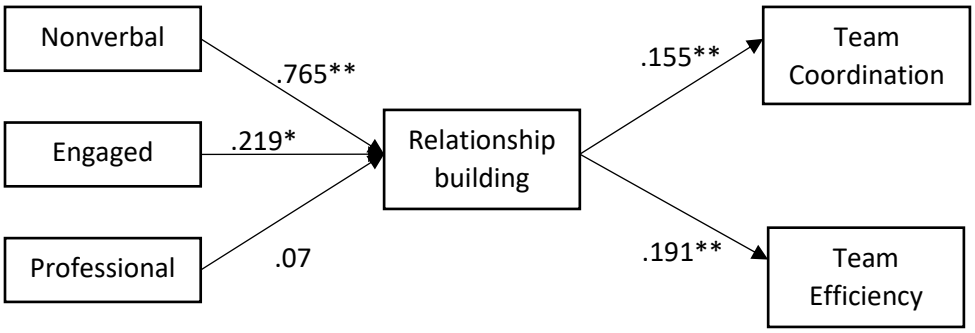

Figure 5b: Mediation results for the relationship between the three communicative behaviors and team outcomes in Videoconferencing (China sample)

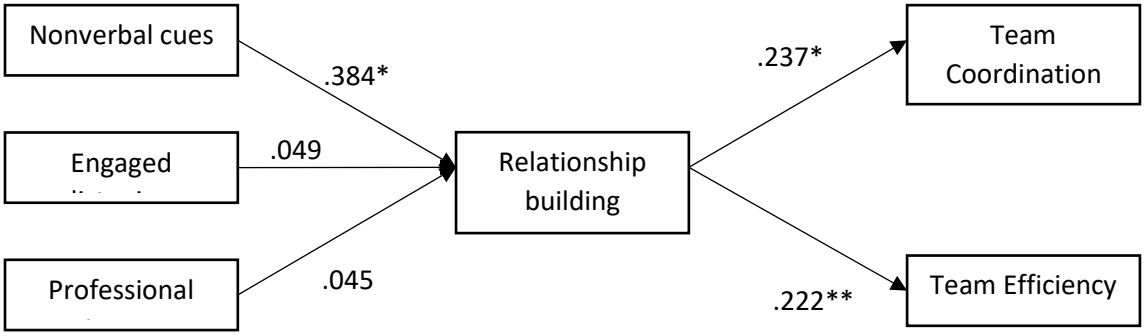

Figure 6a: Mediation results for the relationship between the three communicative behaviors and team outcomes in FTF meetings (U.S. sample)

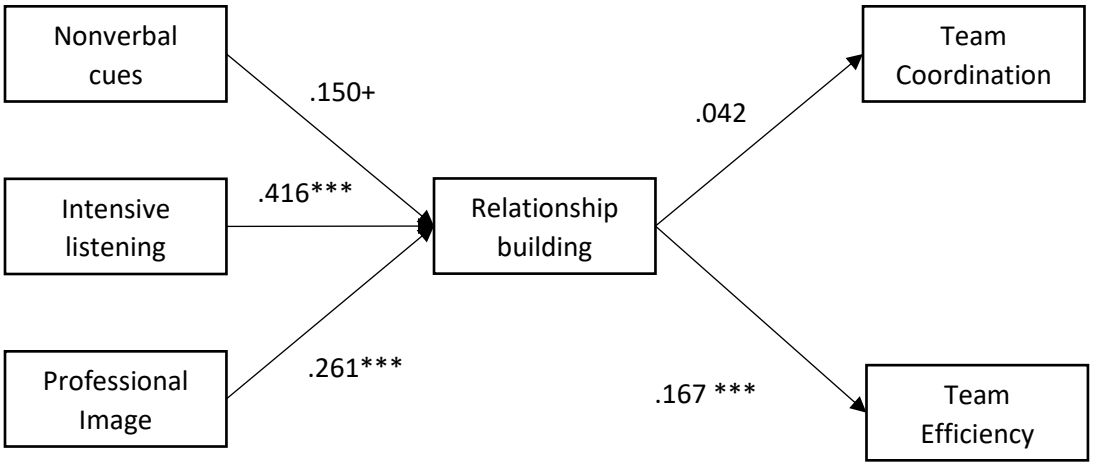

Figure 6b: Mediation results for the relationship between the three communicative behaviors and team outcomes in FTF meetings (China sample)