ABSTRACT

Trust, Collaboration, and Effectiveness in Virtual Teams

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The COVID-19 pandemic has accelerated the trend of organizations using virtual project teams to bring dispersed talent together, which has created unique challenges such as low group satisfaction and productivity (Kirkman et al., 2002). Using social information processing theory (Walther, 1992), this study investigates the impact that trust has on a virtual team's ability to collaborate by examining the concepts of swift trust (Meyerson et al., 1996) and transactive memory systems [TMSs] (Wegner, 1987). Data was collected from virtual groups participating in a group communication simulation at a mid-sized university. The results found that while swift trust was associated with perceived TMS strength, this effect was moderated by the cognition-based trust in the late stages of the group. Swift trust was also found to be unrelated to effectiveness in the early stages of a group. These results suggest that trust is a vital element in the development of virtual team member relationships and the group's ability to collaborate.

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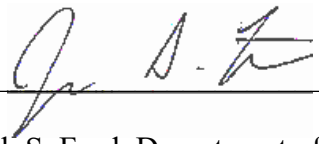

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TRUST, COLLABORATION, AND EFFECTIVENESS IN VIRTUAL TEAMS

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CHAPTER 1

Review of Relevant Literature

Introduction

The COVID-19 pandemic has vastly reshaped workplaces. Seemingly overnight, a large amount of U.S. organizations became entirely "virtual," with employees collaborating solely through communication technologies that vary from text-based computer-mediated communication to video conferencing calls. Many of those organizations, both small, regional firms and tech giants such as Google and Facebook, are considering permanent virtual options because of the potential productivity gains afforded by virtual collaboration. Meanwhile, contrarians claim these "virtual organizations" will "bleed out" with the erosion of organizational cultures and deteriorating personal connections that will eventually force companies to return to the office[1].

While COVID-19 magnified the process of virtualization, many companies and organizations have utilized virtual teams long before March 2020. Virtual teams offer key benefits over face-to-face teams. These often include greater schedule flexibility for team members (Leonardi et al., 2009), lower travel costs, and more diversity in team composition (Lipnack & Stamps, 2000). But there seems to be a high cost for the increased flexibility brought by virtual teams. As Walther and Bunz (2005) argue,

[1] One example is from this McKinsey and Company article from June 2020. While they avoid advancing a claim, they do discuss the potential pitfalls of virtual work. Retrieved from https://www.mckinsey.com/business-functions/organization/our-insights/reimagining-the-office-and-work-life-after-covid-19

virtuality often creates environmental, temporal, and relational disruptions. Members' affection, group cohesion, task orientation versus social orientation, formality, and dominance, and trust can all be impacted by increased virtual communication. Other studies have found that virtual teams function at a disadvantage with group performance and related processes compared to face-to-face teams (Andres, 2002; Baltes et al., 2002; Li, 2007; Ortiz de Guinea et al., 2012; Straus & McGrath, 1994). These dynamics of virtual collaboration create tension between the costs and benefits of virtual teams and create opportunities to learn more about the role of communication in virtual work.

One such opportunity is the role that communication plays in the development of trust among virtual team members. Trust has been identified to be an important element in the success of traditional teams because of its role in mediating member relationships, navigating social norms, and facilitating collaboration (Greenberg et al., 2007; Kanawattanachai & Yoo, 2007). But while there is an abundance of scholarship on trust in virtual groups, not much research has been done on the impact of trust on the development of a virtual team and its ability to coordinate activities. This paper's purpose is to fill this gap by exploring the communication behaviors of group members that influence the development of trust and the impact of trust on group effectiveness measures in virtual groups over time. Before addressing the research questions behind this study, it is vital to have a thorough understanding of the potential communication variables that might be involved in the development of trust in virtual teams.

Literature Review and Hypotheses

Trust in Virtual Teams

Following McAlister's definition, trust is conceptualized as "the extent to which a person is confident in, and willing to act on the basis of, the words, actions, and decisions of another" (1995, p. 25). The nature of trust emphasizes clear communication and coordination among team members. The ability of virtual teams to develop trust might be different due to the constraints imposed by the virtual communication context. To understand what I mean by virtual teams, I will define virtual teams as "groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish a variety of critical tasks" (Townsend et al., 1998, p. 17).

In a virtual team, trust is both a vital aspect of group development and performance, as well as challenging to develop in an electronically mediated context (Andres, 2002; Jarvenpaa et al., 2004). Kirkman et al. (2002), during their observation of the challenges faced by managers and organizations with virtual teams, found trust among the most difficult to create and sustain in a virtual context. Other critics have mirrored this pessimism, believing that trust in virtual teams is impossible to build due to the geographical separation and lack of richness of the computer-based medium (Andres, 2002; Kirkman et al., 2002; Walther, 1992; Walther & Bunz, 2005). These challenges are not unfounded: virtuality in groups can lead to a lack of shared understanding and expectations, a lack of contextual awareness of the other group members, and a general uncertainty with the other members of the group (Andres, 2002; Kirkman et al., 2002; Walther, 1992; Walther & Bunz, 2005). Despite these challenges, scholarship has found

that trust can and does develop in virtual teams (Crisp & Jarvenpaa, 2013; Iacona & Weisband, 1997; Jarvenpaa et al., 2004; Jarvenpaa & Leidner, 1999; Kanawattanachai & Yoo, 2002; Kirkman et al., 2002; Walther & Bunz, 2005), but scholars know less about the communicative processes of developing trust with teams in a virtual context and how it relates to the team's success.

Several antecedents and processes of trust development have repeatedly emerged from the literature on trust in virtual contexts. First, research has found communication among virtual teams is an important contributor to the development of trust among its members. Ianoco and Weisband (1997) found that high-trust teams communicated more frequently and more consistently than low-trust teams. The content of members' communication was also more specific and clearer in high-trust teams than their low-trust counterparts. This finding was perhaps the most frequent, with studies by Jarvenpaa et al. (2004) and Walther & Bunz (2005) also discovering this in their research. Another study by Jarvenpaa and Leidner (1999)proposed a distinct set of behaviors that helped maintain trust over time. The factors that sustained trust in virtual teams were predictable communication, substantive and timely responses, leadership, and transition from procedural to task focus.

Crisp and Jarvenpaa (2013) went beyond antecedents and investigated the process of trust development in virtual teams and found communication to be a key facilitator of trust development. They argued that trust developed when normative actions were followed through by team members. Normative actions, in turn, were positively correlated by frequent initial communication. These studies show that trust develops in virtual teams when team members create and then fulfill expectations, which supports the

idea of trust as the absence of uncertainty (Meyerson et al., 1996). Among other factors, it shows that communication is vital in facilitating the interchange between expectations and behavior during the development of trust in teams.

Time and Trust in Virtual Teams: Social Information Processing Theory

While this understanding of the development of trust in virtual teams is helpful, it still leaves several important concerns unaddressed. Trust remains a struggle in virtual teams (Kirkman et al., 2002), which often perform worse than comparable face-to-face teams. Walther's (1992) social information processing (SIP) theory helps to give more detail in explaining the development of trust in virtual teams and the distinction between virtual and face-to-face teams.

Walther wanted to reconcile different research findings in the emerging field of computer-mediated communication (CMC). Some scholars were finding evidence that relationships relying on CMC did not develop similarly to face-to-face relationships (Walther, 1992). They argued that relationships over CMC would be difficult, if not impossible to develop and sustain. But other scholars found little differences between CMC and face-to-face interactions in their research. Walther argued that, with a few exceptions, the differences between relationships maintained through CMC and those conducted face-to-face were minimal, stating that "as goes face-to-face so goes CMC" (1992, p. 75). As a caveat to this and to explain the diverse findings, he proposed that the reduced-cue medium would cause relational dynamics to develop similarly, but more slowly with CMC versus face-to-face communication. The resulting theory, named Social Information Processing (SIP) theory explained these vast differences in scholarship: studies that found the biggest differences between CMC and face-to-face communication

were conducted at a single point in time, but the studies that found little differences between the two conditions were conducted over a longer period. Research on virtual relationships and team decision-making have confirmed Walther's hypothesis that virtual groups communicate and progress through the group life cycles more slowly than face-to-face groups (Antheunis et al., 2012; Baltes et al., 2002; Li, 2007; Walther, 2002). This slow relational development process impacts the development of trust also. Kanawattanachai and Yoo (2002) found that the development process of trust in virtual groups is slower than its development in face-to-face groups.

The slower development of trusting relationships causes major problems for organizations and leaders that are attempting to leverage virtual teams to enhance organizational performance. Time is a valuable resource for organizations: the extra cost of time for virtual teams to develop might not compensate for benefits in flexibility, human resource utilization, and lower costs that this group structure provides. This dynamic creates a strong tension for team leaders and managers using a virtual format. Additionally, time is not the only cost that virtual teams bring to organizations. Baltes et al. (2002) discovered that virtual team members report less post-task satisfaction than members in face-to-face teams. Over time, this could lead to decreased employee morale and higher turnover. Baltes and colleagues also discovered that the decisions made by virtual groups were lower in quality and effectiveness than comparable face-to-face teams. Similarly, Li (2007) argued that the differences in performance between a virtual team and a comparable face-to-face team would enlarge with stricter time constraints and more complex tasks. While virtual teams and face-to-face teams performed similarly when faced with no time constraints and simple tasks, these time and task conditions are

rare in organizations. Organizations need high-quality decisions (a complex task in itself), and often other complex coordination work done as quickly as possible, potentially making the cost of virtual groups outweigh their benefits.

Despite the vast evidence revealing the challenges of virtual teams, virtual work is not doomed to ruin teams and organizations. Walther's (1994) research might suggest that high trust in teams could minimize the negative effects of virtual collaboration. During his investigation of the differences between face-to-face and virtual groups, Walther discovered that groups using CMC who had future expectations of interaction were similar to face-to-face groups in multiple relational dynamics, including trust. These findings suggest that electronic communication is the moderator by which people expect or do not expect ongoing future interaction. The expectation of future interaction, or the lack of it, influences the disparity between face-to-face and virtual groups by moderating the effects of CMC on a group. The expectation for future interaction raises questions about the impact of initial and lasting trust on the time of group development.

Swift Trust

The tensions between organizational objectives being met on time and the slower nature of virtual team development reveal a need for virtual teams to develop more quickly. Initial trust, or swift trust, is a concept that was developed by Meyerson et al. (1996) that answers the question of how trust develops in new teams. They conceptualized swift trust because they observed trusting behaviors in temporary teams in the early stages of the group before traditional trust had developed. How did the team members trust one another before they had any experience with each other? Meyerson and colleagues explain:

> These observations come together in a fascinating puzzle. Temporary systems exhibit behavior that presupposes trust, yet traditional sources of trust – familiarity, shared experience, reciprocal disclosure, threats and deterrents, fulfilled promises, and demonstrations of nonexploitation of vulnerability – are not obvious in such systems. In this respect, temporary systems act as if trust were present, but their histories seem to preclude its development. (1996, p. 167)

Meyerson and colleagues proposed that during the early stages of group formation people would be motivated to extend swift trust to others in the group to reduce uncertainty and manage risk and personal vulnerability. Because each team member's reputation was on the line, including the team's organizer, the mutual vulnerability promoted trusting actions. Swift trust, according to Meyerson et al., will focus primarily on the task-based elements of trust, often called cognitive trust (i.e. competence, reliability, professionalism), over affective trust (i.e. caring, emotional connection to each other) (Kanawattanachai & Yoo, 2002). This focus on cognitive trust allows groups to quickly confirm if people are trustworthy, contributing to the resilience of swift trust in teams.

Swift trust is not just for temporary teams. Research has found that swift trust plays a role in the development of trust in virtual teams. Jarvenpaa and Leidner (1999), during their investigation of trust in global virtual teams, found that teams with high levels of initial trust were more likely to maintain a high level of trust throughout the lifespan of the group. This finding resonates well with Meyerson et al.'s (1996) research. They had argued that that swift trust is a resilient construct in a group and contributes to long-term group trust.

Jarvenpaa et al. (2004) also found support for this claim. Their model of the antecedents and results of trust was based on attribution theory and Gersick's (1988, 1989) model of punctuated equilibrium. They argued that before the team has settled into its effective norms and processes – a stage called pre-equilibrium – initial trustworthiness

and early communication level would predict swift trust. Swift trust would then moderate the effects of late communication level on task performance, satisfaction, and cohesion after the equilibrium. This model was supported by their data, suggesting that the presence of swift trust is necessary, along with frequent communication, for teams to perform at a high level. Crisp and Jarvenpaa (2013) further clarified the relationship between swift trust and lasting trust. They found that although swift trust did not directly relate to performance or have a strong relationship between lasting trust, swift trust was significantly related to the enactment of normative actions, which in turn predicted lasting trust, which then predicted performance.

These findings show that swift trust is an essential first step in developing lasting trust and high performance. As evidenced by Jarvenpaa and Leidner (1999), teams with high trust initially (e.g. high swift trust), were more likely to maintain high trust in the later stages of the group. But for the benefits of swift trust to be realized, team members need to fulfill the expectations that other group members had of them. This finding also helps to explain why some groups with high initial trust in Jarvenpaa and Leidner's study did not maintain trust over time.

To seek conclusive evidence for the impact of swift trust on teams, Kroeger et al. (2020) decided to perform an empirical investigation of swift trust as outlined by Meyerson et al. (1996). They decided to test Meyerson et al.'s hypothesized antecedents of swift trust: member roles, institutional categories, trusting predispositions, reputations and the "shadow of the future", active engagement, and "as if" behaviors. Their study concluded that clarity of member roles and the "shadow of the future" significantly

predicted all areas of swift trust development in teams[2]. The remarkable instance of this study is the similarity of Kroeger et al.'s (and Meyerson et al.'s [1996]) concept of the "shadow of the future" and Walther's (1994) concept of future expectations. This could suggest that trust, specifically swift trust, is the moderator between expectations of future interaction and performance, potentially making it possible to minimize process losses associated with virtual teams.

Leadership behaviors also play a role to facilitate the development of trust in teams. Since maintenance of trust over time depends on leadership (Jarvenpaa & Leidner, 1999), leadership behaviors can't be neglected when investigating trust. Carte et al.'s (2006) study of emergent leadership investigated emergent leadership and its connection with performance. They tested which emergent leadership behaviors were linked to high performance in virtual teams and examined the nature of those behaviors: whether they were concentrated in one individual or dispersed throughout the group. They found that concentrated producer behavior and dispersed monitor behaviors were significantly associated with team performance. Producer behavior was when a group member "seeks closure, and motivates those behaviors that will result in completion of the group's task" (Carte et al., 2006, p. 327). An example of producer behavior would be when a group member takes responsibility to accomplish one part of the group's task and encourages others to do the same. High-performing teams had concentrated producer behavior, meaning that only a few members in the group did his for any given task. In effect, high-performing teams would specialize in tasks, just like teams with developed TMSs (see

[2] Kroeger et al. found significant correlations between trusting predispositions as well, but statistical analysis revealed that this was a confounded variable, presumably due to its relationship to clarity of member roles and "the shadow of the future."

section below on *Transactive Memory*). Monitor behaviors were when a member "collects and distributes information, checks on performance, and provides a sense of continuity and stability" (2006, p. 327). In high-performing teams, this behavior was found to be dispersed among team members, meaning that a large amount of the group performed these actions. Since the transition from swift trust to long-term trust is facilitated by normative actions and fulfilling commitments (Crisp & Jarvenpaa, 2013; Iacona & Weisband, 1997; Jarvenpaa & Leidner, 1999; Meyerson et al., 1996), it follows that dispersed monitoring behavior and concentrated producer behavior might be trust-building behaviors. And, consequently, trust might be the moderator variable by which these behaviors influence team performance.

While there has been select evidence that teams with high trust can reach decisions more quickly than lower-trust teams (Crisp & Jarvenpaa, 2013; Kroeger et al., 2020), there is a gap in the literature between the presence of swift trust and the time required for the development of long-term trust and performance. To this end, I ask:

RQ1: How does swift trust impact the performance of a virtual team before and after the project midpoint?

H1: Initial swift trust will be positively related to the team's initial effectiveness, given by their performance and the amount of time needed for the virtual team to complete the task.

H2: Initial swift trust will be positively related to long-term, cognition-based trust in virtual teams.

Transactive Memory

Trust contributes heavily to both the efficiency and quality of group performance. But the link between trust and performance is not direct. Some researchers have been unable to find a link between the two concepts, including Jarvenpaa et al. (2004), who found during an investigation of virtual teams that trust was not associated with performance. However, they also noted that many other studies have found contrary or qualifying results, including Crisp & Jarvenpaa (2013), Janardhanan et al. (2020), and Kanawattanachai & Yoo (2002). This indirect link may be explained by Wenger's (1987) theory of transactional memory, which links the concept of trust to team performance and explains these conflicting findings. The theory of transactive memory refers to the relationship between individual memory, communication, and the collective memory of groups. It argues that individuals who are in a continual relationship create a division of labor about the encoding, storage, and retrieval of information. A transactive memory system (TMS) develops when group members learn about the areas of expertise of other group members (Wegner, 1987). Members expect information that relates to a particular area of expertise to be remembered by the specialist member of that type of expertise. Over time, as TMSs develop in the group, group members will rely on the group for assistance in the retrieval of needed information. The development of a TMS in a group enables team members to coordinate by utilizing their cognitive resources effectively, increasing the overall ability of the group (Kanawattanachai & Yoo, 2007). This in turn makes synergistic process gains possible for project teams (Lewis & Herndon, 2011).

Developed TMSs in groups are highly correlated with group performance in several studies covering multiple contexts. A study by Liang et al. (1995) demonstrated

that developed TMSs, facilitated by group training as opposed to individual training, correlated with better group performance during an execution task. A review of the theory authored by Lewis and Herndon (2011) noted that research in the laboratory and in the field consistently has shown a positive relationship between TMS and performance, as well as other group outcomes such as group learning and creativity. These studies suggest that TMS development is an important consideration for practitioners wanted to cultivate these group outcomes.

Kanawattanachai and Yoo (2007) argued that TMSs are composed of three distinct yet interrelated aspects. First, TMS involved an awareness of the knowledge specialization between members. This aspect is critical for the focus of transactive memory theory: the division of cognitive labor. Second, teams with well-developed TMSs display the ability to effectively coordinate tasks and knowledge among group members. And finally, groups with TMSs have a high level of cognition-based trust, showing confidence in other members' knowledge and their ability to carry out tasks for the team (Kanawattanachai & Yoo, 2007; Lewis, 2003). This is similar to Rau's (2005) finding that trust influences and enhances the development of a TMS and its impact on group performance. These studies confirmed Liang et al.'s (1995) finding that groups with highly-developed TMSs did not need to explicitly justify their knowledge to the rest of the group, revealing high levels of trust among the members of the group. There is strong evidence, then, that trust is essential in promoting group collaboration and task coordination as an integral component of TMSs (Greenberg et al., 2007; Kanawattanachai & Yoo, 2002, 2007).

Leadership behaviors also factor into the development of coordination and a TMS among groups. A study by Bachrach et al. (2019) argued that both transactional and transformational leadership can drive the development of a TMS: transformational leadership motivates group collaboration (Kahai et al., 2003) and promotes shared vision and teamwork (Day et al., 2004), which contribute to the socio-emotional processes that drive TMS development. Transactional leadership also accelerates TMS formation in teams through incentive structures (Hollingshead, 2001). And emotive leadership can also build trust: Cogliser et al.'s (2012) data suggested that socio-emotional emergent leadership behaviors foster higher levels of trust in the group, particularly when leadership roles were specialized and distributed among team members. This finding also helps to explain why Jarvenpaa and Leidner (1999) found that social communication and communication conveying enthusiasm help develop trust initially.

H3: Cognition-based trust will be positively related to the strength of the transactive memory system in a virtual team.

H4: Cognition-based trust will mediate the impact of initial swift trust on the strength of the transactive memory system in a virtual team.

CHAPTER 2

Materials and Methods

Methods

Participants

To investigate the development of trust over time in virtual teams and how it impacted collaboration, I decided to conduct the study within the context of a virtual team project. The capstone team project for a small group communication course provided an excellent context to study virtual groups because the group members participated virtually, completed the assignment over five weeks, and included opportunities to study the trust, knowledge management, and due to its length and the nature of the project tasks.

Participants were recruited from two sections in this course via email. The resulting sample was composed of (N=47) students. Among the sample, 53.3% (N = 26) identified as male and 47.7% (N = 21) identified as female, with 0% (N = 0) identifying as non-binary, third gender, or preferring not to say. The participants ranged from 18 to 22 years of age, with 4.3% (N = 2) reporting being 18, 10.6% (N = 5) at 19, 29.8% (N=14) at 20, 31.9% (N = 15) at 21, and finally 21.3% (N = 10) at 22. There was N = 1 non-response. Most of the sample identified as Caucasian with 80.9% (N = 38) of respondents. 6.4% (N = 3) identified as African American, 4.3% (N = 2) identified as Latino or Hispanic, 4.3% (N = 2) identified as Asian, 2.1% (N = 1) identified as other/unknown, and 2.1% (N = 1) preferred not to say.

Context for Data Collection

The study consisted of three surveys that are administered at various times as the students underwent an online group communication simulation assignment. These surveys were conducted online via the Qualtrics online survey platform. In the simulation, a participant plays a role in a group of community leaders of a fictional town that needs to create a wildfire prevention plan. The participants are expected to learn about various fire mitigation techniques (such as mechanized thinning, prescribed burning, or manual thinning) and must make decisions about where each technique should be assigned to different spaces on the map. Each technique has benefits and costs.

As an element of each member's role, every team member has an ideal map that best fits the values of the constituent group that they represent. However, each member's ideal map is different, which leads to conflict that must be managed through communication. Beyond this, each member is given specific, personalized information to complete the task and needs to communicate with the group to make decisions. Members can also share this information with their teammates to enhance their decision-making and problem-solving.

The simulation is composed of five group meetings, each about an hour-long, and led by a different group member. The group leader is the only member that can edit the group mitigation technique map for that meeting. The simulation was conducted over five weeks, with one meeting per week conducted via the Zoom video communications application. Some participants used Zoom for communicating with each other and relied on the website that hosts the simulation to access information about the simulation and

their group map. Other groups utilized Zoom to both communicate and share the simulation information, by sharing the group leader's screen with the other members.

Procedure for Data Collection

An initial survey was administered before the students began the simulation, followed by a survey administered after their first meeting, and then the final survey was administered after the fifth meeting after the project. Because of the nature of the simulation, I only recruited participants who were participating in the simulation as an element of their classwork. This closed group dynamic is ideal for studying how transactive memory systems and trust develop in a group because new members can disrupt the process of development of trust and TMSs (Hackman, 2002). Every individual that was participating in the group simulation was invited to participate in the research. A recruitment email was sent to the professor of the course sections participating. This first email was sent the week before the beginning of the simulation, and it included a link to the initial survey, which included the scale for disposition to trust. The second survey link was sent out, via email by the course professor, after the first group meeting, and included scales on early trust, role clarity, "shadow of the future," normative actions, transactive memory systems, positive leadership, and positive communication. The final survey was sent in the same manner, but after the group had finished the meetings and all group deliverables. This included scales for late trust, role clarity, "shadow of the future," normative actions, transactive memory system, positive leadership, positive communication, effectiveness, and perceived virtuality. Administering the surveys at different times in the study helped us evaluate how our variables changed over time as

the group progressed. The professor also distributed reminder emails after each initial email was sent out to the participants.

Measurement

Several cases were excluded from the final analysis due to certain factors. Most commonly, this was due to incomplete responses (Progress < 80%). Also, repeated responses (two responses submitted by the same individual) were excluded from analysis and the first response was taken in most situations because this response was closer to the meeting which was the focus of the survey, and the first survey was assumed to contain a more genuine perception from the participant, which was desirable. The latter response was only taken in a few clear examples (mistakes in demographic or group information). Cases were also excluded from the final analysis if they had not completed all the surveys, meaning that participants who responded to the first survey but not the second, or vice versa, were excluded from the analysis. This resulted in N = 41 cases for analysis.

Reliability analyses were performed on all the scales used in the survey using Cronbach's alpha. Following Fornell and Larcker (1981), internal reliability was deemed sufficient if $\alpha > 0.700$. For several scales, certain items were removed because they dramatically reduced the reliability of the scale. Several times, this occurred with a negative statement response, suggesting that respondents misunderstood the statement under question. Reliability was re-calculated after the removal of these questions, the results which are reported below.

The survey was designed with items from other published research (Crisp & Jarvenpaa, 2013; Kanawattanachai & Yoo, 2002; Kroeger et al., 2020; Lewis, 2003; Maurer & Tarulli, 1994; Schoorman et al., 2007) and other items designed by the

researcher for this specific study. All questions were Likert-style responses (1 = Strongly disagree to 5 = Strongly agree).

Our initial survey was designed to measure the variable "disposition to trust," which was theorized to be significant in predicting swift trust. This scale was created by Kanawattanachai and Yoo (2002) to measure the willingness in which someone would extend trust to others. This scale was composed of four Likert-type items with higher scores indicating a greater willingness to extend trust and included questions like "most people tell the truth about the limits of their knowledge." The reliability of the disposition to trust scale in the current study was .76 (M = 11.55, SD = 2.91).

The post-initial meeting survey and the post-simulation survey were similar because they sought to track how the variables of early/late trust, role clarity, "shadow of the future," transactive memory systems, normative actions, effective communication, and positive leadership changed over time. The scale for early/late trust was created by Schoorman et al. (2007) and was adapted by Crisp and Jarvenpaa (2013). Schoorman et al. (2007) designed the scale to measure a person's trusting beliefs in the context of their team. The scale was made of 8 Likert-type questions with higher scores indicating more trusting beliefs. Questions from this scale were like this: "we are able to rely on the people we work with on this team." The reliability of the early trusting scale in the current study was .84 (M = 12.35, SD = 3.82). The reliability of the late trusting beliefs scale in the current study was .90 (M = 34.24, SD = 5.95).

The scales for role clarity and "shadow of the future" as predictors of early trust were created by Kroger et al. (2020). The scale for role clarity was intended to measure participants' personal feelings of clarity in what they were expected to do, and "shadow

of the future" was designed to measure the perceptions of the likelihood that the participant would work with their group members in the future. The scales featured questions like "it was clear from the start who was responsible for which task," and "if I had the choice, I would like to work with the people involved in the project again in the future" respectively. Both scales were composed of three Likert-type items with higher scores indicating higher levels of role clarity or higher levels of expectations that the group would work together again in the future. In the current study, the scale for role clarity had a reliability of .74 (M = 4.89, SD = 1.92) at time one and .86 (M = 12.10, SD = 2.57) at time two. The scale for "shadow of the future" had a reliability of .79 (M = 8.53, SD = 1.52) at time one, and .81 (M = 12.08, SD = 2.87) at time two.

The scale used for transactive memory systems was created by Lewis (2003) to measure the strength of the transactive memory system in a team. In total, this scale had 15 Likert-type items, with lower scores suggesting lower TMS strength in a team. This scale included three subscales, specialization (6 items, at time one α = .85 (M = 12.60, SD = 3.76); at time two α = .86 (M = 23.28, SD = 4.83)), credibility (4 items, at time one α = .83 (M = 10.06, SD = 2.64); at time two α = .83 (M = 17.66, SD = 2.72)), and coordination (5 items, at time one α = .60 (M = 10.00, SD = 3.02); at time two α = .56 (M = 13.12, SD = 1.83)), and included responding to statements like "different team members are responsible for expertise in different areas," and "I was confident relying on the information that other team members brought to the discussion," and "our team worked together in a well-coordinated fashion." The reliability of the TMS scale in the current study was .84 (M = 60.79, SD = 7.10) at time one and .86 (M = 61.48, SD = 8.53) at time two.

The scale used for normative actions was created by Crisp and Jarvenpaa (2013). This scale was made up of 10 Likert-type items with lower scores indicating lower perceptions of setting norms and monitoring norms behavior in a group. This scale included two subscales including setting behaviors (4 items, at time one .73 (M = 7.72, SD = 2.48); at time two .83 (M = 13.14, SD = 3.69)) and monitoring behaviors (6 items, at time one .89 (M = 10.47, SD = 3.88); at time two .91 (M = 23.42, SD = 5.17)) and included questions like "to what extent did your team discuss specific final performance goals?" and statements like "we try to be aware of this team's level of performance." The reliability of the normative actions scale in the current study was .88 (M = 41.81, SD = 5.71) at time one and .90 (M = 36.56, SD = 7.76) at time two.

The scales for effective communication and positive leadership were created by the author. The scale for effective communication included three subscales: frequent communication (3 items, at time one .84 (M = 6.02, SD = 2.73); at time two .83 (M = 12.08, SD = 2.45)), predictable communication (3 items, at time one .70 (M = 5.72, SD = 1.95); at time two .73 (M = 12.04, SD = 2.58)), and substantial and timely responses (3 items, at time one .85 (M = 5.19, SD = 2.01); at time two .82 (M = 12.38, SD = 2.53)). These subscales were adapted from the concepts articulated by Jarvenpaa and Leidner (1999) and were designed to measure the perceptions of effective communication among the participant's team members. Made up of 9 Likert-type items, the scale ranges from 9 to 45, with higher scores indicating a perception of greater prevalence of effective communication in the team. The concept for the positive leadership scale was also adapted from Jarvenpaa and Leidner (1999) to measure perceptions of positive leadership in the team. Composed of 3 Likert-type items, this scale ranges from 3 to 15, with higher

scores reflecting a perception of more positive leadership behaviors and communication among the team. The reliability of the effective communication scale in the current study was .90 (M = 33.24, SD = 5.43) at time one and .87 (M = 36.86, SD = 5.94) at time two. The reliability of the positive leadership scale was .84 (M = 5.13, SD = 1.93) at time one and .83 (M = 12.54, SD = 2.62) at time two.

The post-simulation survey also had additional measures beyond these to include early effectiveness, perceptions of virtualness, and late effectiveness. The measures for early and late effectiveness were adapted from Maurer and Tarulli (1994). The adapted scale included items like this: "if it were graded by a subject expert, the portion of the mitigation plan my team developed would earn a high grade." The scale was made up of 3 Likert-type items with lower scores indicating perceptions of low effectiveness in the team. The reliability for the early effectiveness scale for the current study was .81 (M = 11.20, SD = 2.67). The reliability for the late effectiveness scale for the current study was .91 (M = 11.90, SD = 2.73); The scale for perceptions of virtualness was created by the author and included questions such as: "I regularly interact with members of my simulation taskforce face-to-face." The reliability for the perceptions of virtualness scale for the current study was .53 (M = 17.00, SD = 4.32). During the analysis phase, an exploratory factor analysis was run on this scale to investigate the low reliability. The result was three separate constructs, indicating that this scale was measuring multiple factors.

The simulation also provides performance measures, in the form of ideal map match. The simulation compares the current group map to an ideal group map and to the maps of everyone in the simulation. The simulation then produces a percentage match

between the group map and the ideal map. The author used this percentage after the first meeting and after the simulation as a supplemental performance measure.

CHAPTER 3

Analysis and Results

Analysis

Analysis Procedure and Rationale

To test my hypotheses, I used five variables: swift trust, subjective initial effectiveness, objective initial effectiveness, cognition-based trust, and transactive memory system (TMS) strength. TMS strength was made from three subscales: specialization, coordination, and credibility. The values of these variables were averaged from the corresponding scale items. The means and standard deviations of these variables are reported in Table 2 of Appendix C.

I conducted two types of analyses for my hypothesis testing I tested the first three hypotheses with linear regression: H1, which predicted that higher measures of swift trust would lead to greater initial effectiveness, H2, which predicted that swift trust would lead to cognition-based trust, and H3, which predicted that cognition-based trust would lead to TMS strength. I tested Hypothesis 4, which predicted that cognition-based trust would mediate the relationship between swift trust and TMS strength, with a multiple regression analysis to test a mediation effect.

Following the analysis methodology of Baron and Kenny (1986), Judd and Kenny (1981), and James and Brett (1984). I tested for a mediation effect using multiple regression with three variables: swift trust (the causal variable), cognition-based trust (the mediator variable), and transactive memory system (TMS) strength (the outcome

variable). I will know that cognition-based trust fully mediates (contrasting from a partial mediation or non-mediation) the relationship between swift trust and TMS if the relationship between swift trust (causal variable) and TMS (the outcome variable) is zero when controlling for cognitive based trust (Baron & Kenny, 1986; Judd & Kenny, 1981).

I used Baron and Kenny's (1986) four steps to investigate a mediation effect using multiple regression. I began by showing that the causal variable and the outcome variables are significantly correlated with each other. Then I tested to establish that the causal variable is related to the mediator variable, and next tested that the mediator variable is related to the outcome variable.

Finally, I performed a multiple regression using both the mediator variable and the causal variable as independent, predictor variables and the outcome variable as the dependent. If the standardized beta coefficient of the causal variable is insignificant, given that the causal variable is a significant predictor of the outcome variable when not controlling for the mediator (as is tested in step one), then the data supports the mediation relationship (Baron & Kenny, 1986).

Results

Pre-Analysis Correlations

To better understand the relationships between the variables involved in the multiple regression, I first calculated the bivariate correlations between the variables. The results of this test are represented in Table 3 of Appendix D. For the hypothesis tests, the variable for TMS strength was computed using the mean of three variables, which are also listed on the correlation table: specialization, coordination, and credibility.

Results for Analysis of Hypothesis 1 and Research Question 1

To test H1, that swift trust would be positively related to initial effectiveness, a simple bivariate correlation analysis was performed between subjective initial effectiveness and swift trust. The measure for swift trust was measured during the second survey after the groups' first meetings ($M = 4.45$, $SD = .49$). The measure for initial effectiveness was taken retrospectively after the project, as members were asked to reflect on their effectiveness early in the project ($M = 3.73$, $SD = .88$). The analysis did not find a significant correlation between swift trust and subjective initial effectiveness, $r(39) = .15$, $p = .338$.

To make sure that the subjective nature of the initial effectiveness measure was not skewing the results, a second analysis was performed with the initial group ideal map match percentage ($M = 37.12$, $SD = 6.90$) as the dependent variable predicted by swift trust. The result did not evidence a significant correlation between the two variables, $r(39) = -.20$, $p = .214$, suggesting that swift trust is not a significant predictor of either subjective initial effectiveness or initial group ideal map match percentage. Therefore, I was unable to reject the null hypothesis for Hypothesis 1.

While the results of the analysis of Hypothesis 1 addresses part of Research Question 1, which asks how swift trust impacts the performance of a virtual team before and after the project midpoint, the relationship between swift trust and performance after the project midpoint was not addressed. To test this, I ran a linear regression analysis with swift trust ($M = 4.45$, $SD = .49$) as the dependent variable and late effectiveness ($M = 4.00$, $SD = .85$) as the independent variable. The model was not significant at the $p < 0.05$ level, $r(38) = .17$, $p = .30$. Since the analysis for H1 did not show evidence that swift

trust impacts the perceptions of effectiveness before the project midpoint, and this analysis did not show evidence that swift trust impacted the perceptions of team effectiveness after the project midpoint, we cannot claim that there is a relationship between swift trust and perceptions of performance, either before or after the project midpoint, answering RQ1.

Results for Analysis of Hypothesis 2 and Hypothesis 3

To answer the question of whether swift trust was positively correlated with cognition-based trust and determine whether to reject the null hypothesis for Hypothesis 2, I used a bivariate correlation test between the variable for swift trust (mean = 4.445, SD = .498) and cognition-based trust (mean = 4.381, SD = .582). The results showed a significant, positive correlation, $r(39) = .56$, $p < .001$, suggesting these two concepts are related to one another. Since the results were statistically significant, I can reject the null hypothesis of H2 and posit that swift trust is related to cognition-based trust.

I tested Hypothesis 3, which predicted that cognition-based trust (mean = 4.381, SD = .582) would be positively related to TMS strength (mean = 4.127, SD = .588), with a bivariate correlation. The analysis demonstrated a significant, positive relationship $r(39) = .74$, $p < .001$, supporting the claim that participants who reported a higher level of trust in their team also reported a stronger TMS. The statistical significance of the test allows me to reject the null hypothesis for Hypothesis 3.

Results for Analysis of Hypothesis 4

For H4, a multiple regression analysis testing for a mediation effect was conducted, following the four-step process outlined by Baron and Kenny (1986), Judd and Kenny (1981), and James and Brett (1984).

The first step requires a significant correlation between the swift trust (mean = 4.445, SD = .498) and TMS strength (mean = 4.127, SD = .588). I used a bivariate correlation analysis to test for this, and found a significant, positive correlation $r(39) = .43$, $p < .005$. Therefore, the first step was fulfilled.

The second step needed to determine a mediation effect for the theoretical model requires a significant correlation between swift trust and cognition-based trust. The correlation analysis resulted in a positive significant correlation which provides support for Hypothesis 2 (mean = 4.381, SD = .582) and meets the requirements for testing the mediation effect in the model (Baron and Kenny, 1986).

The third step requires a significant correlation between cognition-based trust and the outcome variable, TMS strength. This requirement was met through the test and results for Hypothesis 3, found above.

Step four requires that the effect of swift trust on TMS strength be insignificant when controlling for cognition-based trust. To test this, a multiple linear regression was calculated to predict TMS strength based on swift trust and cognition-based trust. I found a significant regression ($F(2,38) = 23.163$, $p < .001$), with an R^2 of .526. The formula for predicted TMS strength of the participants equals .799 + .739 * (cognition-based trust) + .021 * (swift trust), where both cognition-based trust and swift trust were measured with a Likert-type scale with a 5 coded as strongly agree, and 1 was coded as strongly

disagree. The participants reported TMS strength increased by .739 points for each point of cognition-based trust and .021 for each point of swift trust. Cognition-based trust was a significant predictor of TMS strength ($\beta = .731$, $p < .001$), but swift trust was not a significant predictor ($\beta = .018$, $p = .895$).

Since the tests supported all four requirements Baron and Kenny's (1986) test for a mediation effect using multiple regression, I can reject the null hypothesis for Hypothesis 4, meaning that cognition-based trust mediates the impact of swift trust on TMS strength.

CHAPTER 4

Discussion, Limitations and Future Directions, and Conclusion

Discussion

This study investigated the relationships between trust, TMS strength, and effectiveness in a virtual context. Previous studies have found support that these concepts are often interrelated, while some scholars have disputed the association between trust and effectiveness. Given the widespread use of communication technology for teamwork and collaboration, the present study contributes to the virtual group literature by investigating the relationship between trust communication, and effectiveness in a virtual group.

Based on previous research, I hypothesized that early trust, or swift trust, was resilient and swift trust would positively relate to cognition-based trust (H2). This hypothesis was strongly supported by the data. The data confirm Jarvenpaa and Leidner's (1999) finding that and groups that initially trusted or distrusted one another were more likely to maintain that same level of trust than to change. This further illustrates the importance of swift trust as a concept because of the influence that swift trust has on traditional trust in the later stages of the project. Practitioners who focus on creating high levels of swift trust at the beginning of a project might have more success with creating high levels of traditional trust.

But the positive relationship between swift trust and cognition-based trust also contributes to our understanding of swift trust by providing support for Meyerson et al.'s (1996) idea that swift trust is a resilient concept as opposed to a fragile concept because

of the confirmatory influence of "as if" behavior in a team. Meyerson and colleagues argue that in temporary teams, swift trust will promote people engaging in trusting behaviors as if they trusted other members, but don't have the experience that would lead to traditional trust. Because of this behavior, swift trust tends to reinforce itself and endure over time. This explanation shows how vital initial impressions are, and how important the first team meeting can be since early perceptions can influence this reinforcing, "as if" behavior (Meyerson et al., 1996).

I also hypothesized that cognition-based trust would be associated with TMS strength (H3), which was supported by the data. This demonstrates that trust is a critical variable in the development of the TMS in a team, which confirms previous findings in the scholarship (Bachrach et al., 2019; Kanawattanachai & Yoo, 2002, 2007; Lewis, 2003; Lewis et al., 2007; Lewis & Herndon, 2011). Theoretically, trust is essential for the development of the TMS in a team because, without it, team members won't be willing to share their diversified knowledge or information with the other group members and won't seek information from the other group members that they may have. This data from this study provides evidence for the claim that trust is a necessary component in the development of a team. Without trusting communication and behavior, the group will not develop a wiliness to collaborate and share knowledge and tasks. Trust is even more vital in virtual groups since those groups tend to have slower relational development due to the restricted information of the leaner mediums (Walther, 1992).

Finally, I predicted that cognition-based trust would mediate the association between swift trust and TMS strength (H4). The analysis showed that swift trust is a significant predictor of TMS, but its effect was mediated by cognition-based trust. This

contributes to our understanding of how trust can increase the effectiveness of a team and its ability to coordinate and accomplish complex tasks. Swift trust is predictive of the TMS strength of a team in the late stages of a project, but this is because swift trust develops into cognition-based trust. Teams who started with high levels of swift trust, but then lost trust with their team as the simulation progressed had reported lower TMSs. The data in this study support the claim that while swift trust helps develop both trust and TMSs in teams, the relationship between swift trust and TMS strength is mediated.

I also predicted that swift trust would be related to initial group effectiveness (H1). The data did not support this hypothesis. I found that there was little to no evidence that swift trust leads to initial effectiveness. This could be for several reasons: first, teams and team members might have been overwhelmed by addressing the primary tensions of the task coupled with the secondary tensions of unfamiliarity with the team. To add to this, the teams were all grappling with the technology. The result is these complications is that even teams that did have high levels of swift trust were unable to make significant progress on their task. This explanation might have a theoretical foundation in Gersick's (1988, 1989) punctuated equilibrium theory, where she observed that task groups made the most progress after the project equilibrium, and the period before equilibrium was characterized by team members familiarizing themselves with the task and each other. This study found some evidence for this theory in team dynamics who are operating in a virtual context.

A second potential explanation relates to the problem of measuring effectiveness with the design of the simulation. Two separate measures were used for initial effectiveness: a subjective measure from the surveys, and an objective measure that was

calculated by the simulation itself that evaluated the student's performance individually and as a team. Because the subjective measure was taken after the project, this could have altered participants' opinions on their performance at the start of the project. Additionally, due to the stressful nature of the first meeting, they could have reported their performance as being worse than it was.

The objective measure addresses the specific shortcomings of the subjective measure, but it has other shortcomings of its own. While the simulation calculates the "ideal map match percentage," (which constituted the objective measure), this information is not accessible to the participants. This could result in a low score for teams who are otherwise coordinating and communicating well but simply don't understand what metrics contribute to a successful performance.

The final and potentially the most obvious explanation is that the null hypothesis for Hypothesis 1 is true, and that swift trust is not correlated with initial effectiveness in any way. This conclusion is not necessarily contrary to the previous literature, which has often produced contrary results on the relationship between swift trust and effectiveness. Jarvenpaa et al.'s (2004) and Crisp and Jarvenpaa's (2013) studies have been among those that have failed to find a significant, direct link between swift or early trust and performance. Other studies, such as Kanawattanachai and Yoo (2002) found strong support for a positive relationship between trust and effectiveness. The analysis for Research Question One found similar results with swift trust and perceptions of late effectiveness. The reasons for this finding could be similar to the reasons why I failed to find evidence for H1: the simulation used various measures to score effectiveness, but these were not made available to the students. Also, since the survey measured

perceptions of effectiveness, this could be distinct from the true effectiveness of the team. Or, like H1, perhaps no association exists between these concepts.

While the relationship between swift trust and performance in this study is unclear, it does not provide support for Hypothesis 1, suggesting, along with Jarvenpaa et al. (2004) and Crisp and Jarvenpaa (2013), that trust may be unrelated to effectiveness, particularly in the early stages of the project. However, the perspective of social information processing (SIP) theory (Walther, 1992), may help explain these conflicting results in the literature. According to SIP theory, team relationships will continue to develop among groups that use only computer-mediated communication (CMC) but will develop more slowly due to the medium's lack of informational richness. It is possible that in this study and others, the initial measure for swift trust was taken before swift trust was fully developed and had translated into effective performance. For instance, the study by Kanawattanachai and Yoo (2002) measured for swift trust two weeks into the project, whereas this study measured immediately after the first meeting. Kanawattanachai and Yoo's study also used a computer simulation that had a clear goal and constant performance evaluation when the simulation in this study did not. Both or either of these reasons could provide a theoretical explanation for the results.

Beyond that, these results add to research done by Jarvenpaa and Leidner (1999), who found that teams who had high levels of trust in the beginning maintained high levels of trust throughout the project, and vice versa with low-trusting teams maintaining low trust. Rather than a static view of trust, this research provides support for the idea that trust develops over time. Swift trust in the early stages of the project did not have a clear impact on the effectiveness of the group. But cognition-based trust in the later

stages of the project was significant as a predictor of TMS, which various studies have shown to be largely consequential in team effectiveness (Hollingshead, 1998, 2001; Kanawattanachai & Yoo, 2007; Lewis et al., 2007; Lewis & Herndon, 2011). The difference in the effects of trust over time shows that trust develops and changes over the lifespan of a team.

This study contributes to our understanding of trust and communication. The data suggests that trusting beliefs, throughout the stages of the project, have important implications on the ability of a team to collaborate and share information. The concept of TMS is key to understanding trusting communication in groups. Past TMS research (Hollingshead, 1998, 2001; Kanawattanachai & Yoo, 2007; Liang et al., 1995; Rau, 2005; Wegner, 1987) has argued that TMS is a group level memory system, defined by encoding and retrieval processes. This allows groups to cooperate and collaborate more effectively because there is a division of labor and the ability to retrieve that information and expertise when needed (Liang et al., 1995). This study links trusting beliefs, including early trust and trust in the latter stages of a project to the development of TMSs in teams. This may be because trusting beliefs lead to team members communicating trust through trusting behaviors, creating a willingness to share information with others. In a sense, trusting beliefs are a necessary precursor for TMS development and utilization that has been shown to increase team performance (Liang et al., 1995; Rau, 2005).

In the context of a virtual team, trust and TMSs could be even more important. Even with tools that help team members collaborate on time, collaborating virtually can be a challenge because of the increased amount of time that it takes to develop trust over virtual media. As Kirkman et al. (2002) argued, trust needs to be a high priority for

virtual team leaders because it is challenging to develop in the virtual context, and yet necessary for smooth group interactions and performance. Because these teams don't have the advantage of face-to-face interaction, which is a richer medium that fosters faster development of trust (Walther, 1992), trust is especially essential for virtual teams. And while virtual collaboration is benefited through modern technological collaboration tools, these tools don't replace the group's ability to use expertise and information spread across multiple team members. The group's TMS helps groups accomplish tasks more efficiently and effectively. Taken together, the results of this study help to illustrate the relationship between trust and collaboration and confirm Kirkman et al.'s (2002) argument: practitioners need to prioritize building trust with their teams because it is highly linked to a team's ability to collaborate and perform well.

Limitations and Future Directions

The current study has several important limitations to be considered. First, the size of my participant sample was small and is not demographically diverse in age. While the results that I found were significant, the characteristics of this sample do not match the larger population of project teams. Also, the sample of this study was composed of colleges students between the ages of 18-24. This sampling strategy to use students who were involved in this group project simulation was appropriate due to the goals of this study to investigate team dynamics throughout the lifetime of the group. Our understanding of individuals and teams of this age group is especially useful for employers and teachers, but the focused ages of the participants limit the generalizable of the study's results to non-students and groups with individuals who are older than 24 years.

Furthermore, the study relied on participants subjective experiences of trust with their team, which creates the possibility of a self-report bias in the data (Donaldson & Grant-Vallone, 2002), as participants might have been inclined to report the levels of trust that they experienced in the team as higher than an outside observer might report that the team experienced or communicated. While the subjective experiences of trust are important factors to consider for both scholars and practitioners, the enacted behaviors of trusting communication are critical to a complete understanding of trusting dynamics in a group. Future research can address this limitation by using different methodologies to focus on the observed behaviors of trust and collaboration in virtual teams as opposed to self-reported perceptions. By using various methodologies, it may generate new insights into the impact that different mediums have on team collaboration and trust.

The results of this study are also in the context of a simulation, which might vary from the context of a professional team in a non-simulated environment. Future research could investigate trust and collaboration in real work teams as opposed to simulated work teams, which might find that the dynamics of trust vary in different situations and contexts. For instance, emergency response teams might be forced to trust one another because of the high stakes of failure and might display high levels of swift trust due to regulations that require training and certification for technicians.

Other future research could focus on comparing the differences in trust and collaboration between virtual teams and face-to-face teams. This study, while drawing from many studies that study face-to-face teams and comparison studies, focused only on virtual teams. Future studies can build on our knowledge of how the virtual medium impacts the process of building trust and collaborating by using an experimental design

with teams interacting on various mediums. Even comparing teams that interact using video conferencing with teams that interact through textual messaging could give us insight into how different mediums impact group dynamics and different degrees of "virtualness."

Conclusion

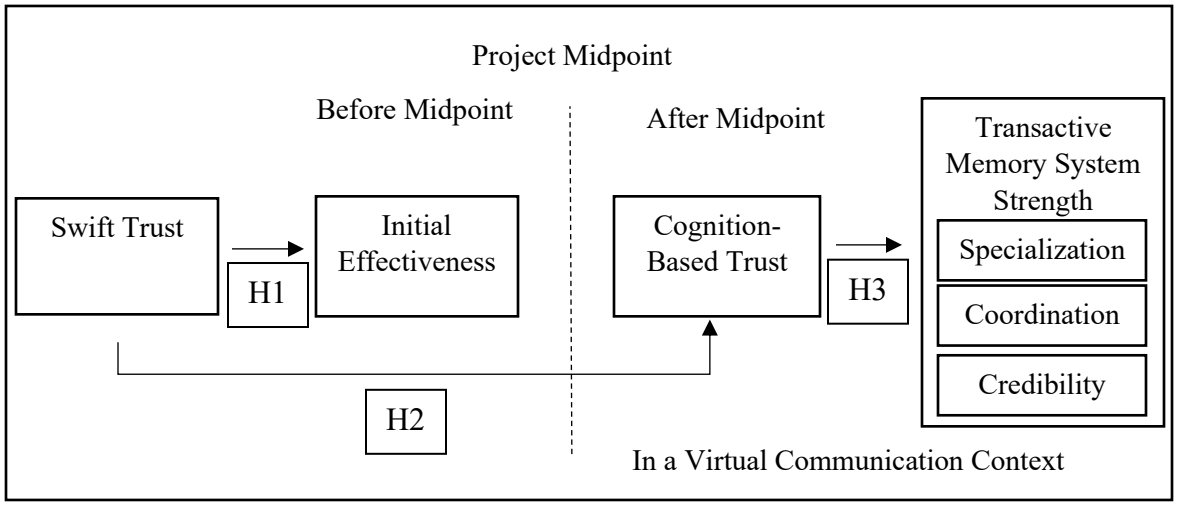
This research sought to explore the impact that trust and swift trust would have on the development of virtual teams. Ultimately, my results seem to suggest that trust plays a critical component in the development of the team's ability to collaborate. Trust in the early stages of the project, or swift trust, seems to be predictive of trust throughout the entire project team life cycle, which supports previous scholarship that claims that swift trust is a resilient construct. In turn, trust in the late stages of the project predicts the strength of the "group mind," and their ability to coordinate and collaborate throughout the project. As the prevalence of teams increases in our organizations, researchers and practitioners need to focus on developing and maintaining trust among their teams to maximize team effectiveness.

APPENDICES

APPENDIX A

Model

Trust and Performance Over Time



APPENDIX B

Table 1

Proposed Antecedents of Constructs from Literature

Table 1

Construct	**Antecedent**	**Source**
Swift (initial) trust	Role Clarity	Kroeger et al. (2020)
	"Shadow of the future"	Kroeger et al. (2020)
	Communicating frequently	Walther & Bunz (2005); Jarvenpaa et al. (2004); Ianoco & Weisband (1997)
Maintained trust	Predictable communication	Jarvenpaa & Leidner (1999)
	Positive leadership	Jarvenpaa & Leidner (1999)
	Substantial and timely responses	Jarvenpaa & Leidner (1999)
	Normative behaviors	Crisp & Jarvenpaa (2013)

APPENDIX C

Table 2

Descriptive Statistics of Variables

Variable	N	Mean	Std. Deviation
Swift Trust	41	4.445	.498
Subj. Initial Effectiveness	41	3.732	.879
Obj. Initial Effectiveness	41	37.122	6.900
Cognition-Based Trust	41	4.381	.582
TMS strength	41	4.127	.588
Specialization (TMS)	41	3.911	.832
Coordination (TMS)	41	4.107	.541
Credibility (TMS)	41	4.476	.680

APPENDIX D

Table 3

Correlation Matrix for Hypotheses Variables

	Mean	SD	1	2	3	4	5	6	7	8
1. Swift Trust	4.445	.497	1							
2. Subjective Initial Effectiveness	3.731	.879	.154	1						
3. Objective Initial Effectiveness	37.122	6.899	-.198	.202	1					
4. Cognition-Based Trust	4.381	.582	.599**	.376*	-.021	1				
5. TMS Strength	4.126	.588	.426**	.445**	-.007	.741**	1			
6. Specialization (TMS)	3.910	.831	.338*	.310*	-.059	.579**	.896**	1		
7. Coordination (TMS)	4.107	.541	.317*	.360*	.045	.629**	.845**	.613**	1	
8. Credibility (TMS)	4.476	.679	.449**	.518**	.041	.717**	.760**	.462**	.623**	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

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