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Trust in People and Trust in Technology: Expanding Interpersonal Trust to Technology-Mediated Interactions

Evgeniya Evgenieva Pavlova Miller
University of South Florida, jenny.pavlova@gmail.com

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Expanding Interpersonal Trust to Technology-Mediated Interactions

by

Evgeniya E. Pavlova Miller

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Department of Psychology
College of Arts and Sciences
University of South Florida

Major Professor: Michael D. Coovert, Ph.D.
Michael T. Brannick, Ph.D.
Wendy Bedwell, Ph.D.
Doug Rohrer, Ph.D.
Artemio Ramirez, Jr., Ph.D.

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DEDICATION

To my parents -- Thank you for your unwavering belief in me throughout this journey. I will always remember the day I had the crazy idea to go to college in the United States and study Psychology and you said “Go for it” without any hesitation. Without you, this wouldn’t have been possible.

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ABSTRACT

Trust is necessary for human interactions. It provides the ability to participate in risky behaviors without engaging in a laborious risk-benefit analysis about the situation at hand. The introduction of information and communication technologies has brought about new ways of communicating (e.g., text messaging, video conferencing). Despite the benefits stemming from the ability to communicate through technology, the lower quality and quantity of communication cues exchanged during a technology-mediated interaction can hamper the development of trust.

This study examined the relationship between interpersonal trust and trust in technology during a technology-mediated dyadic interaction and aimed to determine whether interpersonal trust and trust in technology had different relationships with outcomes of interest. The Mayer et al. (1995) interpersonal trust model was augmented by including trust in technology. To test the hypothesized relationships between interpersonal trust, trust in technology, collaboration and performance, an interchangeable member dyadic path model was fit to the data. Three alternative models were fit to the data.

Results revealed that interpersonal trust impacted trust in technology, which in turn impacts collaboration behaviors. Both types of trust had an effect on intentions to continue the interpersonal interaction and intentions to use the technology in the future, however interpersonal trust had a stronger influence on both intentions. The results of the study help us understand how trust operates in technology-mediated environment. Future research should focus on examining how interpersonal trust and trust in technology unfold over time.

CHAPTER 1: INTRODUCTION

Technology has become an integral part of people's lives. The majority of people from industrialized economies use information and communication technology (ICT) on a daily basis in both their personal or professional lives. People have interacted with technology for a very long time. Primitive tools such as picks and wheels eased everyday hard labor; they later gave way to sophisticated information-driven tools, which have made travel and life in outer space a reality. The technological tools that people have developed over hundreds of years have allowed us to expand human knowledge and push nature's limits.

Over the past century we have witnessed an unprecedented technological development. The role of technology is changing from tools used by people to ease labor, to autonomous entities which perform complicated tasks and can make complex decisions. Technology's role is shifting from an auxiliary assistant to an independent agent that people work alongside; it is quickly becoming the newest team member at work and at home.

Technology can fulfill a variety of human needs that can be classified in three broad clusters – provide information, facilitate work, and facilitate communication (Means, 1994). When technology is used to provide information, it allows people to gain quick access to material of interest. For instance, I can use a computer and its internet search capabilities to research specific topics. On the other hand, when technology is utilized to facilitate work, we use it as a tool designed to alleviate some of our work. For example, I can program a worksheet to do repeated calculations so I can focus on other, less mechanical tasks. Lastly, we can use technology to facilitate communication between people; I can email, talk on the phone, or Skype with colleagues and friends around the globe. The present research project focuses on this last function of technology, technology as a communication facilitator.

Through most of human history people have interacted face-to-face. People learned to read physical and verbal signs coming from others about their truthfulness and intentions. They also developed rules to decide whether the interaction with a particular person or a group should continue or not. The invention of the telephone in the late 19th century introduced a completely novel method of interpersonal communication; now people could interact without meeting in person. Since then, the adoption of technology-mediated communication methods has grown dramatically.

When people interact with one another, an important factor which impacts behavior is trust. Trust influences the rate of information sharing between people (Jones & George, 1998), collaboration (Smith & Barclay, 1997), backup behaviors (Wildman, Shuffler, Lazzara, Fiore, Burke, Salas, & Garvena, 2012), and performance (McAllister, 1995; Costa, Roe, & Taillieu, 2001; Dirks, 1999; Langfred, 2004; Peters & Karren, 2009). Trust becomes even more important when people are dependent on each other to achieve a certain goal.

Much research has been conducted concerning the role of trust in face-to-face interactions (Dirks & Ferrin, 2001; Schoorman, Mayer & Davis, 2007; Lewicki, Tomlinson & Gillespie, 2006). Additionally, there is a large body of literature examining technology-mediated interactions and their effectiveness (e.g. Cohen & Gibson, 2003; Journal of Computer-Mediated Communication). However, less work has been done at the intersection of these two areas. Trust is particularly relevant in technology-mediated interactions because these interactions involve greater risk compared to face-to-face interactions. Misunderstandings and disagreements are more likely when people interact through technology, which increases the complexity of the communication task. Appropriate levels of trust can reduce this complexity by lowering the perceived risk associated with the technology-mediated interaction (Riegelsberger, Sasse, & McCarthy, 2003).

Interpersonal interactions through communication technology are particularly interesting because they involve both an interaction between people as well as an interaction with technology. Therefore a successful technology-mediated interaction will be dependent on both a successful interaction with the person and successful interaction with the technology. Failure for trust to develop in either one of these trust referents could have detrimental effect on the overall interaction.

Trust has an integral role in the communication process. Much research has been conducted on the nature of trust and its effects in face-to-face interactions, interpersonal trust. Additionally, recent research has started examining the nature of the trust construct in human-machine interactions, trust in technology. Across disciplines trust in technology has received a lot of attention from both the research and applied communities, providing support for its theoretical and practical significance (e.g., Muir, 1987; Lee & See, 2004; Dutton & Shepherd, 2006; Taddeo, 2009; McKnight, Carter, Thatcher, & Clay 2011).

The majority of trust research thus far has studied interpersonal trust completely separately from trust in technology. In computer-mediated interpersonal interactions however, both trust in people and trust in technology bear relevance. This project will discuss and empirically assess the distinct relevance of both interpersonal trust and trust in technology for collaboration and performance. Through this work I aim to answer the following research question:

Does trust in technology and trust in people differentially impact behaviors and performance?

The investigation of this issue has both practical and theoretical importance. Technology-mediated communication is becoming commonplace in people's personal and professional lives. Moreover, work tasks are becoming more collaborative, further making technology-mediated interactions necessary. This highly collaborative environment requires that people rely on each other and trust one another more than ever before. During technology-mediated collaborative interactions, both interpersonal trust and trust in technology are necessary for effective communication and performance. Learning how interpersonal trust and trust in technology relate to one another can aid in designing human-technology systems for optimal trust. Moreover, identifying the unique effect that interpersonal trust and trust in technology have on outcomes of interest such as communication frequency, technology use, and performance, can aid in understanding and facilitating collaboration better. Examining how those two constructs operate in a communication context is crucial since the communication process is essential to effective collaboration and performance.

Theoretical Development

Interpersonal trust has been widely studied. It captures "the willingness to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the trustor's ability to monitor or control that other party" (Mayer, Davis, & Schoorman, 1995, pg. 712; Appendix A). There are several theoretical models, which aim to describe trust, its development, antecedents, and consequences (see Lewicki, Tomlinson, & Gillespie, 2006 for a comprehensive review). For this work, I will use the conceptualization of trust put forth by Mayer, Davis, and Schoorman (1995) and further expanded by McKnight, Cummings, and Chervany (1998). The model posits that interpersonal trust is rooted within the trustor's beliefs of the trustee's integrity, benevolence, competence (Mayer et al., 1995), and predictability (McKnight et al., 1998). These beliefs, along with the trustor's propensity to trust and perceived risk of the situation, determine risk-taking in the relationship (Mayer et al. 1995) and the trustor's trusting intentions (McKnight et al. 1998), which in turn shape the outcomes of the interaction (Mayer et al. 1995). Both the Mayer et al. (1995) model and McKnight et al. (1998) model are presented in Figures 1 and 2, respectively. Trust in technology has also been studied, though not as extensively as interpersonal trust. It is most often discussed in the context of automation and people's reliance on automation (e.g., Muir, 1986; Parasuraman, 1997; Lee & See, 2004). Similar to interpersonal trust, there are several theoretical models focused on describing trust in technology and its development. Most of these models are adaptations based on models describing interpersonal trust. In this work I will use the conceptualization of trust in technology developed by McKnight et al. (2011). They define trust in technology as "a belief that a specific technology has the attributes necessary to perform as expected in a given situation in which negative consequences are possible" (McKnight et al., 2011, pg. 17; Appendix A). Their model was built upon the Mayer et al. (1995) interpersonal trust model. Similarly to interpersonal trust, trust in technology is determined by the trustor's beliefs in the technology's characteristics - reliability, helpfulness, and functionality. Additionally, trust in technology is determined by propensity to trust technology and institutional trust (McKnight et al., 2011). A graphical representation of the model is presented in Figure 3.

When it comes to technology-mediated communication, interpersonal interactions are layered with human-technology interactions, making both interpersonal trust and trust in technology necessary for an effective interaction. According to sociotechnical systems theory, elements of both the human subsystem and the technology subsystem interact to determine the outcome. Based on the theory, trust in technology and trust in people will uniquely impact the elements of the overall system to ultimately determine system outcomes. In other words, during a technology-mediated interaction, *both trust in technology and trust in people will determine outcomes of interest such as satisfaction with the overall interaction, the person involved in the interaction, and the technology used for the interaction, and intentions for repeated interactions as well as repeated use of the technology*, to name a few.

Limited empirical research supports this systems approach to the study of trust in different targets (objects of trust). For instance, Montague and Asan (2012) examined the differentiation between trust in a medical provider, trust in medical technology, and trust in the provider's use of medical technology. Their findings revealed that the levels of trust in different elements of the sociotechnical system are related to each other and impact each other. In another study, Smith (2010) found that trustworthiness-related cues in government e-services related to government institutional trust, supporting the view that perceptions of trust in one domain impact perceptions of trust in another domain.

In this project, I examine trust during technology-mediated interpersonal interactions while applying a sociotechnical systems theory perspective. I integrate Mayer et al. (1995) interpersonal trust model with McKnight et al. (2011) trust in technology model and propose that during technology-mediated interpersonal interactions trust in technology and interpersonal trust influence each other. Moreover, because there are both human and technological elements in the system where the interaction is taking place, I expect interpersonal trust and trust in technology to impact each other in such a way that changes in interpersonal trust will result in changes in trust in technology, and vice versa, changes in trust in technology will result in changes in interpersonal trust. Lastly, I anticipate that both trust constructs will have unique relationships with relevant intentions, such as intention to continue the interaction and intention to continue the use of technology as well as behaviors including use of the technology, communication and collaboration. Figure 4 summarizes the relationships which will be examined through this work.

So far, I have introduced the goal of this project, which is to examine the differential impact of trust in technology and interpersonal trust on collaborative behaviors and performance during technology-mediated interactions. Furthermore, I have described the theoretical foundation for the expected relationships. Next, I review the literature on interpersonal trust (trust in people) and trust in technology. I then examine the limited research where both objects of trust, people and technology, are examined in the same framework. Following the literature review, I present the hypotheses investigated through this work and propose the study to test those hypotheses. The study experimentally examines the differential effect of trust in people and trust in technology on relevant attitudes, intentions, and behaviors.

CHAPTER 2: LITERATURE REVIEW

In this section I review the literature relevant to trust in people (interpersonal trust) and trust in technology. Furthermore, I specifically focus on research examining interpersonal trust in virtual environments and trust in communication technology, as those are closely relevant to the question of interest.

Trust is a construct of much interest both for researchers and practitioners alike. Trust is vital for human relationships that require collaboration and cooperation (Rusman, van Bruggen, Sloep, & Koper, 2010), is central to building alliances (Smith & Barclay, 1997), group participation (Bandow, 2001), and sharing information (Jones & George, 1998). It is necessary when a situation involves risk. Trust is a heuristic which allows people to participate in risky behaviors without constantly engaging in a laborious risk-benefit analysis pertaining to the situation at hand (Riegelsberger et al., 2003). In order for trust to be a necessary component of an interaction, two conditions need to be satisfied, 1) one of the participants in the interaction needs to be cognizant of the risk involved in the situation, and 2) there needs to be an incentive associated with involving oneself in the situation (Mayer, Davis, & Schrooman, 1995). Trust is positively related to satisfaction, performance, and commitment as well as negatively associated with stress (Costa, Roe, & Taillieu, 2001; Costa, 2003). It is critical to the communication process. Lack of trust can have severe negative consequences. For instance, Salas and colleagues determined that in situations when there is a low level of trust, ambiguous information is interpreted more negatively (Salas, Sims, & Burke, 2005).

Trust can have several different referents, or trust objects, such as other people, technology, and institutions. This research focuses on two of those objects of trust – people and technology. First, I discuss the literature on trust in people or interpersonal trust. I focus on the major theories of interpersonal trust in the field as well as on research relevant to the development of interpersonal trust in a technology-mediated environment. Then I discuss the available research on trust in technology, and more concretely trust in communication/ collaboration technology. Lastly, I examine outcomes of interest which are impacted by both trust in people and trust in technology.

Trust in People

Over the years, much research has been conducted in the area of interpersonal trust. Lewicki, Tomlinson, and Gillespie (2006) aptly summarized the available research on the construct and its relationships.

Interpersonal trust has been examined from a behavioral theoretical approach and a psychological theoretical approach. The behavioral approach focuses on the observable actions performed by the participants in the interaction. Trust is defined in terms of observable behaviors the participants choose to engage in and it is usually assessed through cooperative behaviors (Axelrod (1984), Deutsch (1973) as cited in Lewicki et al., 2006). Prior to any interactions and collaborative behaviors between the members of the interaction, trust starts at zero and then changes as a function of the collaborative/non-collaborative behaviors that both participants engage in during the interaction. When examining trust through a behavioral perspective, paradigms like the Prisoner's Dilemma are often used to examine participants' collaborative/non-collaborative behaviors.

More often trust is examined within the psychological theoretical approach. In this instance, trust is studied as a unidimensional, two-dimensional, or a transformational construct and is commonly measured through paper-and-pencil scales.

When trust is conceptualized as a unidimensional construct, it is defined as the trustor's confident expectations that the trustee will perform an action and/or the trustor's willingness to be vulnerable in a situation. Trust and distrust are considered to be polar opposites on the same continuum. Interpersonal trust is thought to consist of cognitive, affective, and behavioral intention elements. While there is no strong agreement as to when trust begins, some researchers argue that trust starts at zero (e.g., Blau (1964), Jones & George (1998) as cited in Lewicki et al., 2006), while others argue that there are moderate to high initial levels of trust that get adjusted after an interaction occurs (e.g., Kramer (1994), Fukuyama (1995) as cited in Lewicki et al., 2006). Still others propose that relationships begin with mistrust (or negative trust) if the trustor has obtained negative information about the trustee prior to the interaction (Lewicki et al., 2006). Initial levels of trust are impacted by personality, social and cognitive processes, trustee reputation, and role-based behaviors, to name a few. Trust can increase or decrease over time as a function of the trustee's behaviors, the communication process, and the degree to which the trustor's expectations are met (Lewicki, Tomlinson, & Gillespie, 2006).

Trust is also examined as a two-dimensional construct where trust and distrust are related but distinct from each other. Trust is defined in terms of confident positive or negative expectations on behalf of the trustor. According to this view, both trust and distrust are low prior to any interaction and they change as a function of the number of the interactions between parties and the fulfillment of the trustor's expectations (Lewicki et al., 2006).

Lastly, trust is defined as a construct that changes over time not only quantitatively, but also qualitatively. According to the transformational view, trust is built upon different trust bases – expected costs and benefits, knowledge of the trustee, shared values, and identity. Trust begins as calculative trust (e.g., Rousseau, Sitkin, Burt, & Camerer, 1998; Lewicki & Bunker, 1996), which is based on information about the trustee's reputation and competence. As the interactions between the participants continue and they gain more information about each other, trust is based on personal values and their identity, forming relational (Rousseau et al., 1998) or identification-based trust (Lewicki & Bunker, 1996). Trust generally increases as the participants learn more about one another, they begin to predict the other's behaviors more accurately, and eventually develop an emotional bond and shared values; trust also decreases when positive expectations are not met (Lewicki, Tomlinson, & Gillespie, 2006).

It is evident from the review above that there are many conceptual models that aim to capture the nature and development of interpersonal trust. I will discuss three theoretical trust models in particular - McAllister (1995), Mayer, Davis, and Schoorman (1995), and McKnight, Cummings, and Chervany (1998). I choose to focus on these three models in particular because they are specific to the development of interpersonal trust in an organizational setting. Additionally, these trust models have been extensively tested empirically, supporting both their underlying theoretical conceptualization as well as the measurement of trust (McEvily & Tortoriello, 2011)

McAllister (1995).

McAllister (1995) proposed a two-component model of trust that focuses on the mechanisms of trust development. Trust is "the extent to which a person is confident in, and willing to act on the basis of, the words, actions and decisions of another" (pg. 25). McAllister's model was originally proposed to explain how trust develops in manager-professional dyads (Figure 5). According to this model, interpersonal trust has two distinct components – cognition-based trust and affect-based trust. Cognition-based trust is derived from knowledge about the characteristics of the trustee; affect-based trust, on the other hand, captures the emotional ties between the trustor and the trustee. Empirical investigation of the model supports this two-component structure of trust (Webber, 2008; McEvily & Tortoriello, 2011; Pavlova, Coovert, & Bennett, 2012). Furthermore, each component has some unique antecedents and outcomes. Affect-based trust is uniquely impacted by interaction frequency and peer citizenship behaviors. Affect-based trust predicts manager citizenship behaviors as well as manager need-based monitoring, which in turn predict peer and manager performance. Cognition-based trust did not have a direct impact on these outcomes. It did, however , have a direct effect on affect-based trust, indicating that a certain level of cognition-based trust is necessary in order for affect-based trust to develop (McAllister, 1995). Due to its strong empirical support (e.g., Webber, 2008; Wilson, Straus, & McEvily, 2006; McEvily & Tortoriello, 2011), McAllister's two-factor model of trust has become very influential in the field of trust research.

Mayer, Davis, and Schoorman (1995).

Mayer, Davis and Schoorman (1995) developed an alternative model of trust which incorporated the element of risk. According to Mayer and colleagues as well as other trust researchers, trust and risk are inherently linked together (Deutch, 1958 as cited in Mayer et al., 1995). Trust is required for collaboration and cooperation when the interaction between two parties involves risk or, one or both parties have something invested in the situation.

Similar to McAllister's model, the trust model developed by Mayer and colleagues (1995) captures interpersonal trust in an organizational setting. Unlike McAllister's model, which focused on the development of trust in a hierarchical relationship (e.g., manager and employee), Mayer and colleagues focus on examining trust between individuals who are on the same level in a hierarchy (e.g., two employees).

Mayer and colleagues (1995) define trust as "the willingness to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (pg. 712). The model includes characteristics pertaining to the trustor, trustee, and the context of the interaction. A schematic representation of the model is presented in Figure 1. One factor contributing to the development of trust is the trustor's propensity to trust. Propensity to trust is a stable personality characteristic that captures someone's general ability to trust a party without any prior knowledge of that party; it is "a generalized expectation about the trustworthiness of others." (Mayer et al., 1995, pg. 715). It is speculated that one's propensity to trust is shaped by experience, personality, and cultural context. Propensity to trust can be extreme in both positive and negative direction. For instance, a person can blindly trust even though the situation does not warrant trust. Alternatively, a person may not be willing to trust even though there are indicators that trust is warranted. In their model of trust development, Mayer and colleagues stipulate that the trustor's propensity to trust impacts initial trust levels, where higher propensity to trust results in greater trust towards the trustee prior to any interaction (Mayer et al., 1995).

Trust does not occur in a vacuum; it involves both the trustor and the trustee, therefore characteristics of the trustee are also relevant to the development of trust. Mayer and colleagues propose that the trustor characteristics relevant to the development of trust are the ones which capture his/her trustworthiness. The authors focus on three trustworthiness factors in particular –

ability, benevolence, and integrity, and argue that these characteristics represent a parsimonious set which captures trustee trustworthiness.

Ability is conceptualized as the set of “skills, competencies, and characteristics that enable a party to have influence within some specific domain” (Mayer et al., 1995, pg. 717). It is specific to the task and situation at hand. Benevolence refers to the trustor’s perception of the positive attachment that the trustee has towards the trustor. It captures the trustee’s motivation to act according to the trustor’s expectations due to factors stronger than external rewards. Integrity is the trustee’s perception that the trustor acts in accordance with an acceptable set of principles. The acceptability of these principles is determined by the trustor. Mayer and colleagues stipulate that the trustor’s perceptions of the trustee’s ability, benevolence, and integrity impact the trust level of the trustor. These characteristics are not completely independent of each other, but they are sufficiently distinct. Acceptable levels of all three are required in order to determine a trustee to be trustworthy. Additionally, changes in each trustworthiness factor can result in changes in overall trust. If the trustor’s trustworthiness decreases, effective repair strategies are dependent on the nature of the damaged trustworthiness factor (ability, benevolence, or integrity) as well as how the damage took place (Schoorman, Mayer, & Davis, 2007). Moreover the relationships between these three characteristics and trust are moderated by the trustor’s propensity to trust. The authors also suggest that the impact of each trustor characteristic on trust is not constant across time. They speculate that early trust is based on perceptions of the trustee’s integrity, and as more information regarding ability and benevolence is acquired, the relative importance of integrity diminishes over time and the relative importance of benevolence and ability increases (Mayer et al., 1995).

After considering the antecedents of trust, namely propensity to trust and perceptions of trustee ability, benevolence, and integrity, Mayer and colleagues discuss the consequences of trust. First they distinguish between trust and trusting behaviors. As already mentioned, trust is the *willingness* to be vulnerable; there is an assumed risk, but that risk has not been undertaken by the trustor. Trusting behaviors, on the other hand, involve accepting the risk associated with the task at hand. The direct outcomes of trust are trusting behaviors in the relationship which involve accepting the risk associated with the situation and engaging in risk-taking behaviors. These trusting behaviors are context specific and confined within the trustor-trustee relationship. The trustor engages in trusting behaviors in order to achieve some ultimate goal or outcome.

Another construct that impacts the development of trust is perceived risk of the overall situation. Perceived risk encompasses risks external to the trustee that can impact the outcome of interest; it moderates the relationship between trust and risk-taking behaviors. If the trustor considers that there is a high level of risk involved in the situation, the likelihood that she will engage in the behavior is low even if relatively high levels of trust exist. On the other hand, if the perceived risk associated with the situation is relatively low, low levels of trust might be sufficient for the trustor to engage in the risk-taking behavior and thus trust the trustee.

Perceptions of benevolence, ability, and integrity as well as the need for trust are not stable and are also context dependent. Changes in the context can reduce or increase the need for trust between the parties involved. Additionally, learning more about the context of the relationship can change the perceptions of the trustor about the trustee's ability, benevolence, and integrity (Mayer et al., 1995).

Trust is also not a static construct; it changes as a function of the interactions between the trustor and the trustee as well as the change in the context of the trustor-trustee relationship.

Because trust is an evolving construct that can both increase and decrease, Mayer and colleagues include a feedback loop linking outcomes of the interaction to the trustor's trustworthiness perceptions of the trustee. The trustor's perceptions of the trustee's trustworthiness are determined by the outcomes of the trustor-trustee interaction. This loop captures the integration of new information in the existing perception of trustworthiness (Mayer et al., 1995).

McKnight, Cummings, and Chervany (1998).

McKnight, Cummings, and Chervany (1998) built upon the trust model developed by Mayer and colleagues (1995). They focused their work on the development of initial high trust between two parties involved in an interaction. They argue that a person's individual trusting disposition, institution-based trust, and a variety of cognitive processes impact the development of early trust. Moreover, the authors specify that trust consists of two trusting components: beliefs and intentions.

Similar to the Mayer and colleagues (1995), McKnight and colleagues propose that a person's disposition to trust has an important role in the development of trust. They distinguish between two components of disposition to trust - faith in humanity and trusting stance. Faith in humanity captures one's belief that people are generally well-intentioned and reliable, while trusting stance refers to one's choice of treating others as if they are well-intentioned and reliable, regardless of their actual characteristics. The authors suggest that both components of disposition to trust directly relate to trusting beliefs; they also directly impact one component of institutional-based trust, namely structural assurance beliefs. Institution-based trust refers to "the security one feels about a situation because of guarantees, safety nets, or other structures" (McKnight et al., 1998, pg. 475). It consists of structural assurance belief and situation normality belief. Situational normality refers to one's belief that she will be successful because the situation is not out of the ordinary. For instance, I have shopped on Amazon.com, but may have never made a purchase from MomAndPopStore.com. However, the shopping experience at MomAndPopStore.com is very similar to Amazon's - I choose my product, add it to my cart, then go to checkout and provide my name, address and credit card information. My experience at MomAndPopStrore.com is virtually identical to my other online shopping experiences, resulting in my belief that this shopping experience will be as successful as my previous ones.

The second type of institutional-based trust is structural assurance beliefs, which refers to "the belief that success is likely because such contextual conditions as promises, contracts, regulations, and guarantees are in place" (McKnight et al., 1998, pg. 478). Both types of institution-based trust impact trusting beliefs and trusting intentions. The relationships between disposition to trust, institutional-based trust, trusting beliefs, and trusting intentions are moderated by two types of cognitive processes, categorization processes and illustration of control processes. Lastly, trusting beliefs along with institution-based trust determine trusting intentions. A schematic representation of the model is available in Figure 2. It is important to note that McKnight et al.'s model focuses purely on the cognitive aspect of trust and disregards the affective processes that take part in the development of trust.

For the purposes of my research, trust is defined as "the willingness to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al., 1995, pg. 712). I have chosen to adopt the conceptualization of trust put forth by Mayer and colleagues (1995) for three reasons. First, this model aptly captures the dynamic nature of trust. Trust constantly changes as a function of the experience of the participants in the interaction, and therefore its ever-changing nature should not be disregarded. Second, this project focuses on the connections between interpersonal trust, trust in technology and outcomes of the interaction, making the examination of the cognitive processes involved in the development of trust beyond the scope of this work. Third, the Mayer and colleagues model describes the development of trust between a dyad where the participants are of equal standing, meaning that one person does not necessarily have influence over the actions of the other, unlike a manager-employee relationship. This equal participant dyad is the focus of my present research.

Trust in people in a virtual setting.

The research I summarized thus far focuses on the development of interpersonal trust in face-to-face situations. However, face-to-face communication is not the only type of interaction in which people are involved. The development of information and communication technology has allowed people to expand their interactions beyond the face-to-face context to technology-mediated ones. Some argue (e.g., Pettit (1995), Nissenbaum (2001) as cited in Turilli, Vacarro, & Taddeo, 2010) that it is not possible for interpersonal trust to develop in technology-mediated environments, because the identity of the trustee cannot be confirmed and the presence of shared cultural and institutional background cannot be established. These authors believe that an individual can trust another only when they are in a structured situation, there are both moral and social norms that pressure the trustee to behave in a trustworthy manner, and there is a safety net to protect the trustee from betrayal. Thus, trust cannot develop in an online environment because there are no structures in place. That leads to high uncertainty and hinders the development of trust (Turilli et al., 2010).

Turilli and colleagues (2010) argue that trust can, and indeed does develop in a technology-mediated environment. They argue that knowledge concerning shared cultural and institutional background in addition to knowledge of physical characteristics is not necessary for trust to arise. They base their argument on findings from the e-commerce literature, where providing and obtaining the correct information is the best way to gain customer trust. Similarly, in an online interpersonal interaction, information obtained about the trustee allows the trustor to assess the trustee's trustworthiness and based on that assessment make a decision whether to trust the trustee or not. Furthermore, Turilli and colleagues argue that face-to-face and online trust are not really different from each other; trust is a property of a relationship between the members of the interaction and the only difference between face-to-face and online trust comes from the environment in which the relationship is taking place (Turilli et al., 2010).

Rusman, van Bruggen, Sloep, and Koper (2010) proposed an integrated view of the trust formation process in both collocated and virtual project teams. They state that the development of trust specifically in virtual project teams is especially challenging because there is usually no expectation that collaboration will continue in the future, reducing the necessity to behave in a trustworthy manner. Rusman and colleagues (2010) argue that trust develops differently in virtual compared to face-to-face teams, because virtual team members often lack the valuable information necessary to evaluate each other's trustworthiness. During an interaction, people will make a trustworthiness assessment based on the information available regarding the trustee's benevolence, competence, and integrity. If this information is not available, then participants in a face-to-face interaction will base their trustworthiness assessment on the available non-relevant information such as appearance and body language. Participants in technology-mediated interactions however, often do not have access to any type of information (trust-relevant or not) upon which to base their initial trustworthiness assessment. Rusman and colleagues (2010) describe the process of interpersonal trust formation as a cognitive one, where information is attended to and, based on that information and the context of the interaction, the trustor makes a trustworthiness assessment. The trustor subsequently assesses whether the situation requires trust. The trustor then makes a trusting decision based on the trustworthiness assessment and the situation, takes part in a trusting behavior, which leads to subsequent results. These results are later used as information to reassess trustworthiness once again. The difference in trust development between face-to-face and virtual teams stems from the quality and quantity of information used to make the trustworthiness assessment as well as the environment in which the teams operate. The development of trust in a virtual environment is more challenging for the following reasons: there are fewer routes to acquire information, the communication process is unusual (e.g., message transfer is delayed, the media richness of the messages is lower), uncertainty is greater, the quality and quantity of communication cues is inferior, diversity is greater reducing the use of cognitive schemas, fewer social control mechanisms are present, and temporal and social embeddedness are decreased. Rusman and colleagues (2010) propose that if team members in a virtual team share specific pieces of information with each other, trust will develop quicker and at greater levels. They developed the TrustWorthiness ANtecedents (TWAN) schema, which captures the elements that describe the information necessary for trust to develop. Those elements include information which signals communality, ability, benevolence, internalized norms, and accountability and address some of the issues previously mentioned. Providing information regarding these elements upfront, before to the interaction, allows team members to assess one other's trustworthiness prior to the interaction, and therefore begin the interaction with higher levels of interpersonal trust than they would have normally (Rusman et al., 2010). The TWAN schema is applicable only when it comes to professional relationships in teams. The schema has yet to be empirically validated.

The development of trust in a virtual environment has been examined empirically. Wu, Chen, and Chun (2010) studied the factors that impact trust in virtual communities. More specifically, the authors focused on the effect of shared values, satisfaction with prior interactions, and website privacy policies on virtual community member trust. They argue that trust and relationship commitment are necessary for effective virtual communities, since these reduce the uncertainty of the virtual interaction and encourage community members to continue their association with the community. Wu and colleagues (2010) stipulate that the set of predictors they examine have both a direct and indirect effect on commitment to the virtual community; shared values, satisfaction with the community and privacy policy directly impact commitment to the community. Additionally the authors hypothesize an indirect relationship where the impact of shared values, satisfaction with the virtual community, website privacy policies on commitment to the virtual community is mediated through trusting belief. They examined trusting belief in terms of its components: ability, benevolence, integrity, and predictability (McKnight & Chervany, 2002). The results of the study revealed that shared values impact commitment directly as well as indirectly through benevolence and predictability (Figure 6). Privacy policy impacts commitment and frequency of website visits indirectly through trusting belief, while satisfaction with prior interactions impacts commitment and frequency visits both directly and indirectly, through trusting belief. Moreover, the results revealed that not all components of trusting belief have the same effects. Only benevolence and predictability had a significant relationship with commitment, suggesting that the nature of the interactions in a virtual community is important to its members and that there is more to successful virtual communities than a well-designed website. On the other hand, ability, integrity, and predictability predict frequency of visits, while benevolence did not. These results suggest that trust impacts different outcomes of interests through different processes.

In another study, Altschuller and Benbunan-Fich (2010) examined the communication process variables that affect trust and performance in virtual teams. Trust is especially important for virtual teams because teamwork requires effective collaboration, coordination, and communication. Altschuller and Benbunan-Fich speculate that interaction experiences such as self-disclosure and positive impression formation, in addition to interpersonal perceptions such as public self-awareness and virtual co-presence, will positively relate to both team trust and team performance. Their results reveal that only virtual co-presence, one's subjective feeling that she is sharing an environment with her virtual counterparts, positively predict both team trust and team performance. Further analysis demonstrates that trust fully mediates the relationship between virtual co-presence and team performance. Interestingly, these results refute the propositions put forth by Rusman and colleagues (2010), who stipulated that trust can be facilitated by making team members share particular pieces of information about each other before the actual interaction takes place.

It is evident from the literature described above that the development and effects of interpersonal trust in a virtual environment are of great interest to researchers. One point that the reviewed studies omit, however, is that an interaction event in a virtual environment has two distinct elements - a human element that a person is *interacting with*, and a technological element that a person it *interacting through*. The theoretical and empirical work reviewed so far exclusively focuses on trust in the human element and ignores trust in the technological one. Since people and technology are intertwined during technology-mediated interactions a consideration of both interpersonal trust and trust in technology is necessary. In the next section I discuss the literature relevant to people's trust in technology.

Trust in Technology

Trust in technology has been of interest to researchers and practitioners for a while. For the purposes of this work, trust in technology is defined as "a belief that a specific technology has the attributes necessary to perform as expected in a given situation in which negative consequences are possible" (McKnight et al., 2011, pg. 17). Most of the research on trust in technology focuses on the relationship between trust and technology adoption (e.g. Gefen, Karahanna, & Straub, 2003; Reid & Levy, 2008), trust in automation (see Lee & See, 2004 for a review), and trust in technology-delivered services such as e-government (Carter & Bélanger, 2005; Smith, 2010), e-banking (Reid, 2009), and e-commerce (Blank & Dutton, 2011). Trust in technology is important; it is linked to crucial outcomes such as appropriate/inappropriate technology use, acceptance/rejection of technology (Montague & Asan, 2012), and technology over/underreliance (Bahner, Hüper, & Manzey, 2008). Additionally, trust in an e-vendor is linked to consumer intentions to complete a transaction with that e-vendor (Pavlou, 2003).

Muir (1987) initiated one of the first discussions of human-technology interactions and the concept of trust during such an interaction. In particular, she discusses the role of trust in designing decision aids. Her approach to modeling people's trust in technology is based on interpersonal trust theories available at the time. Specifically she models human-technology trust after Barber's (1983) interpersonal trust model. Muir puts forth that "Trust (*T*) is the expectation (*E*), held by a member (*i*) of a system, of persistence (P) of the natural (n) and moral social (m) orders, and of technically competent performance (TCP), and of fiduciary responsibility (FR), from a member (*j*) of the system, and is related to, but not necessarily isomorphic with, objective measures of these quantities." (pg. 531). Similar to other trust definition, here trust is also based on the perceived qualities of the trustee's trustworthiness. Trustworthiness, in turn, is based on perceived knowledge and skills, behavior, perceived reliability and validity, and the trustee's perceived intentions, power, and authority. The relative dynamics of these components of trustworthiness change with the situation. Additionally, these elements are hypothesized to interact with each other and those interactions can subsequently impact perceived trustworthiness and thus trust itself. Muir argues that users need to calibrate their trust in a decision aid to appropriate levels. Both underreliance and overreliance on technology can have dire consequences. The author suggests that calibration could be improved by modifying the user's criterion for trustworthiness, making it easier for the user to perceive trustworthiness cues, enhancing the user's ability to distribute functions within the system, and identifying and recalibrating the user's trust when it is inappropriately calibrated. Designing systems which allow for these processes to take place can ensure that proper trust calibration and re-calibration is possible ensuring optimal technology use (Muir, 1987).

Often when trust is discussed in the context of human-machine interactions, it addresses human reliance and usage of certain technology. After all, technology is often developed in order to reduce errors made by the human in the system. Indeed, the adoption of various technological tools in the fields of aviation and medicine has been able to achieve that goal (Ho, Wheatley, & Scialfa, 2005).

Appropriate calibration of trust is one of the biggest issues when it comes to human-automation interactions. Improper trust calibration can result in misuse of the technology; a person can either rely on the technology too much or not enough. Different individual characteristics, such as age (Ho et al., 2005), impact proper calibration. One of the biggest questions that the technology development community faces concerns how to build technological tools for proper trust calibration.

With the emergence of the Internet and communication technologies, we have observed the merging of human-human interactions and human-technology interactions. For instance, let us examine the Internet. Is it purely a technology? Not in the sense that a computer or an alarm is; there is a human element associated with it. Without that human element the Internet would not be of value. Let us examine the Internet from the other perspective. Is it a person or a group of people? Again, not in the sense of a breathing, living human being. The Internet captures people's collective humanness, however its existence is inseparable from technology. Technology is as necessary as is the human element. This union of people and technology has sparked additional interest in the construct of trust in this unique context.

Most of the theoretical development around the construct of trust in technology is based on interpersonal trust research. McKnight, Carter, Thatcher, and Clay (2011) parallel the trust in technology construct to the trust in people construct (refer to Table 1 for a summary). They develop a model of how trust operates in a human-technology environment. The authors propose that there are three levels that trust operates on, very general predisposition to trust technology, more specific trust in a context/class of technologies, and trust in specific technologies. These separate trust levels relate to each other, and ultimately impact the user's intentions to explore a technology and use a wider variety of features.

McKnight and colleagues (2011) build their trust in technology model upon the existing models of interpersonal trust, namely Mayer and colleagues (1995) and McKnight and Chervany (2002) models of interpersonal trust. McKnight and colleagues posit that people possess a general propensity to trust technology similar to their general propensity to trust people. They break down the propensity to trust technology concept into faith in general technology and trusting stance-general technology. Faith in general technology refers to a person's beliefs about the characteristics of technology in general, while trusting stance-general technology focuses on the individual's beliefs that relying on technology leads to a positive outcome. Faith in general technology and trusting stance-general technology are relatively stable dispositions that individuals possess.

Propensity to trust technology influences the development of institution-based trust in technology and has a positive effect on trust in specific technologies. Institution-based trust in technology refers to the user's beliefs about a similar set of technologies within a specific context. It is comprised of two separate constructs, situational normality and structural assurance. Situational normality-technology captures "the belief that using a specific class of technologies in a new way is normal and comfortable within a specific setting" (McKnight et al., 2011, pg. 18). Situational assurance, on the other hand, captures the belief that there is sufficient infrastructural support to ensure the successful use of a technology. Institution-based trust in technology impacts trust in specific technology as well as technology use.

The last component of the model is trust in specific technology, or trusting beliefs in technology. Trusting beliefs can lead to trusting intentions (McKnight, Cummings, & Chervany, 1998), which in turn can lead to trusting behaviors (Mayer et al., 1995). Looking at trust in specific technology, McKnight and colleagues (2011) propose that trusting beliefs in technology are based in the trustor's perceptions of the technology's functionality, helpfulness, and reliability, which are analogous to the constructs of competence, benevolence, integrity (Mayer et al., 1995), and predictability (McKnight et al, 1998) that comprise interpersonal trust. Functionality captures the trustor's expectation that the technology has the capacity and ability to complete the intended task. Helpfulness captures the adequacy and responsiveness of the assistance features built into the technology. Reliability refers to the trustor's expectation that the technology will perform predictively and consistently. The three components of trusting beliefs are distinct, but still related to each other. The authors posit that trusting beliefs is a superordinate and reflective construct, implying that overall trust flows down to its dimensions of reliability, helpfulness, and functionality. Therefore, it is expected that the user's beliefs regarding the reliability, functionality, and helpfulness of the specific technology will covary. Indeed, McKnight and colleagues report correlations between the three beliefs ranging between .5 and .63 (McKnight et al., 2011). A graphical representation of the model is presented in Figure 3.

Trust in information and communication technology.

The role of trust in technology has often been discussed in the context of information and communication technology (ICT) use (Kuriyan, Kitner, & Watkins, 2010; Smith, 2010; Kuriyan & Ray, 2009). Frequently, technology is used as a tool to provide important services to people in areas such as rural communities (Kuriyan & Ray, 2009). The adoption and use of those technological tools is critical to the success of developmental programs and ultimately the well-being of the people affected by these programs. Trust in technology has been linked to user technology adoption and use behaviors, making the facilitation of trust in technology a question of broad interest.

Some of the work on trust in technology comes from the field of information systems. Research suggests that trust in technology is dependent on the trustor's perceptions of the technology, trust in the information itself or the service being provided, and institutional mechanisms which ensure the security of the technology interaction (Rajalekshmi, 2008 as cited in Kuriyan, Kitner & Watkins, 2010). It is evident that trust is a multi-faceted and multi-layered construct that can have a profound impact on the user's behaviors. Most of the research in the area seeks to examine the links between institutional trust and the adoption of ICT for a variety of services including mobile banking (Morawszynski & Miscone, 2008; Reid & Levy, 2008) and e-government (Smith, 2010).

Reid and Levy (2008) examined the factors predicting customer acceptance and ultimate use of banking information systems such as ATMs, telephone banking, and Internet banking. They augment the classical Technology Adoption Model (TAM; Davis et al., 1989) by adding computer self-efficacy and institutional trust to perceived usefulness of the technology and perceived use of the technology in an effort to explain attitudes towards banking information systems and customer intentions to use those systems. The results of the study indicate that institutional trust positively predicts both perceived use and perceived usefulness of banking information systems, while computer self-efficacy has a significant relationship only with perceived usefulness. These results suggest that trust in the institution, which is using the technology, has an effect on the technology-related behaviors users are willing engage in.

In another study, Morawszynski and Miscione (2008) examined the role of trust and its emergence when it comes to the adoption of a mobile banking application by an impoverished community in Kenya. The mobile banking application, M-PESA, allows customers to make deposits and withdraw funds, check their account balance, and transfer money to other users, amongst other financial services. Customers can gain access to their assets through a retail agent outlet. An interesting aspect of M-PESA is that the customer has no direct contact with bank branches; there is no banking institution associated with the mobile application; M-PESA is a stand-alone service. The authors examined the role of trust in the adoption of M-PESA using an ethnographic approach. They examined M-PESA records that retail agents had, such as number of transactions per day and types of transaction. In relation to trust, the authors noted that customers often blamed the agents for malfunctions of the mobile banking application. For instance when a money transaction failed during peak texting times (the mobile application uses the same data channel as text messaging), agents were blamed for trying to steal money. Morawszynski and Miscione's observations suggest that unreliability and malfunctions of the technology, which associate with low trust in technology, subsequently reflect on the people associated with the technology even if those people are not directly responsible for malfunctions; low trust in technology can lead to low trust in people.

In this section I reviewed the literature pertinent to trust in technology and its importance to outcomes such as technology adoption and use. Further, I described McKnight and colleagues' (2011) trust in technology model which describes the trustworthiness characteristics of technology and how those impact technology adoption and use. The model has received empirical support and is analogous to Mayer et al.'s (1995) interpersonal trust model. Next, I discuss research relevant person-technology systems, trust in those systems, and the relationship between trust in different elements of the same sociotechnical system.

Trust across system elements.

Trust is a multi-faceted and multi-layered construct. Characteristics related to the trustor and the trustee as well as the environment affect the trustor's perceptions and ultimately her assessment of trust. The trustor, trustee, and the environment constitute a system where their characteristics interact with one another. Since these elements influence one another, it is expected that trust in one element of the system will affect trust in the other elements of the system. Indeed, recent research I review below supports this view. Next, I review research that demonstrates trust in one element of a system relates to trust in another system element.

Ross (2008) examines if users can compartmentalize their trust across an automated system. In complex automated systems several different automated agents could work together. The author explores whether users develop trust in each element of the system separately, or if trust assessments blend across element into a single trust perception of the overall system. Ross hypothesizes that there will be carry-over effects when the automated agents differ in reliability. Furthermore, it is expected that this carry-over effect would be impacted by the type of agent, human versus technology.

People have a unique relationship with technology in that they have extremely favorable views towards it (perfection bias) or extremely negative views (rejection bias). Wiegmann, Rich, and Zhang (2001) refer to this phenomenon as the polarization bias; people expect perfection from technology and if it deviates from perfection even slightly, then the technology is deemed untrustworthy. Interestingly that phenomenon is not observed when it comes to people and their trustworthiness; people are not expected to be perfect and therefore if they make a mistake, they are likely to be forgiven. Humans are tolerant to human errors, and generally intolerant to mistakes committed by technology.

Ross tests the hypothesized relationships experimentally, where agent type (two dissimilar automated agents, two similar automated agents, and two human agents), agent reliability (low, high) and error salience (low, medium, high) are manipulated and task performance, trust, and system reliance are assessed. Interestingly Ross's data shows no support for the polarization bias phenomenon. The relationship between trust in two independent human agents was greater than the relationship between two similar automated agents, suggesting that there is a greater transfer of trust when it comes to trust in people and not so much when it comes to trust in technology. Based on the results of this study, it appears that in a complex technology system, people's trusting beliefs for the components of the system are somewhat independent of one other.

In another study Montague and Asan (2012) examine the relationship between trust in different elements in a system in a medical setting. Today, technology is inseparable from modern healthcare; its appropriate use by both medical staff and patients alike has life-altering consequences. Montague and Asan speculate that when it comes to healthcare systems and patient use of technology, there are several types of trust which need to be considered: trust in the physician, trust in the medical technology, and trust in the physician's use of medical technology. They further propose that trust in how the physician uses technology determines both trust in one's physician and trust in technology, and that trust in technology and trust in one's physician are positively related. Montague and Asan test their hypotheses in a sample of 101 medical patients. Their findings support the expected relationship, a patient's trust in the physician's use of technology determines both trust in technology and trust in the healthcare provider. Additionally, trust in technology and trust in the healthcare provider are positively related. These findings support the notion that trust in different elements of the same system can and often are related to each other.

Trust in e-government has a drawn wide interest in the research community. A study by Smith (2010) examines if trustworthiness cues regarding government e-services impact institutional trust, namely trust in government. Findings from the study reveal that people's experiences with e-government services are related to their perceptions of overall government. In theory, the trustworthiness cues related to e-government impact the user's trust in e-government, which then impacts trust in overall government, further supporting the notion that trust in one element of the system relates to trust in other elements of the system.

The studies described thus far focus on established connections between trust in different components of a system. In the following study the authors aim to explore differences in the nature of trust between and across different parts of a system. Lankton and McKnight (2008) explore empirically whether interpersonal trusting beliefs are distinct from technology trusting beliefs. They examined the relationship between trusting beliefs and these two elements in the context of social networking websites, specifically Facebook. They argue that users perceive social networking sites as entities that have both human-like (e.g. competence, benevolence, and integrity) and technology-like (e.g. functionality, helpfulness, and reliability) trust characteristics. The goal of the study is to model the trusting beliefs in both people and technology. The authors examine two models; 1) people-related attributes (e.g. competence, benevolence, and integrity) group separately from technology-related attributes (e.g. functionality, helpfulness, and reliability) or 2) trustworthiness attributes fall into three groups based on their conceptual similarity (e.g. competence-functionality, benevolence-helpfulness, and integrity-reliability). Lankton and McKnight test the two models in a sample of 427 college students who were daily Facebook users. Both models fit the data well. However, the three-factor model where the trustworthiness attributes are conceptually related to each other fits the data better than the two-factor model where trustworthiness attributes were separated into people-related and technology-related. These findings suggest that 1) the six trustworthiness characteristics which were examined (competence, benevolence, integrity, functionality, helpfulness, and reliability) are distinct from each other, and 2) users perceive social networking websites, and Facebook in particular, as having both a technology and people characteristics.

These findings further support the stance that when people are interacting through technology, both trust in technology and trust in people are relevant and should be examined together.

In this section, I reviewed research relevant to person-technology systems, the relevance of trust in those systems, and the relationship between trust in different elements within the system. Results suggest that there are relationships between trust in different elements in a system, more specifically trust in people is associated with trust in technology. Trustworthiness characteristics of the technology and the person are distinct, but related to each other. In the next section, I discuss some of the outcomes of interest when examining human-technology systems, and more specifically when examining human interactions in a technology-mediated environment.

Outcomes

Understanding trust during technology-mediated interactions is important because these types of interactions are increasingly commonplace. Research reviewed here referenced technology-mediated interactions in a medical setting, where a medical provider uses the technology (Montague & Asan, 2012). In addition to using technology for treatment purposes, technology is used for diagnosis. Teleconsultations can save patients the stress of traveling when sick, while allowing doctors to remain in their home hospitals and see local patients (Esterle & Mathieu-Fritz, 2013). The medical field though is just one example of the areas where technology-mediated interpersonal communication is becoming more commonplace. In the field of education, we have observed the emergence of online classes, where students and teachers can interact in virtual classrooms. In a variety of business settings, technology-mediated collaboration between coworkers is becoming the norm. Additionally, many organizations use a variety of communication tools to interact with their clients. For each of the above-mentioned setting, trust is important during a face-to-face interaction. For instance, if a patient does not trust her doctor, she is less likely to follow the doctor's plan of action. Given the greater risk associated with technology-mediated interactions (Riegelsberger et al., 2003), trust is even more important in technology-mediated interactions compared to traditional face-to-face interactions.

When it comes to examining outcomes of technology-mediated interactions, there is a variety of outcomes of interests. I will examine two outcomes in relation to continuance of the relationship, in particular intention to use the technology in the future, and intention for a repeated interpersonal encounter. I will use intentions of engaging in the two continuance behaviors as proxy for the actual behaviors, as intentions are the key predictors of behaviors (Ajen & Fishbein, 1969). Additionally, I will examine the effects of trust in people and trust in technology on behavioral outcomes, in particularly collaboration, communication, and performance.

Trust in technology is often linked to intention to adopt or continue using the technology (e.g., Reid, 2009; Blank & Dutton, 2011; Ho, Wheatley, & Scialfa, 2005; Lankton & McKnight, 2008). It is important to examine intent to continue using the technology, because if the user does not intend to continue utilizing the technology, then a repeated interaction cannot take place, which directly impacts future collaboration, communication, and performance. Similarly, intent to continue the interpersonal interaction is crucial. If the participants in the interaction do not intend to continue their interaction, the communication and collaboration behaviors, as well as performance are impacted. Additionally, people interact face-to-face or through technology in order to achieve some ultimate outcome. The outcome is often determined by a variety of communication and task behaviors that take place. I examine the relationships between trust in technology, trust in people, and outcomes of the interaction through the prism of sociotechnical systems theory.

Sociotechnical systems theory.

Sociotechnical systems theory was developed to describe complex interactions between people and technology in a work system. The term "sociotechnical system" was coined by Trist to describe "a method to view organizations which emphasizes the interrelatedness of the functioning of social and technological subsystems of the organization and the relationship of the organization as a whole to the environment it operates in" (Pasmore, Francis, Haldeman, & Shani, 1982, pg. 1181-1182). The theory contends that people are involved in the production of goods and the provision of serviced by using some type of technology. Both the use of technology and the actions of the people determine the ultimate outcome of making a product or delivering a service. Through joint optimization both the social and technical side of the system can be improved in order to achieve an optimal result (Pasmore et al., 1982).

The approach was born out of Trist and Bamforth's (1951) work which examined the social and psychological consequences of the longwall coalmining method in Britain. Prior to the industrial revolution coalmining work was conducted by small groups of two or three mining craftsman who were responsible for the work from start to finish. The miners self-selected into their small groups and often worked together in those small teams for years to come. This allowed for the establishment of social relationships between the men on the team which flourished both at work and in their community. Leadership was internal to the team and the team determined its own production goals and pace of work. Task significance and skill variety were high, with workers taking pride in their work.

The longwall method was introduced to improve productivity in coal mining by standardizing and specializing the work and introducing mass production technology. After the implementation of the longwall method, coal mines resembled small factories. Teams were comprised of 40-50 men who carried out the different tasks associated with coal mining. Each team was supervised by a deputy. The work was broken down into seven distinct tasks which had to be executed in a specific order. Occupational roles were defined based on one of the seven tasks; the miners had to switch from performing the work from start to finish, to performing only one task over and over again. Additionally, three work shifts were introduced, where specific shifts were responsible for specific tasks. The sociotemporal characteristic of the longwall method made it hard to establish stable social relationships between the men both at work and in the community. The virtual removal of autonomy and task variety resulted in very high task interdependence, which made the overall system extremely vulnerable to breakdowns.

On top of that the lack of social organization and connection between the workers increased the vulnerability of the system even more. The differentiation of work tasks in a high task-interdependence environment makes social integration extremely important because then vital team behaviors, such as coordination and communication, can take place between workers and teams. This lack of social integration and the pure focus on work optimization resulted in a plethora of bad working conditions, such as informal organization of cliques, reactive individualism where workers were competing with each other for a better spot for work, scapegoating where different shifts and crews placed the blame for mistakes on one another, and absenteeism. Ultimately, the longwall method resulted in less motivated workers, higher stress, lower safety, and lower productivity (Trist & Bamforth, 1951). The British coalmining studies demonstrate that in a work system where people interact with technology to achieve some ultimate outcome, consideration for both the social aspect as well as the technological component of the work is necessary. If technology optimization is considered without the social aspect of work, then negative consequences such as the ones described above become inevitable. Alternatively, if only the social aspect of work is considered without the technological one, the full potential of the technology may not be utilized.

Organizational interventions grounded within sociotechnical systems theory has been applied in a variety of settings. Pasmore and colleagues (1982) reviewed over 100 studies which demonstrated the effectiveness of interventions following this approach. Their review indicates that these types of interventions are generally successful in improving productivity.

Sociotechnical systems theory takes into consideration various subsystems, such as people, technology, organizational characteristics, the task itself, and the environment. The subsystems are a part of the overall system, and interact with each other in a variety of ways to determine overall system outcome (Montague, Asan, & Chiou, 2013). There are two major principles to the theory. The first principle states that the interaction between the social and the technical elements of the system determine both successful and unsuccessful system outcomes. These interactions include designed, linear, causal relationships, and unexpected, often non-linear, relationships. The second principle states that optimization of only the social or technical elements typically increases the likelihood of unexpected, complex, non-linear relationships which are often harmful to overall system performance. Only through joint optimization of both the social and technical factors can system performance be improved (Walker, Stanton, Salmon & Jenkins, 2008). Sociotechnical systems theory has been used to explain human-technology interactions on both the organizational level (see Pasmore et al., 1982 for a review) as well as the individual level (e.g., Montague et al., 2013).

The goal of this work is two-fold. My first intention is to examine the relationship between trust in people and trust in technology during a technology-mediated interpersonal interaction. According to sociotechnical systems theory, trust in the human element of the communication system will impact trust in technology and vice versa -- trust in technology will affect interpersonal trust. Given the prevalence of technology-mediated communication, understanding the relationships between these two constructs is increasing in importance. Each of these constructs has been linked to continuance intentions in a technology and social context. Understanding their cross-context impact could facilitate more effective technology-mediated interactions as well as shed light on potential interventions geared toward improving those types of interactions. The second goal of this work is to examine the potential unique effects that trust in technology and trust in people have on cooperation, communication, and subsequent performance in a technology-mediated environment. Understanding the differential impact of the two constructs on attitudes and behaviors should help mitigate some of the issues associated with technology-mediated work.

Text Analysis

One of the methods that will be used to analyze the data obtained from the participants in this study is text analysis. The following section summarizes the development of the methodology and illustrates its use.

Brief History.

Researchers' interest in analyzing natural speech is not surprising. After all, that is how people communicate their thoughts, feelings, and emotions to others in order to bring about common understanding. Text analysis is not a new phenomenon; Freud wrote about the information people would reveal about themselves through slips of the tongue; Rorschach used the descriptions that people provided about ambiguous inkblots to examined their thoughts, intentions, and desires; McClelland and other thematic apperceptions researchers utilized the narratives people provided around a picture to gain insights into their need for power, affiliation, and achievement (Tausczink & Pennebaker, 2009).

In the middle of the 20th century, Gottschalk and colleagues developed a content-analysis method to detect Freudian themes in written samples of text. The text was broken down into grammatical phrases that were later examined for themes by human judges. This methodology has been used to detect cognitive impairments and mental disorders amongst others (Tausczink & Pennebaker, 2009).

The first computerized text analysis program in the field of psychology was developed by Phillip Stone and colleagues (Rosenberg & Tucker, 1978; Stone, Dunphy, Smith, & Ogilvie, 1966 as cited in Tausczink & Pennebaker, 2009). The program adapted McClelland's need-based coding schemes to any text. This approach has been useful in distinguishing mental disorders and assessing personality dimensions (Tausczink & Pennebaker, 2009). In the 1980s Walter Weintraub introduced the first transparent text analysis methodology. It was built upon word counts for specific parts of the speech (e.g., pronouns, articles). In his work, Weintraub observed that simple words in everyday speech reflect psychological states, and thus can be used as markers for those states (Tausczink & Pennebaker, 2009). Shortly after, Pennebaker and colleagues were conducting work where people were asked to describe highly emotional experiences in their lives. These highly emotional texts were then rated by judges on multiple dimensions. Through their work, Pennebaker and colleagues uncovered some issues associated with human coding of texts – consistency issues due to lack of complete agreement, the process was slow and expensive, and the emotional state of the coders was affected by the texts (i.e., the judges got depressed from reading depressing personal stories). In an effort to address the issues, Pennebaker and colleagues developed the Linguistic Inquiry and Word Count, LIWC (pronounced “Luke”; Tausczink & Pennebaker, 2009).

Linguistic Inquiry and Word Count (LIWC).

The two building block of the LIWC program are the dictionary and the processing component. The dictionary is central to LIWC. It contains all the potential words that LIWC can search for and code in a piece of text. Each word is assigned to one or more categories. For instance, the verb “smiled” is assigned to the categories positive emotion, affect, verb, and past tense. There are 80 standard categories (i.e., variables), however researchers can add categories if they choose to do so. These variables include general descriptor categories (e.g., word count, number of sentences), standard linguistic dimensions (e.g., percentage of article words), psychological constructs (e.g., affect, cognition), personal concern categories (e.g., work, religion), paralinguistic dimensions (e.g., assent, noninfluencers), and punctuation categories (e.g., periods, commas) (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007).

The second part of the program is the processing component. During processing, LIWC scans the input text and compares each word in the text file to the dictionary. If a word from the text is present in the dictionary, then it is scored in its respective category. After completing the scoring on the whole text, LIWC calculates the percentage of words in each category, which is the information listed in the output.

To examine the internal reliability of this approach, Pennebaker and colleagues examined the relationships between words within the same category. Theoretically, if people are describing an experience which makes them anxious, they are more likely to use the other 91 words assigned to the Anxiety category. Internal reliability is assessed by examining the correlation between each word and the sum of the other words in the category. External validity for several of the categories was assessed by examining the correlation between LIWC ratings and judge ratings. The correlations were relatively high providing support for external validity (Pennebaker at al., 2007).

Applications.

The LIWC text analysis methodology has been applied to study a variety topics such as deception (Hancock, Curry, Goorha, & Woodworth, 2008; Braun, Van Swol, Vang, 2015), cohesiveness (Gonzales, Hancock, & Pennebaker, 2010), relationship satisfaction (Slatcher, Vazire, & Pennebaker, 2008), customer satisfaction (Hall, Verghis, Stockton, & Goh, 2014), and distraction (Hsu, Babeva, Feng, Hummer, & Davison, 2014) .

Gonzales, Hancock, and Pennebaker (2010) utilized LIWC to examine the relationship between language matching style and social dynamics in small groups, more specifically cohesiveness and task performance. They examined these relationships in face-to-face and technology-mediated groups and focused on verbal mimicry by studying the rate of function words the participants used during the interaction. Function words include prepositions, articles, and other words that are void of specific content when used on their own. The authors note that function words are the backbone of language and are harder to consciously manipulate compared to content words. Verbal mimicry was examined in nine LIWC categories that capture function words - auxiliary verbs, articles, common adverbs, personal pronouns, indefinite pronouns, prepositions, negations, conjunctions, and quantifiers. In addition to verbal mimicry, Gonzales and colleagues also examined the individual features of language that may predict cohesiveness and performance. They explored four potential categories – overall word count, pronoun pattern, future-oriented, and achievement-oriented language (Gonzales et al., 2010).

Results of the study indicated that verbal mimicry as well as word count were a predictor of cohesiveness. First-personal plural pronouns were also predictors of cohesiveness, however the direction of the relationship was negative, lower prevalence of first-person plural pronouns was associated with higher group cohesiveness perceptions. Verbal mimicry was a predictor of task performance when the interaction took place face-to-face. Additionally, future-oriented language had a positive relationship with task performance, while achievement-oriented language had a negative relationship (Gonzales et al., 2010).

In another examples, Slatcher, Vazire, and Pennebaker (2008) examined the association between language, relationship satisfaction, and stability in couples. They focused on two broad categories, personal pronouns and emotional words. They examined first-person plural pronouns (e.g., “we”) for their association with shared identity and interdependence, and second-person pronouns (e.g., “you”) for their association with other-focused attention. Additionally, they looked at both positive and negative emotions, and further categorized phrases into positive sarcasm (i.e., positive phrases are used to communicate negative affect) and negative sarcasm (i.e. negative phrases are used to communicate positive affect). Slathcer and colleagues used chat-based conversations over a 10-day period from 68 heterosexual couples. Findings from the study indicated that the use of first-person singular pronouns and negative sarcasm by the woman in the relationship were predictive of her relationship satisfaction, while positive negations by the woman and the man’s positive emotions and positive sarcasm were predictive of his satisfaction with the relationship. Female use of first-person singular words and male use of positive sarcasm were associated with relationship stability six months after the interactions (Slatcher et al., 2008).

The Present Study

In the present study, I examine how trust in technology and interpersonal trust uniquely impact a technology-mediated interaction between people and the outcomes of that interaction. The investigation of this question is of importance because increasingly more interactions in both personal and professional environments are conducted through a technological medium. These interactions are considered to be higher risk than traditional face-to-face interactions because there is a limited amount of information available to the participants. Trust diminishes the risk associated with the situation, reduces the cognitive load of the task, and allows for optimal performance. Technology-mediated interactions involve both a technology component and a human component, making both trust in technology and interpersonal trust relevant and necessary to achieve an optimal interaction and thus a satisfactory outcome of that interaction.

In the study I examine the relationships between interpersonal trust, trust in technology, and interaction outcomes, and ultimately answer the research question of how trust in technology and interpersonal trust differentially impact collaboration and performance. The study experimentally tests the links between trust in technology and interpersonal trust, and how those determine participant intentions and behaviors during an interaction.

Both trust in technology and interpersonal trust are influenced by stable dispositions, which capture one's general predisposition to trust. Based on the model of interpersonal trust put forth by Mayer and colleagues (1995) one's propensity to trust is related to trust in people. Propensity to trust also moderates the relationship between trustworthiness beliefs and trust. Therefore, I hypothesize that the relationships will be replicated in this study.

> H1a: Propensity to trust people will be positively related to trust in people.

H1b: Propensity to trust people will moderate the relationship between trustworthiness beliefs and trust in people.

Similarly, McKnight and colleagues (2011) propose that there is a stable disposition when it comes to trusting technology. They separate predisposition to trust technology in two sub-factors, trusting stance technology and faith in general technology. Taken together, trusting stance technology and faith in general technology are related to trust in specific technology. Thus, I hypothesize that the same relationship will be observed in this study.

H2: Propensity to trust technology will be positively related to trust in technology.

Human interactions in a technology-mediated environment are examples of interactions taking place in a human-technology system. Based on sociotechnical systems theory, human and technology elements interact with each other to determine system results. Empirical research examining the relationship between trust in different elements of the same system further supports this stance. Therefore, I anticipate a relationship between trust in people and trust in technology in the same sociotechnical system.

H3: Trust in people will be related to trust in technology.

Further, because there is a relationship between the two trust domains, trust in people and trust in technology, I expect that changes in one trust domain will result in a change in the other trust domain. More specifically, I expect that when trustworthiness attributes signal low trust in people, participants will have lower trust in both people and technology, compared to when trustworthiness characteristics signal high trust in people. This expectation is rooted in the notion that both the technology in use and the person involved in the interaction (the trustee) are a part of the same sociotechnical system, thus trustworthiness perceptions of one part of the system will bleed into the trustworthiness perceptions of another part.

> H4a: Trust in people impacts trust in technology, such that there will be a significant difference in trust in technology ratings between condition 1 and condition 3, and condition 2 and condition 4.

Similarly, when technology-related trustworthiness characteristics signal low trust in technology, trust in people will be lower compared to when technology-related trustworthiness characteristics signal high trust in technology.

> H4b: Trust in technology impacts trust in people, such that there will be a significant difference in trust in people ratings between condition 1 and condition 2, and condition 3 and condition 4.

Both trust in technology and interpersonal trust have been linked to continuance intentions in their respective areas. Research has demonstrated that trust in technology is related to intentions to use the technology in the future (Wu, Zhao, Zhu, Tan, & Zheng, 2011). Therefore, it is expected that the same relationship will be observed in this study.

> H5: Trust in technology will be positively related to intentions to continue to use the technology.

Likewise, interpersonal trust has been linked to relationship commitment (Costa, Roe, & Taillieu, 2001) which captures intentions to continue the interpersonal interaction. Therefore, based on the existing research, it is expected that this study will replicate that relationship.

> H6: Trust in people will be positively related to intentions to continue the interpersonal collaboration.

During a technology-mediated interaction, people are involved in an interaction with technology and an interpersonal interaction. Since those two experiences take place within the same system, it is expected that trust will not only impact intentions within the same domain, but will also have an effect across domains. Thus both trust in technology and interpersonal trust will impact intentions to continue the interpersonal collaboration and intentions to continue using the technology, respectively.

> H7: Trust in technology will be positively related to intentions to continue the collaboration.
>
> H8: Trust in people will be positively related to intentions to continue to use the technology.

Additionally, I examine the impact of interpersonal trust and trust in technology on two behaviors in particular, collaboration and communication, and their outcome, performance. Collaboration is defined as interactive and relational behaviors that occur between people working together in order to achieve a task (Hill, Bartol, Tesluk, Langa, 2009). The reasons why people engage in collaborative behaviors in certain situations have been studied extensively (refer to a review by Parks, Joireman, & Van Lange, 2013). My focus is to examine the link between trust and collaborative behaviors during a technology-mediated interaction. Research supports the connection between interpersonal trust and collaboration (Mayer et al., 1995; McAllister, 1995; Jones & George, 1998; Costa, 2003; Balliet & Van Lange, 2013). In situations where there is high level of trust, people are willing to take the risk of being vulnerable and rely on the other person involved in the interaction; they are willing to accept the risk of working together towards a common goal. Based on the extensive research on the interpersonal trust – collaboration link, I anticipate to replicate the findings from the literature.

H9: Trust in people will be positively related to collaborative behaviors.

Trust in technology is characterized by the user's perceptions of the technology's reliability, helpfulness, and functionality. If the technology functions consistently, performs the necessary tasks, and help is available for the user when it is needed, then the user is more likely to trust the technology and continue utilizing it. If either one of these three requirements is lacking, the user is less likely to continue using the technology. Similarly, when using technology for a collaborative interaction, if the technology functions consistently, has the necessary capabilities, and help is provided when needed, the users will be more likely to continue their interaction and thus engage in more collaborative behaviors. However, if the technology impedes the interaction, collaborative behaviors are hampered as well. Therefore I anticipate that trust in technology will be positively related to collaboration.

H10: Trust in technology will be positively related to collaborative behaviors.

Interpersonal trust has also been studied in relation to communication behaviors. Trust development is dependent on the amount and type of information both parties involved in the interaction have about each other (McAllister, 1995). If the information indicates that a person is trustworthy (competent, benevolent, and has integrity), then trust is likely to increase. On the other hand, if the information obtained suggests that a person is not trustworthy then trust is likely to decrease or plateau (Lewicki et al., 2006). Information can be obtained through a variety of methods. One can observe a person's behavior, communicate with a person, or obtain information through a third party. Here, I focus on obtaining information through interpersonal communication.

The connection between trust and communication is reciprocal. Greater frequency in communication can result in more information pertaining to competence, benevolence and integrity being shared and thus levels of trust can change (McAlister, 1995). On the other hand, higher levels of interpersonal trust can lead to greater risk-taking (Mayer et al., 1995); those risk-taking behaviors can include engaging in task non-relevant communication such as disclosing personal information (information disclosure) thus increasing communication frequency. Therefore, I anticipate that there will be a link between interpersonal trust and communication behaviors.

> H11: Interpersonal trust will be positively related to communication behaviors, namely communication frequency and information disclosure.

When people are communicating through technology-mediated channels, the type of information communicated becomes even more relevant because users cannot necessarily observe each other's behaviors or rely on a third party for information. During technology-mediated interactions trust in technology becomes as relevant and important as interpersonal trust. If users trust the technology in use, they are more likely to exclusively focus on the task and communication taking place, and thus devote more time and resources to the interaction. If the technology is not functioning as anticipated, however, the users' primary focus will be on making the technology work, making the task at hand and communication of secondary importance. When the technology functions as intended to, the interaction between the users can be seamless and they can focus on both communication and task performance.

H12: Trust in technology will be positively related to communication behaviors, namely communication frequency and information disclosure.

Trust is of great importance to both researchers and practitioners because of its connection to important interaction outcomes such as task performance. Research suggests that trust impacts performance through mediating variables such as risk-taking (Mayer et al., 1995), citizenship behaviors, and monitoring (McAllister, 1995). Because the effects of trust are often not directly reflected in performance (Dirks, 1999), it is important to examine this relationship in the context of existing trust-performance models. In this work I have adopted the Mayer et al. (1995) conceptualization of the trust-performance relationship. This model focuses on the link between interpersonal trust and outcomes. However, in a technology-mediated interaction, a person interacts both with another person as well as with technology, making trust in both the person and the technology relevant. Thus, I propose that the Mayer and colleagues model is deficient when it comes to technology-mediated interpersonal interactions. Because both a person-to-person and a person-to-technology interaction are taking place, both interpersonal trust and trust in technology should be included in the model. Given that the focus of this work is to examine the relationship between trust in people and trust in technology and its effect, the antecedents of interpersonal trust, ability, benevolence, and integrity, will be omitted from the models compared.

H13: The augmented trust model (Figures 8, 9, 10) will explain more variance in risk-taking behaviors and performance than the original trust model (Figure 7).

In additional, I will test several competing models with capture the effect of interpersonal trust and trust in technology on the overall interaction and its outcomes. Models 1, 2, and 3 (Figures 8, 9, and 10 respectively) capture the different plausible relationship between the constructs at play.

Contributions

Technology-mediated interactions are widespread in people's personal and professional lives. These types of interactions take place at work (e.g., virtual teams, telework), in education (e.g., online classes), in medicine (e.g., telemedicine, online therapy), as well as in other aspects of people's lives such as banking, shopping, and personal relationships. When engaging in an interaction people need to have a certain amount of trust in order to be willing to accept the risk associated with the interaction; patients need to trust their doctors and their expertise; coworkers need to trust each other to truly collaborate. In addition to trusting the person involved in the interaction, people also need to trust the technology which facilitates the interaction. If there are issues associated with either aspects of the interaction, the person or the technology, the overall interaction could be suboptimal.

This study contributes to the field of trust research in two distinct ways. First, the study examines interpersonal trust and trust in technology during a technology-mediated interaction simultaneously, which has not been previously studied. Research in the field has urged for the examination of the relationship between the two constructs and disentangling trust in technology from interpersonal trust (McKnight et al., 2011). Understanding the unique effects that the two types of trust have on outcomes of interest will give researchers a better understanding of the role of trust during a technology-mediated interaction.

Second, the study links interpersonal trust and trust in technology to important attitudinal and behavioral outcomes. Understanding the relationship between these two types of trust and outcomes of importance will allow for the design of better interactions. From a technological standpoint, systems architects will have the information necessary to develop person-to-person interaction tools for maximal trust. From a behavioral standpoint, people who use technology to interact will have a better understanding of the potential shortfalls resulting from the use of technology and be able to adjust their expectations and behaviors to account for those shortcomings.

CHAPTER 3: METHOD

Participants

Participants were recruited from SONA, the USF research participant recruitment pool. A total of 174 dyadic sessions took place. Of those sessions, 82 sessions contained useable data. Data from sessions were discarded when one of the participants failed to meet their appointment and thus a research assistant had to participate in the session. Each of the 82 sessions contained two participants for a total of 164 participants. The average age of the participants was M=19.41 (SD=2.59). The sample contained 26% men and 74% women. The majority of participants identified as heterosexual (92%), followed by homosexual (4%), bisexual (4%). One participant chose not to provide sexual orientation identification information. Forty-five percent of participants self-identified as Caucasian, 26% as Hispanic/Latino, 13% as African American/Black, 11% as Asian, 4% as Other, and 1% selected not to self-identify. Of the 82 dyads, 54 were same-gender dyads, and 28 were cross-gender. The majority of participants indicated that when they collaborate on projects, most often they utilize text messages and face-to-face meetings, followed by email (Table 2).

Materials

Experimental stimuli.

Four hypothetical scenarios were designed specifically for this study. The use of hypothetical scenarios to study relationships between constructs that are difficult to manipulate is generally accepted in the field (e.g., Bekier, Molesworth, & Williamson, 2011).

The goal of the scenarios is to manipulate the trustworthiness characteristics of the trustee and the technology. In each scenario, trustworthiness aspects concerning people (ability, benevolence, and integrity) and technology (functionality, helpfulness, and reliability) were manipulated, resulting in four conditions in total. In condition 1, interpersonal trustworthiness characteristics are manipulated to signal high interpersonal trust and technology characteristics are manipulated to signal high trust in technology. In condition 2, interpersonal trustworthiness cues signal low trust as do technology characteristics. In condition 3, interpersonal trustworthiness cues signal high interpersonal trust while technology characteristics signal low trust in technology. And lastly, in condition 4, interpersonal trustworthiness cues signal low trust in people, while technology characteristics signal high trust in technology. The four scenarios are available in Appendix B.

Performance task.

Participants took part in the Desert Survival task (Johnson & Johnson, 2009; Littlepage, Schmidt, Whisler, & Frost, 1995; Lafferty, & Pond, 1974). They completed the task in a computer-mediated environment. The Desert Survival task involves reading a scenario that places the participants in a desert. They have 12 items that they can take with them as they try to survive in the desert. The participants have to work together to determine the importance of each one of the 12 items for their survival. Their goal is to rank the items from most important to least important for survival. Refer to Appendix E for the complete task. Performance on the task is determined by the quality of the solution. The generated solution is scored against a pre-determined correct solution. The absolute difference between the two solutions captures the task performance score. Lower scores indicate a solution closer to the expert solution and thus better performance. Performance scores can range from 0 (most accurate solution) to 72 (least accurate solution). Normative information on the task is available by contacting Human Synergystics. The use of this task is generally accepted in the field as a proxy for decision-making tasks that temporary teams engage in on the job (Thompson & Coovert, 2002, 2003; Littlepage et al., 1995).

Measures.

Propensity to trust technology was assessed using the measure developed by McKnight and colleagues (2011). It measures both faith in general technology (4 items) and trusting stance – general technology (3 items). The overall reliability of the measure was α=.91. Propensity to trust people was measured using an 8-item scale (McKnight et al., 2011; Appendix C). The reliability for the scale was α=.76. Trust in technology was assessed through the trusting beliefs in technology - reliability (4 items, α_{pre}=.95, α_{post}=.94), functionality (3 items, α_{pre}=.92, α_{post}=.94), and helpfulness (4 items, α_{pre}=.97, α_{post}=.97). McKnight and colleagues (2011) conceptualize trust in technology as a reflective construct which is assessed through the trusting beliefs of reliability, helpfulness, and functionality.

Perceived risk was assessed using a 6-item measure. The majority of items are adapted from Ma and Wang (2008). The original set of items developed by Ma and Wang assessed perceived risk associated with the use of an online decision aid. For the purposes of this study I modified the items to reflect perceived risk associated with participation in a technology-mediated interaction. In addition to the four items adapted from Ma and Wong (2008), two more items were included in the measure (Kim, Ferrin, & Rao, 2008; Laroche, McDougall, Bergeron, & Yang, 2004). The reliability of the measure was α=.89. Items measuring perceived risk are available in Appendix C.

Survival proficiency was assessed using a 5-item assessment. Items were generated based on content from a wilderness survival website (Wilderness Survival, 2014), generated from the US Army Field Manual "Survival" (FM 21-76). Items are available in Appendix C.

Communication frequency was measured by examining the text logs from each collaborative session. Frequency was assessed by examining the number of messages exchanged between the participants. The word count variable in the LIWC output was utilized to assess communication frequency. Information disclosure was also assessed though the communication logs.

Collaboration was assessed through the text logs from each session following the procedure outlined in Hill et al (2009). Hill and colleagues used Marks, Mathieu, and Zacarro's (2001) taxonomy of team process behaviors to code dyadic interactions during a task. Marks and colleagues (2001) methodically capture the different processes that teams take part in when working together. They specify ten team processes taking place within two phases, transition phase and action phase. During the transition phase teams focus on planning for future tasks and reflecting on accomplished ones. Three specific processes take place - mission analysis, goal specification, and strategy formulation and planning. The second phase is the action phase where team members engage in processes that directly lead to achieving their goals. The processes in the action phase are monitoring progress towards goals, systems monitoring, team monitoring and backup behaviors, and coordination activities. In addition to task-related processes, during both phases team members also engage in interpersonal processes that allow team members to manage interpersonal relationships. These interpersonal processes include conflict management, motivating/confidence building, and affect management. Given the limits of the experimental task in the study, collaboration behaviors were defined through four processes, strategy formulation and planning, coordination, conflict management, and affect management. The text logs for each dyad were coded for each of these processes.

Interpersonal trust was measured using both assessments of trusting beliefs (ability, benevolence, and integrity) and trusting intentions. The measures were adapted from Serva, Fuller, & Mayer (2005) such that they reflect an interaction between individuals, not teams.

Intentions to continue the interpersonal interaction as well as intention to continue technology use were assessed using three items each adapted from Venkatesh, Morris, Davis, and Davis (2003). Reliability for both measures was acceptable, α_{ppl}=.94 and α_{tech}=.96.

All surveys were administered using an electronic survey platform (SurveyGuizmo).

Defining Collaboration

Collaboration was defined using the team process taxonomy put forth by Marks, Mathieu, and Zaccaro (2001). According to the taxonomy, team members engage in ten different team processes while working together. Continual team interactions can be examined as a string of consecutive performance episodes. Every performance episode consists of two phases – a transition phase and an action phase. During the transition phase, team members engage in three main processes – mission analysis, goal specification, and strategy formulation and planning. As team members move from the transition phase to the action phase, their focus switches from planning to doing. During the action phase, team members engage in four processes – monitoring progress, systems monitoring, team monitoring and backup, and coordination. During both the transition and the action phases, team members also engage in three interpersonal processes – conflict management, motivation and confidence building, and affect management (Marks et al., 2001).

For this work, collaboration was assessed through four of the team processes – strategy formulation and planning, coordination, conflict management, and affect management. The other six processes were excluded from the analyses due to limitations imposed by the performance task. Each of the four team processes was mapped on one of the LIWC categories based on existing research.

The first examined process was strategy formulation and planning. This process involves team members deciding how they would go about completing the task at hand, discussing expectations, exchanging task-related information, and assigning roles (Marks et al., 2001). Strategy formulation and planning was measured through the future tense verb, *future (ftr)*, LIWC category. The *future* category captures verbs that are in the future tense form such as "will" and "gonna". A total of 48 words define the category. The binary reliability for the category is α=.75 (Pennebaker et al., 2007). Gonzales and colleagues (2010) posit that future-oriented language demonstrates real-time planning and cognitive complexity. Indeed, their work demonstrated a positive relationship between the degree of future-oriented language as indicated by the future tense verb LIWC category and team performance.

The second examined process was coordination. When team members coordinate, they organize the sequence and timing of interdependent actions and activities. This involves exchanging information, adjusting to other team members' performance, and managing concurrent activities. The coordination process is closely linked to actually performing the task at hand. Coordination was measured through the *questions* LIWC category. The *questions* category captures the number of questions present in the text. A question is defined by the question mark ("?") punctuation sign (Pennebaker at al., 2007). The *question* category most accurately captures the information seeking and sharing behaviors that team members can engage in during the coordination process. Posing a question suggests that the participants are interacting with each other. As team members ask more questions, they are more likely to uncover unique pieces of information which can have a positive impact on performance.

The third team process examined was conflict management. When team members attempt to manage conflict they can establish conditions to prevent or guide conflict before it actually occurs (preemptive conflict management) or they can work through the interpersonal disagreement (reactive conflict management). Given the short-lived nature of the teams in this study, the likelihood that team members would engage in preemptive conflict management is extremely low. However, there is a chance that conflict may occur during the interaction, thus assessment was focused on reactive conflict management. Conflict management was assessed through the *assent* LIWC category. The *assent* category can capture the lack of disagreement between team members and the effective resolution of conflict when it occurs. The *assent* category captures verbal expressions where the participants agree with each other. Examples of words in the *assent* category are "OK", "agreed", and "sure". The category is defined by 38 unique words and has a binary reliability of α=.59 (Pennebaker et al., 2007).

Lastly, the fourth process that was examined was affect management. It involves team members regulating and calibrating their emotions during mission accomplishment as a function of the task, other team members, and environmental conditions (Marks et al., 2001). Affect management was measured through the *affect* LIWC category. The *affect* category captures words that indicate emotional expression. Affect captures both positive and negative affective expressions. Examples of words in this category are "happy", "cry", and "abandoned". A total of 915 words define the category. The binary reliability for *affect* is α=.97 (Pennebaker et al., 2007).

Design

This is an experimental study where participants were randomly assigned to one of four experimental conditions. Two factors are manipulated through their trustworthiness cues, trust in technology (high, low) and trust in people (high, low) for a total of four experimental conditions.

Procedure

Two participants took part in each experimental session. The participants were greeted by the research assistant and shown to their respective station. Each station was equipped with software that the participants used to interact with each other (Chatzy) as well as the survey software (Survey Gizmo). Access on the workstations was restricted to those two applications to minimize potential distractions.

After obtaining informed consent, the participants completed the first set of measures - survival proficiency, propensity to trust people, and propensity to trust technology. The participants then completed the experimental task on their own. They were given seven minutes to complete the task, where they provided their own individual solutions. Afterwards, the participants read one of the four manipulation scenarios. Both participants were assigned to the same condition and received the same scenario. Then, the participants completed the first trust assessments, both interpersonal trust and trust in technology, and reported their perceived risk of the situation. Afterwards the participants proceeded to complete the survival task for the second time where they had to collaborate to reach a solution. They were given 25 minutes to complete this part. The participants used the chat tool to collaborate and arrive at their solution. After task completion and submitting the common solution, the participants completed the second set of measures assessing interpersonal trust and trust in technology and provided demographic information. After the completion of the study, a research assistant debriefed the participants, answered any questions, and thanked them for their participation.

CHAPTER 4: RESULTS

This study examined the effects of trust in technology and interpersonal trust on collaborative behaviors and performance. These interactions were examined in the context of a dyad where two participants performed a collaborative decision-making task while communicating using a text chat tool. Data were collected from 257 participants comprising 174 dyadic sessions. Data from 92 sessions were discarded because one of the participants failed to come to the session (61 sessions) or only one participant signed up for the session (31 sessions). All data analyses were performed on data obtained from 164 participants comprising 82 complete dyads.

Data were collected during one continuous session. Each participant dyad was assigned to one of the four conditions. For each of the four conditions, two factors were manipulated through their trustworthiness cues, trust in technology (high, low) and trust in people (high, low) for a total of four experimental conditions (Appendix B). First, the participants completed the first set of measures, which included a survival proficiency assessment, propensity to trust people, and propensity to trust technology. Afterwards, the participants completed the experimental task on their own. After submitting the individual solutions, each participant read an experimental scenario. The scenario provided information on the trustworthiness characteristics of the person that the participant would collaborate with, along with trustworthiness cues of the technology that would be used to collaborate and complete the task. Both participants read the same scenario. Afterwards the participants completed the perceived risk, interpersonal trust, and trust in technology assessments. Then the participants completed the collaboration task together (Appendix D). After task completion, the participants completed the interpersonal trust and trust in technology assessments one more time. Lastly, the participants provided demographic information.

Attention Check

Participant response patterns were examined for inattention. The protocol of the study provided some safeguard against inattention, since the participants were closely monitored by a research assistant while the study was taking place. The monitoring ensured that both participants were actively completing the task at hand, however it could not diminish inattention during the time that participants were completing the measure. To examine inattention during the measure completion sections of the study the standard deviation of a sequence of survey responses was examined. The survey responses were separated in three sections. The first section captured survey items from the beginning of the study until the individual performance task. The second section captured survey items from the end of the individual performance task to the beginning of the collaborative performance task. The third section captured items from the end of the collaborative task to the end of the study. A row standard deviation was calculated for each one of the three sections. If inattention is present (i.e., the participant is selecting the same response over and over again), the standard deviation of the responses would be close to zero. All three indicators should be flagging the case as having inattention present for removal of the observation. The average standard deviation for each of the three sections was SD_1=1.47, SD_2=1.47, and SD_3=1.43. The row standard deviations ranged from 0 (min) to 2.94 (max). Only one observation had one inattention flag, however that did not meet the criterion for removal, thus the observation for the particular dyad was retained. Table 3 summarizes the inattention measures. These measures suggest that there was sufficient variability across the responses each participant provided. No observations were discarded due to lack of variability across responses.

Text Processing

The conversations within each participant dyad were saved. To prepare the text data for analysis, the practices described in the LIWC 2007 operator manual were followed (Pennebaker at al., 2007). First, the data were organized so there was only one text file per dyad. Second, all text files were processed to correct spelling errors. All errors were corrected to standard United States English spelling. Additionally, meaningful abbreviations were spelled out (e.g., "b/c" to "because"). All contractions ending on an " 's" were corrected to their full form when appropriate. The corrections to those specific contractions were performed because LIWC cannot distinguish between the possessive and contracted form. Punctuation was corrected when needed. Periods (.) and question marks (?) are often omitted when people interact via chat, however those are necessary for certain LIWC analyses, so they were added when appropriate. Lastly, the full text logs contained both interactions between the participants and interactions between the researcher and the participants (e.g., progress updates, instructions). For this analysis, only the text where the two participants were interacting with each other to complete the collaborative task was retained.

The text logs were analyzed using the build-in LIWC 2007 US English language dictionary (Pennebaker, Booth, & Francis, 2007).

Descriptive Statistics

Descriptive statistics were examined for all variables. Table 4 summarizes all variables at the individual and dyad level. All measures were administered on a one- to seven-point scale.

The means for the two propensity to trust constructs, propensity to trust people and propensity to trust technology were M_{PTP}=4.39 (SD=.75) and M_{PTT}=5.48 (SD=.98), respectively. The propensity to trust people scores were normally distributed, while the propensity to trust technology scores were negatively skewed, z_{PTT}=6.55, $p<.05$, and leptokurtic. The mean survival proficiency scores were relatively low, M_{SP} = 1.32 (SD=.95) and positively skewed, z_{SP}=2.27, $p<.05$.

The three trustworthiness characteristics - ability, benevolence, and integrity, were examined at two different points in time, pre-collaboration and post-collaboration. All three measures were higher post-collaboration compared to pre-collaboration, M_{Apre}=4.60 (SD=1.67) and M_{Apost}=5.95, (SD=1.08), $t(163)=-10.64$, $p<.001$; M_{Bpre}=3.74 (SD=1.52) and M_{Bpost}=5.39, (SD=1.19), $t(163)=-13.49$, $p<.001$; M_{Ipre}=3.83 (SD=1.36) and M_{Ipost}=5.16, (SD=1.27), $t(163)=-10.24$, $p<.001$. The trust measure followed a similar pattern, M_{Tpre}=3.65 (SD=1.24) and M_{Tpost}=4.83, (SD=1.16), $t(163)=-10.78$, $p<.001$. The increase in scores is not surprising since the majority of the interactions were successful (i.e., there were no technological issues or interpersonal conflicts during the interaction). The pre- and post-collaboration ability and post-collaboration benevolence distributions had negatively skewed distributions. All other trust in people variables were normally distributed.

Trust in technology was assessed similar to interpersonal trust, pre- and post-collaboration. Similar to interpersonal trust, trust in technology was higher after the interaction. Reliability ratings were higher post-interaction M_{Rpre}=4.92 (SD=1.48) and M_{Rpost}=5.86 (SD=1.15), $t(163)=-9.07$. $p<.001$, along with functionality, M_{Fpre}=5.33 (SD=1.35) and M_{Fpost}=6.00 (SD=1.08), $t(163)=-6.79$, $p<.001$, and helpfulness, M_{Hpre}=4.73 (SD=1.61) and

M_{Hpost}=5.29 (SD=1.41), $t(163)=-5.44$, $p<.001$. All trust in technology distributions were negatively skewed.

The average dyad performance scores was M_{perf} =52.10 (SD=7.55), where a greater score indicated a lower quality solution. The distribution of team performance scores was negatively skewed, z_{perf}=5.53, $p<.05$ and leptokurtic. Dyad performance scored on the task were relatively high indicating a generally low quality solution, with dyads performing at chance levels. Other have observed similar performance levels. Littlepage and colleagues (1995) utilized a variation of the task, where the average performance was 36% (they captured accuracy) which is slightly higher by the accuracy rate in this study, 27% . In another study, Thomson and Coovert (2002) utilized the same task. They report mean individual scores ranging between M=47.28 (sd=6.64) and M=50.13 (sd=8.68) in a similar sample. Scores were computed by subtracting the mean deviation score from 100. Applying the same calculation methodology to the scores in this study yielded a comparable mean rating, M =48.32 (sd=7.82).

Distributions for the text variables were also examined. The average score for the *future* LIWC variable was M_{ftr}=2.40 (SD=1.60). Average score for the *affect* category was M_{aff}=4.75 (SD=1.73), *assent* M_{asnt}=3.56 (SD=1.58), and *questions* M_{q}=4.24 (SD=2.20). All distributions were normal and mesocurtic except for the future one which had a positive skew, z_{ftr}=8.65, $p<.05$.

Nonindependence Analyses

All variables were tested for nonindependence of observations within the dyad. If nonindependence between observations is detected then the data cannot be analyzed as if the members of the dyad are independent of one another. To test for nonindependence I followed the methodology described in Chapter 2 in Kenny, Kashy, and Cook (2006). Since the data were nested within four experimental conditions, the method designed to account for variance due to differences in conditions was utilized. First, the unique measure for each member of the dyad was captured in a separate variable. For example, perceived risk for participant 1 and risk for participant 2 were two separate variables that were a part of the same observation, i.e. the same dyad. Then, the data for each dyad was double-entered resulting in 2n observations for n number of dyads. The intraclass correlation between the responses of the two members of the dyad was computed for all variables using the ANOVA univariate method. Kenny and colleagues (2006) point out that the ANOVA intraclass correlation is a biased estimator, however the bias declines and becomes trivial when there are more than 30 dyads. Given that data from 82 dyads were utilized, the bias in the ANOVA intraclass correlation was trivial. Table 4, column r_I lists the intraclass correlations for all variables measured on the level of the individual. Kenny and colleagues recommend the use of a liberal alpha of .2 when testing for nonindependence. Nonindependence was observed for 11 of the 21 measured variables – propensity to trust people, ability pre-collaboration, benevolence pre-collaboration, functionality pre-collaboration, helpfulness pre-collaboration, ability post-collaboration, benevolence post-collaboration, trust post-collaboration, helpfulness post-collaboration, intent to continue the interaction, and intent to continue use of the technology. Based on the analyses, the design of the study, and the data collection method, the dyad would be the unit of analysis and not the individual.

Model Development

Several dyadic models were developed to test the relationships between interpersonal trust, trust in technology, collaboration behaviors, and performance (Refer to Figures 7-10 for conceptual models). First, a dyadic variation of the Mayer et al. (1995) interpersonal trust model was developed and fit to the data (Figure 7). Subsequently, the trust in technology constructs were added to the interpersonal trust model resulting in the augmented interpersonal trust models (Figure 8-10). Several variations of the augmented interpersonal trust and trust in technology models were tested.

Modeling technique.

It was expected that interpersonal trust and trust in technology would have unique relationships with collaborative behaviors and thus team performance. Both interpersonal trust and trust in technology were measured on the level of the individual while collaborative behaviors and performance were measured on the level of the dyad. Methodologically, a dyadic path analysis model was utilized to fit the model to the data. Since the members of the dyad are interchangeable (i.e., there is no variable to meaningfully distinguish one member from the other), the model that was used was an indistinguishable dyadic path model. The application of this model is preferred to other modeling techniques for three reasons. First, as a dyadic model, it simultaneously uses variables from both members of the dyad allowing for the examination of partner effects. Second, this approach accounts for the nonindependence between observations within a dyad. Ignoring nonindependence can bias significance test results if the members of the dyad are treated as individual observations. Third, since this is a path model, it allows for the simultaneous estimation of all parameters of interest. Additionally, a variable can be simultaneously an input for one set of relationships and an outcome for another (Olsen & Kenny, 2006).

One potential shortcoming of the dyadic path model involves the assumption that all observed variables in the model are perfectly measured, which may result in unreliable path estimates. To correct for this assumption, the reliability of each observed variable was modelled. To account for measurement error, the residual variance of each measured variable was set to

$(1-\alpha) * \sigma^2$ (Muthén, 2005; Schumacker & Lomax, 2010). Given that the goal of this study is to examine how individual perceptions of interpersonal trust and trust in technology impact dyadic collaboration and performance, an indistinguishable path model is most appropriate to utilize.

Variable description.

First, the interpersonal trust model was fit to the data. The model contained eleven individual-level observed variables and five dyadic ones: one variable capturing propensity to trust people for each participant, one variable capturing perceived risk for each participant, eight variables capturing trustworthiness characteristics and trust pre- and post-collaboration (ability pre, benevolence pre, integrity pre, trust pre, ability post, benevolence post, integrity post, trust post) for each participant, one variable capturing individual performance per each participant four variables capturing collaboration behaviors, future tense, assent, affect, and questions for each dyad, and one variable capturing team performance for each dyad (Figure 11, Model 0).

Three alternative models were tested and compared the original model (Models 1, 2, and 3). Each one of the alternative models contained in the trust in technology variables in addition to the variables included in Model 0. Models 1, 2, and 3, contain 17 individual observed variables and five dyadic ones: one variable capturing propensity to trust people for each participant, one variable capturing propensity to trust technology for each participant, one variable capturing perceived risk for each participant, eight variables capturing trustworthiness characteristics and trust pre and post collaboration (ability pre, benevolence pre, integrity pre, trust pre, ability post, benevolence post, integrity post, trust post) for each participant, six variables capturing trust in technology pre- and post-collaboration (reliability pre, functionality pre, helpfulness pre, reliability post, functionality post, helpfulness post) for each participant, four variables capturing collaboration behaviors, future, assent, affect, and questions for each dyad, and one variable capturing team performance for each dyad (Figures 13-15, Model 1, 2, and 3). The three alternative models differ in the hypothesized paths between interpersonal trust, trust in technology, and collaboration.

Items from the Mayer et al. (1995) trust assessment scale measured the trustworthiness characteristics and trust variables at both measurement points. Trust in technology and propensity to trust technology were measured utilizing the assessments developed by McKnight and colleagues (2011). Perceived risk was assessed through a 6-item scale adapted from Ma and Wang (2008). Collaboration was captured by assessing the *future*, *assent*, *affect*, and *question* LIWC variables. Lastly, performance was assessed based on the dyad score at the end of the Desert Survival task.

Modeling approach.

All examined models were dyadic. To test the models, the modeling techniques for interchangeable dyads outlined in Olsen and Kenny (2006) and Kenny, Kashy, and Cook (2006, Chapters 5 & 7) were utilized. Due to the complexity in specifying and testing dyadic models with interchangeable dyad members several unique aspects need to be considered – dataset structure, model specification, model testing.

Dataset structure. The dataset was a dyad-level dataset containing *n* number of dyads and *n* number of observations for *2n* total number of individuals. Each person in the dyad was randomly assigned to be an actor or a partner in the dyad. Table 5 illustrates the configuration of the data. For example, for dyad 1 all the observations are in one row of data. Participant A is treated as the actor and participant B is treated as the partner. Participant B variables are entered after participant A variables. Data were entered in such a manner for all variables collected on the level of the participant.

Model specification. Since the assignment to the actor and partner roles were random, all paths connecting the same constructs across the actor and partner variables were constrained to be equal to each other. For instance, in Model 0, the actor path between ability and interpersonal trust is set to equal the partner path between ability and interpersonal trust. Means, intercepts, and thresholds across the two members of the dyad were also set to equal each other. Additionally, the residuals for the same actor-partner variables were allowed to covary. Measurement error was accounted for by setting the residual variance for each observed variable to $(1 - \alpha) * \sigma^2$ (Muthén 2005; Schumacker & Lomax, 2010).

Four models were fit to the data to examine the relationships between interpersonal trust, trust in technology, collaboration, and performance. All the models were estimated using Maximum Likelihood (ML) estimation. Even though the distributions of some of the variables were skewed, ML estimation is still appropriate (Schumacker & Lomax, 2010). Several overall fit indices were examined - the Tucker Lewis Index (TLI), the Root-Mean-Square Error of Approximation (RMSEA), and Akaike Information Criterion (AIC), and the Parsimony Goodness-of-Fit Index (PGFI).

Model testing. Because the models being tested were dyadic models with interchangeable members, the fit indices from the standard output need to be adjusted based on the dyadic null (I-Null) and dyadic saturated (I-Sat) models. For each hypothesized model, both the saturated model and the null model were estimated. The estimation of both models is necessary due to the random assignment of the dyad members to the actor and partner roles. This random assignment introduces additional error in the model. By estimating the null and saturated models the error due to member assignment can be accounted for when examining overall fit. The hypothesized model will always have a better fit than the null model and worse fit than the saturated model. Following the procedure outlined in Olsen and Kenny (2006), the chi-squared and degrees of freedom for both the null and hypothesized model were adjusted by subtracting the chi-square and degrees of freedom of the saturated model from the chi-square and degrees of freedom of the hypothesized and null models.

To specify the saturated models (I-Sat), the means and variances of the same variables across dyad members were constrained to be equal to each other. All intrapersonal and interpersonal paths were constrained to be equal across dyad members. To specify the null models (I-Null), the covariances across all variables were set to be equal to zero. The means and variances across both members were set to be estimated and equal each other. After the estimation of each null and saturated mode, the chi-square and degrees of freedom for the model being tested were adjusted and overall fit indices were computed.

The Tucker-Lewis index (TLI) captures overall model fit. It examines the discrepancy between the hypothesized model and the null model. The values of the TLI range between 0 and 1, where 0 indicates that the model does not fit the data, and 1 indicates perfect fit. Values above .9 indicate good model-data fit (Schumacker & Lomax, 2010). The TLI for a dyadic model with interchangeable member is estimated using the following formula (Olson & Kenny, 2006):

$$TLI = \frac{\frac{\chi_b^2}{df_b} - \frac{\chi^2}{df}}{\frac{\chi_b^2}{df_b} - 1} ,$$

where $\chi_b^2 = \chi_{I-Null}^2 - \chi_{I-Sat}^2$,

$df_b = df_{I-Null} - df_{I-Sat}$,

$\chi^2 = \chi_{model}^2 - \chi_{I-Sat}^2$, and

$df = df_{model} - df_{I-Sat}$.

The Root Mean Square Error of Approximation (RMSEA) measures the extent to which the specified model fits the data. Smaller values indicate better fit, with values equal or smaller than .05 being considered a good fit, between .05 and .08 a close fit, and values above .10 poor fit (Schumacker & Lomax, 2010). To calculate the RMSEA for a dyadic model with interchangeable dyad members the following formula from Olson and Kenny (2006) was used:

$$RMSEA = \sqrt{\frac{\frac{\chi^2}{df} - 1}{N - 1}} \quad ,$$

where $\chi^2 = \chi^2_{model} - \chi^2_{I-Sat}$, and

$df = df_{model} - df_{I-Sat}$.

The Akaike Information Criterion (AIC) can be used to compare models that are not nested. It adjusts the chi-squared for the number of free parameters. The AIC values are not compared to an absolute standard like the TLI and RMSEA and cannot be interpreted in isolation. When using AIC, the goodness of a model is compared to the AIC of a competing model. AIC was calculated using the following formula from Schumacker and Lomax (2010):

$$AIC = \chi^2 + 2q \quad ,$$

where $\chi^2 = \chi^2_{model} - \chi^2_{I-Sat}$, and

q = the number of free parameters in the model.

Lastly, the Parsimony Goodness-of-Fit Index (PGFI) can be used as a criterion for choosing the most parsimonious model between competing models. The values for PGFI range from 0 to 1. Higher values are desirable as they indicate a more parsimonious fit. The PGFI adjusts the GFI and penalizes for model complexity. The following formula was used to calculate PGFI (Schermelleh-Engel, Moosbrugger, & Müller, 2003):

$$PGFI = \frac{df}{df_b} - \frac{\chi_b^2 - \chi^2}{\chi_b^2} ,$$

where $\chi_b^2 = \chi_{I-Null}^2 - \chi_{I-Sat}^2$,

$\chi^2 = \chi_{model}^2 - \chi_{I-Sat}^2$,

$df = df_{model} - df_{I-Sat}$, and

$df_b = df_{I-Null} - df_{I-Sat}$.

All models were analyzed using Mplus 7.3 (Muthén & Muthén, 2012). All analyses used individual data where rows represent observations and columns represent variables.

Model 0.

Model 0 captures the trust-collaboration-performance model as put forth by Mayer and colleagues (1995) and examines the relationships on the dyadic level. The model captures only the relationships between interpersonal trust, collaboration and performance and includes the following variables – propensity to trust people, ability pre-collaboration, benevolence pre-collaboration, integrity pre-collaboration, trust pre-collaboration, perceived risk, affect, questions, assent, future, dyad performance, ability post-collaboration, benevolence post-collaboration, integrity post-collaboration, trust post-collaboration, individual task performance, and survival proficiency. The correlations between all the variables were examined (Table 7). Survival proficiency did not correlate significantly with any of the variables, thus it was excluded from the model and further analyses. The collaboration variables were allowed to covary with each other. Additionally, the trustworthiness variables were allowed to covary with one another. The model (Model 0) did not fit the data well, $\chi^{2\prime}$=190.66, df'=24, p<.01, TLI=.78, GFI=.98, RMSEA=.22, PGFI=.09, AIC=714.66 (Table 7, Model 0). Examination of the individual paths revealed that there was no support for the moderating effect of propensity to trust people on the trustworthiness characteristics and trust relationships (none of the path coefficients were significant). Additionally, there was no support for the moderating effect of perceived risk on the trust-collaboration relationships. As a result, all interaction terms were removed. Path coefficients are presented in Table 8. A graphical representation of the model is presented in Figure 11.

For the second iteration of Model 0, Model 0.1, all the interactions from Model 0 were removed. The resulting model (Model 0.1) did not fit the data well, however it was a more parsimonious model, $\chi^{2\prime}$=792.22, df'=71, $p<.01$, TLI=.70, GFI=.87, RMSEA=.27, PGFI=.35, AIC=1044.22 (Table 7, Model 0.1). Examination of the individual paths revealed no relationship between propensity to trust people and trust.

A potential mediating relationship was examined where propensity to trust impacted trust indirectly through the trustworthiness characteristics of ability, benevolence, and integrity. The resulting model (model 0.2) had greater parsimony, $\chi^{2\prime}$=894.45, df'=98, $p<.01$, TLI=.75, GFI=.85, RMSEA=.24, PGFI=.48, AIC=1090.45 (Table 7, Model 0.2). The added paths from propensity to trust people to ability, benevolence, and integrity were relatively strong and significant, thus they were retained.

Lastly, additional paths were included from propensity to trust people to ability, benevolence, and integrity post interaction (Model 0.3). Adding the relationships is theoretically sound; propensity to trust is a stable characteristic that may impact one’s perceptions even after an interaction with the entity to be trusted has taken place. Even though it is expected that propensity to trust would impact post-interaction perceptions, its impact should be smaller compared to its impact on pre-interaction perceptions. The overall fit of the model was slightly better, χ^{2}'=742.30, df'=101, p<.01, TLI=.81, GFI=.88, RMSEA=.21, PGFI=.51, AIC=934.30 (Table 7, Model 0.3). This final interpersonal trust model was retained.

Next, the path coefficients of the model were examined. All standardized path coefficients are presented in Table 9. Propensity to trust people had a positive relationship with the three trustworthiness characteristics, which in turn had significant relationships with pre-interaction trust. There were no significant relationships between the four collaboration behaviors, measured by the future, affect, assent, questions variables, and pre-interaction trust. Similarly, perceived risk was not related to any of the collaboration measures. None of the collaboration variables predicted dyadic performance after controlling for individual performance. Dyad performance, in turn had positive relationships with post-interaction ability and benevolence, but not integrity. All three post-interaction trustworthiness characteristics were positively related to post-interaction trust. The final interpersonal trust model is depicted in Figure 12.

Model 1 – augmented interpersonal trust and trust in technology model (no relationships between the two trust concepts - Figure 8).

Model 1 integrates trust in technology in the final interpersonal trust model, Model 0.3. The model captures the relationships between interpersonal trust, trust in technology, collaboration, and performance. It contained the following variables – propensity to trust people, propensity to trust technology, ability pre-collaboration, benevolence pre-collaboration, integrity pre-collaboration, trust pre-collaboration, reliability pre-collaboration, functionality pre-collaboration, helpfulness pre-collaboration, perceived risk, affect, questions, assent, future, dyad performance, ability post-collaboration, benevolence post-collaboration, integrity post-collaboration, trust post-collaboration, reliability post-collaboration, functionality post-collaboration, and helpfulness post-collaboration. Model 1 posits that propensity to trust technology predicts each of the three components of trust in technology. In turn, trust in technology impacts collaboration behaviors that impact dyad performance. Dyad performance then determines post-interaction trust in technology. The pre-collaboration trust in technology concepts were allowed to covary with each other as were the post-collaboration ones. The paths between the interpersonal trust constructs were the same as in Model 0.3. In this model, no relationship between interpersonal trust and trust in technology was specified. The overall model had a poor fit, $\chi^{2\prime}$=4410.06, df'=338, $p<.01$, TLI=.68, GFI=.76, RMSEA=.29, PGFI=.55, AIC=4738.06 (Table 7, Model 1). Propensity to trust people had a positive relationship with the three trustworthiness characteristics. In turn, ability, benevolence, and integrity predicted pre-interaction trust. As anticipated, propensity to trust technology had a positive relationship with reliability, functionality, and helpfulness. Pre-interaction trust and risk did not predict any of the four collaboration variables. From the trust in technology constructs, reliability, functionality, and helpfulness pre-collaboration predicted the affect and future variables. None of the collaboration variables predicted dyadic performance after controlling for individual performance. Dyad performance, in turn had positive relationships with post-interaction ability and benevolence, but not integrity, and a negative relationship with post-interaction reliability and helpfulness, but not functionality. All three post-interaction trustworthiness characteristics were positively related to post-interaction trust. See Figure 13 for a graphical representation of the model and Table 10 for all path coefficient estimates.

Model 2 - augmented interpersonal trust and trust in technology model (trust in technology impacts interpersonal trust – Figure 9).

For Model 2, additional paths were included capturing the relationship between the trust in technology constructs and interpersonal trust, where interpersonal trust was regressed on reliability, functionality, and helpfulness at both the pre-collaboration and post-collaboration measurement points. Adding the paths did not improve the fit of the model, $\chi^{2'}$=4418.90, df'=344, p<.01, TLI=.69, GFI=.76, RMSEA=.29, PGFI=.55, AIC=47834.90 (Table 8, Model 2) , χ^2_{diff}=8.84, df=6, p=.06. None of the paths that were added, from trust in technology to interpersonal trust, were significant at either measurement points, pre- and post-collaboration, $\beta_{rpre->tpre}$=.01 (s.e.=.08), t=.08, p>.05; $\beta_{hpre->tpre}$=-.05 (s.e.=.06), t=-.92, p>.05; $\beta_{fpre->tpre}$=.02 (s.e.=.08), t=.21, p>.05; $\beta_{rpost->tpost}$=-.09 (s.e.=.09), t=-1.00, p>.05; $\beta_{hpost->tpost}$=-.01 (s.e.=.05), t=-.18, p>.05; $\beta_{fpost->tpost}$=.07 (s.e.=.10), t=.69, p>.05. For all path coefficients refer to Table 11. A graphical representation of the model is presented in Figure 14.

Model 3 - augmented interpersonal trust and trust in technology model (interpersonal trust impacts trust in technology – Figure 10).

Similarly to Model 2, Model 3 integrated trust in technology in the interpersonal trust model. In Model 3, trust in technology was regressed on interpersonal trust at both measurement instances. All other paths were kept the same as in Model 2. Model 3 fit the data significantly better than Model 1, $\chi^{2'}$=4089.39, df'=344, p<.01, TLI=.71, GFI=.78, RMSEA=.28, PGFI=.57, AIC=4405.39, χ^2_{diff}=320.67, df=6, p<.01 (Table 8, Model 3). The paths from interpersonal trust to trust in technology were significantly different than zero for all three aspects of trust in technology at both pre- and post-collaboration, $\beta_{tpre->rpre}$=.14 (s.e.=.02), t=6.93, p<.05; $\beta_{tpre->hpre}$=.08 (s.e.=.02), t=4.46, p<.05; $\beta_{tpre->fpre}$=.10 (s.e.=.02), t=4.56, p<.05; $\beta_{tpost->rpost}$=0.24

(s.e.=.02), t=15.02, $p<.05$; $\beta_{tpost->hpost}$=0.20 (s.e.=.02), t=13.92, $p<.05$; $\beta_{tpost->fpost}$=0.25 (s.e.=.02), t=17.18, $p<.05$. Table 12 contains all path coefficients in Model 3. A graphical representation of the model is presented in Figure 15.

Hypothesis Testing

In addition to the above-discussed model, 13 hypotheses were proposed. Hypothesis 1 examined the relationship between propensity to trust people, trustworthiness characteristics, and trust. H1a stated that propensity to trust people would be positively related to trust in people. To test the hypothesis, the path from propensity to trust to interpersonal trust was examined in the final augmented trust model, Model 3. The path was not significantly different than zero, $\beta_{prpp->tpre}$=-.03 (s.e.=.07), t=-.41, $p>.05$ (Table 12), thus the null hypothesis was accepted.

> H1a: Propensity to trust people will be positively related to trust in people. – Accept H_0/Reject H1a

Hypothesis 1b examined the relationship between propensity to trust people and trustworthiness beliefs. It stated that the relationship between trustworthiness and trust would be moderated by propensity to trust people. To test the hypothesis, three interaction variables in Model 0 were examined, one for each trustworthiness characteristic. All path coefficients for Model 0 are presented in Table 8. The paths from each interaction variable to trust were not significantly different than zero, $\beta_{prpp*apre->tpre}$=.04 (s.e.=.07), t=.56, $p<.05$; $\beta_{prpp*bpre->tpre}$=-.05 (s.e.=.10), t=-.51, $p>.05$; $\beta_{prpp*ipre->tpre}$=-.06 (s.e.=.10), t=-.56, $p>.05$, therefore the null hypothesis was accepted and hypothesis 1b was rejected. Further analyses suggested that the relationship between propensity to trust people and interpersonal trust is mediated through trustworthiness perceptions, namely ability, benevolence, and integrity.

H1b: Propensity to trust people will moderate the relationship between trustworthiness beliefs and trust in people. – Accept H_0/Reject H1b

Hypothesis 2 examined the relationship between propensity to trust technology and the three components comprising trust in technology, reliability, functionality, and helpfulness. It was hypothesized that propensity to trust technology was positively related to the three components. The hypothesis was tested by examining the structural paths in Model 3 from propensity to trust technology to reliability, functionality, and, helpfulness, respectively (Table 12). The three paths were significantly different than zero, $\beta_{prtx\text{->}rpre}$=.41 (s.e.=.03), t=16.37, p<.05; $\beta_{prtx\text{->}fpre}$=.36 (s.e.=.03), t=12.24, p<.05; $\beta_{prtx\text{->}hpre}$=.34 (s.e.=.02), t=15.95, p<.05, failing to accept the null hypothesis.

H2: Propensity to trust technology will be positively related to trust in technology. – Reject H_0/Support for H2

Hypothesis 3 examined the relationship between trust in technology and interpersonal trust. To test the hypothesis, the paths between interpersonal trust and reliability, functionality, and helpfulness in Model 3 were examined (Table 12). All pre- and post-collaboration paths were significantly different than zero , $\beta_{tpre\text{->}rpre}$=0.14 (s.e.=.02), t=6.93, p<.05; $\beta_{tpre\text{->}hpre}$=0.08 (s.e.=.02), t=4.56, p<.05; $\beta_{tpre\text{->}fpre}$=0.10 (s.e.=.02), t=4.08, p<.05; $\beta_{tpost\text{->}rpost}$=0.24 (s.e.=.02), t=15.02, p<.05; $\beta_{tpost\text{->}hpost}$=0.20 (s.e.=.02), t=13.92, p<.05; $\beta_{tpost\text{->}fpost}$=0.25 (s.e.=.02), t=17.18, p<.05.

H3: Trust in people will be related to trust in technology. – Reject H_0/Support for H3

Hypotheses 4a and 4b tested the relationship between interpersonal trust and trust in technology further. The two hypotheses were tested on the level of the individual using a multivariate analysis of variance (MANOVA; Tabachnick & Fidell, 2007). To isolate the effect of the manipulation, the MANOVA was performed with all pre-collaboration measures. Hypothesis 4a posited that trust in people would impact trust in technology such that there would be a difference in reliability, functionality and helpfulness perceptions between conditions 1 (high trust in people, high trust in technology) and condition 3 (low trust in people, high trust in technology), and conditions 2 (high trust in people, low trust in technology) and condition 4 (low trust in people, low trust in technology). Hypothesis 4b on the other hand put forth that trust in technology would impact trust in people, such that there would be a difference in ability, benevolence, integrity, and trust between condition 1 (high trust in people, high trust in technology) and condition 2 (high trust in people, low trust in technology), and between condition 3 (low trust in people, high trust in technology) and condition 4 (low trust in people, low trust in technology). A between-subject MANOVA was performed on seven dependent variables - pre-collaboration ability, benevolence, integrity, trust, reliability, functionality and helpfulness. The independent variable was the condition that each dyad was in. The combined dependent variables were significantly affected by the condition variable, $F(41, 468)=7.37$, Pillai's trace =.75, partial η^2=.25. Next, the individual ANOVA models for each dependent variable were examined. The F statistics and df were adjusted to account for nonindependence of the observations. The following adjustments were made:

$$F' = F\left(\frac{1 - \frac{2r_I}{n-2}}{1 + r_I}\right)$$

and

$$df' = \frac{(n-2-2r_I)^2}{n\,(1-r_I^2)-2(1+r_I)^2}$$

where F is the original F statistic reported by the ANOVA, r_I is the interperson correlation, and n is the number of individuals in the study (DeCoster, 2002). Both the original and adjusted F statistics are available in Table 13.

Condition had a significant effect on all seven variables, Ability pre-collaboration, F(3, 171.34)=18.66, p<.001, partial η^2=.30; Benevolence pre-collaboration, F(3, 164.86)=23.77, p<.001, partial η^2=.34; Integrity pre-collaboration, F(3, 162.42)=19.01, p<.001, partial η^2=.27; trust pre-collaboration, F(3, 163.07)=19.01, p<.001, partial η^2=.28; Reliability pre-collaboration, F(3, 163.07)=20.32, p<.001, partial η^2=.26; functionality pre-collaboration, F(3, 167.54)=24.14, p<.001, partial η^2=.27; helpfulness pre-collaboration, F(3, 164.85)=28.43, p<.001, partial η^2=.32. A subsequent Bonferroni post-hoc analyses were performed to examine the differences between the four conditions. Table 14 presents the means and standard deviations for the seven variables in each of the four conditions. First, the differences between the four conditions for reliability, functionality, and helpfulness were examined. For reliability, functionality, and helpfulness, there were significant differences between all conditions, except between conditions 1 (high people, high technology) and 3 (low people, high technology). There was an effect of interpersonal trust only for the low trust in technology conditions, as indicated by the differences between conditions 2 and 4 for the trust in technology variables, thus partially supporting hypothesis 4a. These findings suggest that interpersonal trust impacts trust in technology only when there is initial low trust in technology.

For ability, benevolence, integrity, and trust, there were significant differences between condition 1 and conditions 3 and 4, and condition 2 and conditions 3 and 4. The results point to a significant effect for the manipulation, the two conditions with high trust in people characteristics had significantly higher means for ability, benevolence, integrity, and trust than the two conditions with the low trust in people characteristics. However, the hypothesized differences in interpersonal trust due to technology, conditions 1 and 2 and conditions 3 and 4, were not significant, thus hypothesis 4b was rejected.

> H4a: Trust in people impacts trust in technology, such that there will be a significant difference in trust in technology ratings between condition 1 and condition 3, and condition 2 and condition 4. – Reject H_0/Partial support for H4a
>
> H4b: Trust in technology impacts trust in people, such that there will be a significant difference in trust in people ratings between condition 1 and condition 2, and condition 3 and condition 4. – Accept H_0/Reject H4b

To test hypotheses 5 through 8, intentions to continue the collaboration and intentions to use the technology again were added to the final technology enhanced model, Model 3. The two intentions variables were added as outcomes of post-interaction interpersonal trust and trust in technology. The model did not fit the data well, χ^2=4803.50, df=479, p<.01, TLI=.73, GFI=.78, RMSEA=.25, PGFI=.60, AIC=5147.50 (Table 7, Model 3i). The paths between the constructs of interest were examined to test the hypothesized relationships.

Hypothesis 5 stated that trust in technology would be positively related to intentions to use technology in the future. The paths between the three components of trust in technology and intentions to continue to use the technology were examined. All path coefficients for the model are summarized in Table 15. Two of the three paths were significantly different than zero in the expected direction, $\beta_{rpost\text{->}inttx}$=.44 (s.e.=.05), t=9.16, p<.05, $\beta_{fpost\text{->}inttx}$=-.05 (s.e.=.05), t=-1.02, p>.05, $\beta_{hpost\text{->}inttx}$=.24 (s.e.=.03), t=8.89, p<.05, providing partial support for H5.

> H5: Trust in technology will be positively related to intentions to continue to use the technology. – Reject H_0/Partial support for H5

Hypothesis 6 posited that interpersonal trust would be related to intentions to continue the collaboration. The path coefficient between interpersonal trust and intent to continue the interaction was examined. The path was significantly different from zero, $\beta_{tpost\text{->}intppl}$=.54 (s.e.=.02), t=45.64, p<.05, providing support for hypothesis 6.

> H6: Trust in people will be positively related to intentions to continue the interpersonal collaboration. – Reject H_0/Support for H6

Hypothesis 7 stated that trust in technology would be positively related to intentions to continue the interaction in the future. The path coefficients between the three components of trust in technology and intentions to continue the interaction were examined. Only reliability had a significant relationship with intent to continue the interaction, $\beta_{rpost\text{->}intppl}$=.24 (s.e.=.04), t=5.64, p<.05, $\beta_{fpost\text{-.}intppl}$=.-04 (s.e.=.04), t=-.87, p>.05, $\beta_{hpost\text{->}intppl}$=.04 (s.e.=.02), t=1.72, p<.05, providing partial support for H7.

> H7: Trust in technology will be positively related to intentions to continue the collaboration. – Reject H_0/Partial support for H7

Hypothesis 8 stated that trust in people would be positively related to intentions to use technology in the future. The path coefficient between the trust in people and intentions to use the technology was examined. The path coefficient was significantly different than zero, β=.38 (s.e.=.03), t=20.85, p<.05, thus the null hypothesis was rejected.

H8: Trust in people will be positively related to intentions to continue to use the technology. – Reject H_0/Support for H8

Hypothesis 9 stated that interpersonal trust would have a positive relationship with collaborative behaviors. The hypothesis was tested by examining the path coefficients in Model 3 from interpersonal trust to the four collaboration variables extracted from the chat logs – assent, affect, questions, and future (Table 12). None of the paths were significantly different than zero, $\beta_{tpre\text{->}asnt}$=.00 (s.e.=.09), t=.03, p>.05; $\beta_{tpre\text{->}aff}$=-.02 (s.e.=.09), t=-.18, p>.05; $\beta_{tpre\text{->}qmark}$=-.02 (s.e.=.12), t=-.13, p>.05; $\beta_{tpre\text{->}ftr}$=.04 (s.e.=.08), t=0.46, p>.05, thus the null hypothesis was accepted.

H9: Trust in people will be positively related to collaborative behaviors. – Accept H_0/Reject H9.

Hypothesis 10 stated that trust in technology would have a positive relationship with collaborative behaviors. The hypothesis was tested by examining the path coefficients in Model 3 from the three trust in technology variables to the four collaboration variables extracted from the chat logs – assent, affect, questions, and future. The paths from both functionality and helpfulness to affect and future were significantly different than zero and in the anticipated direction as well as the path from reliability to affect, $\beta_{rpre\text{->}asnt}$=-0.06 (s.e.=.14), t=-.46, p>.05; $\beta_{rpre\text{->}aff}$=.14 (s.e.=.04), t=3.29, p<.05; $\beta_{rpre\text{->}qmark}$=-.11 (s.e.=.07), t=-1.56, p>.05; $\beta_{rpre\text{->}ftr}$=-.45 (s.e.=.09), t=-4.97, p<.05; $\beta_{fpre\text{->}asnt}$=.13 (s.e.=.12), t=1.12, p>.05; $\beta_{fpre\text{->}aff}$= .11 (s.e.=.03), t=3.45, p<.05; $\beta_{fpre\text{->}qmark}$=.08 (s.e.=.18), t=.46, p>.05; $\beta_{fpre\text{->}ftr}$=.16 (s.e.=.03), t=4.69, p<.05; $\beta_{hpre\text{->}asnt}$=.10 (s.e.=.18), t=.55, p>.05; $\beta_{hpre\text{->}aff}$= .06 (s.e.=.02), t=2.56, p<.05; $\beta_{hpre\text{->}qmark}$=.25 (s.e.=.22), t=1.12, p>.05; $\beta_{hpre\text{->}ftr}$= .19 (s.e.=.03), t=6.27, p<.05 providing partial support for hypothesis 10.

H10: Trust in technology will be positively related to collaborative behaviors. – Reject H_0/Partial support for H10.

Hypothesis 13 stated that the augmented trust model (Model 3) would explain more variance in risk-taking behaviors than the interpersonal trust model (Model 0.3). To test the hypothesis, the variance explained for each of the four collaboration variables by the two models was examined. The amount of variance explained was obtained from the Mplus output for each model. The augmented model explained slightly more variance only for the future variable - future R^2o=.003, R^2a=.016; affect R^2o=.004, R^2a=.010; assent R^2o=.00, R^2a=.003; questions R^2o=.00, R^2a=.004, thus the null hypothesis was accepted.

H13: The augmented trust model (Figure 8) will explain more variance in risk-taking behaviors than the original trust model (Figure 7). –Accept H_0/Reject H13.

Hypothesis 11 stated that interpersonal trust would be positively related to communication frequency and information disclosure. Communication frequency was defined by the word count variable captured by LIWC. The variable captures the numbers of words LIWC detects in the text to be analyzed. Information disclosure was defined by the personal concerns LIWC category. The personal concerns category consists of seven LIWC variables – *work*, *achievement*, *leisure*, *home*, *money*, *religion*, and *death* (Pennebaker et al., 2007). An overall personal concerns variable was computed by summing up the seven individual variables. The dyadic correlations between trust and, word count and personal concerns, were examined by fitting a dyadic model. Both the pre-collaboration and post-collaboration correlations were examined. Neither the correlations with word count nor personal concerns were significant, $r_{tpre-wc}$=.06 (s.e.=.05), t=1.33, p>.05, and $r_{tpost-wc}$=-.10 (s.e.=.05), t=-1.95, p>.05; $r_{tpre-pers}$=.01 (s.e.=.05), t=.28, p>.05, and $r_{tpost\text{-}pers}$=.07 (s.e.=.05), t=1.27, p>.05 therefore the null hypothesis was accepted.

> H11: Interpersonal trust will be positively related to communication behaviors, namely communication frequency and information disclosure. – Accept H_0/Reject H11

Hypothesis 12 stated that trust in technology would be positively related to communication frequency and information disclosure. The dyadic correlation between each of the three components of trust in technology, and word count and personal concerns were examined pre- and post-interaction. None of the correlations were different than zero, $r_{rpre\text{-}wc}$=-.06 (s.e.=.05), t=-1.30, p>.05; $r_{fpre\text{-}wc}$=-.02 (s.e.=.07), t=-.31, p>.05; $r_{hpre\text{-}wc}$=.03 (s.e.=.03), t=.92, p>.05; $r_{rpost\text{-}wc}$=.01 (s.e.=.04), t=.13, p>.05; $r_{fpost\text{-}wc}$=.06 (s.e.=.04), t=1.51, p>.05; $r_{hpost\text{-}wc}$=-.002 (s.e.=.02), t=-.10, p>.05; $r_{rpre\text{-}pers}$=-.02 (s.e.=.05), t=-.36, p>.05; $r_{fpre\text{-}pers}$=.00 (s.e.=.07), t=.00, p>.05; $r_{hpre\text{-}pers}$=.01 (s.e.=.03), t=.31, p>.05; $r_{rpost\text{-}pers}$=.02 (s.e.=.04), t=-0.45, p>.05; $r_{fpost\text{-}pers}$=-.04 (s.e.=.04), t=-1.02, p>.05; $r_{hpost\text{-}pers}$=.03 (s.e.=.02), t=1.33, p>.05, therefore the null hypothesis was accepted.

> H12: Trust in technology will be positively related to communication behaviors, namely communication frequency and information disclosure.- Accept H_0/Reject H12

In summary, the results from this study suggest that interpersonal trust and trust in technology are related to each other. More specifically, interpersonal trust had a positive impact on trust in technology during a technology-mediated interpersonal interaction. Additionally, interpersonal trust and trust in technology had unique relationships with collaborative behaviors. None of the relationships between interpersonal trust and the four collaborative behaviors were significant, while trust in technology had significant relationships with two of the collaborative behaviors – *assent* and *future*. Both types of trust were related to intent to continue the collaboration with the individual and intent to use the technology in the future. Interestingly, neither interpersonal trust nor trust in technology had significant relationships with communication frequency and information disclosure.

CHAPTER 5: DISCUSSION

The current study had two specific goals; first, to examine the relationship between interpersonal trust and trust in technology during a technology-mediated interpersonal interaction, and second, to examine the potential unique effects that interpersonal trust and trust in technology have on collaboration, communication, and ultimately performance.

Using technology to facilitate and enable communication has continued to become more commonplace. People use technology to interact and achieve specific outcomes in both their personal and professional lives. During a technology-mediated communication, a person simultaneously interacts with two entities, a human agent and a technology agent. Understanding how attitudes about these two entities relate to each other and impact intentions and behaviors can help in designing systems and interactions that maximize desired outcomes.

Technology-mediated interactions are especially relevant to organizations. These interactions can take place during any stage of the employment cycle with the organization and can involve both employees and customers. For instance, during the recruitment and selection processes, potential employees often communicate with organizational representatives through technology. Job interviews using technologies such as Skype, Google Hangout, and GoToMeeting are becoming increasingly popular. The attitudes developed based on interactions with both the organizational representative and the technology can potentially determine whether an applicant is selected for the job as well as whether an applicant chooses to take the job at a particular organization. Once an individual is an employee of the organization, she may have to collaborate through technology with team members who are not collocated. The efficacy of those interactions can determine the success of the organization. Moreover, organizational representatives and customers often communicate through technology to satisfy customer needs. These interactions can determine the customer's satisfaction with the product and the company, ultimately determining whether the customer continues their interaction with the organization or not--which impacts financial performance. These technology-mediated interactions transcend industries and cultural boundaries, making it that much more important they be understood.

The first goal of the present study was to examine the relationship between interpersonal trust and trust in technology. To examine this relationship, the interpersonal trust model developed by Mayer and colleagues (1995) was augmented by including perceptions of trust in technology. Three competing augmented trust models were tested. The first model specified no relationship between interpersonal trust and trust in technology (Figure 13). The other two models specified relationships between the two constructs in opposite directions. Model 2 (Figure 14) specified a relationship from trust in technology to interpersonal trust, while Model 3 (Figure 15) specified a relationship from interpersonal trust to trust in technology.

Before testing the three competing augmented models, the original interpersonal trust model was examined. The model as specified by Mayer et al. (1995) fit the data poorly and was thus modified. The main adjustment to the model involved the removal of the anticipated moderation effects of propensity to trust and perceived risk on several of the relationships. Additionally, the data that suggest trustworthiness characteristics, ability, benevolence, and integrity, mediate the relationship between propensity to trust and interpersonal trust. This mediated relationship is not surprising; one's propensity to trust coupled with the information that they have about the trustee would determine perceptions of ability, benevolence, and integrity; which in turn would impact trust. Indeed Aubert and Kelsey (2003) observed similar results when examining the antecedents of trust in virtual and collocated teams over time. They studied the development of interpersonal trust in both collocated and distributed team members over a 3-month time period. Trust was measured in the beginning of the collaboration and at the end. The results from the study suggest that during the early stages of an interaction, propensity to trust does not have a direct relationship with trust for either collocated or distributed team members. There was, however, a direct relationship between propensity to trust and interpersonal trust in the end of the collaboration for the distributed team members, but not for the collocated ones. Aubert and Kelsey argue that limited knowledge of the trustee during the early stages of the interaction might explain the lack of relationship early on. This justification, however, does not explain the findings during the second trust assessment. Research suggests that due to the quality of the communication cues and the lack of information interactions, members of virtual teams obtain less information about one another compared to collocated members in the same amount of time (Rusman et al., 2010). Therefore, if knowledge about the trustee is what drives the relationship between propensity to trust and interpersonal trust, then the propensity-trust relationship should either be similar, if not stronger in collocated teams than in virtual teams. However, that is not the case; Aubert and Kelsey (2003) demonstrated the opposite, the propensity-trust relationship was present for virtual team members post-collaboration but not for collocated ones.

A potential alternative explanation for the lack of a direct relationship between propensity to trust and interpersonal trust is that the presence of information necessary to make a trustworthiness assessment diminishes the role of propensity to trust. If there is no information to make a trustworthiness assessment, the trustor's general predisposition is more likely to be a contributing factor to the trust assessment. As soon as relevant information is obtained, however, the role of predisposition to trust becomes less relevant and its effect is minimized. In this study, participants were provided with relevant information to make a trustworthiness assessment through the manipulation scenarios (see Appendix B for scenarios). Because of this information, participants were able to make a trustworthiness assessment and base their trust judgement on information relevant to the perceived ability, benevolence, and integrity of the trustee.

The moderating role of perceived risk on the trust-collaboration relationship was also not supported. Generally, participants deemed technology-mediated interactions to be relatively low risk, as indicated by the low overall mean for risk (M=3.77 on a 7-point scale). Additionally, perceived risk did not have a direct association with any of the variables of interest. The limited variability in risk perceptions may be impacting the relationships between the observed variables.

Once the interpersonal trust model was finalized, the three competing augmented models were tested. For the three models, all relationships between variables were kept the same except for the linkage between interpersonal trust and trust in technology. Based on the analyses, Model 3 (Figure 15) fit the data best. The model specified that interpersonal trust impacted trust in technology perceptions. In turn, trust in technology perceptions impacted collaboration behaviors. Similar to the interpersonal model, in the augmented trust model propensity to trust people impacted trust through the trustworthiness characteristics of ability, benevolence and integrity. Trust in technology mirrored that pattern; propensity to trust technology impacted functionality, reliability, and helpfulness perceptions which comprise the trust in technology concept. Interpersonal trust did not have a direct relationship with any of the collaboration behaviors, while trust in technology had an impact on two of the collaboration variables – *future* and *affect*. Additionally, the collaboration behaviors did not have a relationship with performance. Performance, however, impacted post-collaboration ability, benevolence, reliability, and helpfulness perceptions. The relationship between interpersonal trust and trust in technology post-collaboration mirrored the relationship pre-collaboration, with interpersonal trust impacting trust in technology.

Taken together, these findings suggest that interpersonal trust and trust in technology are related to each other, with interpersonal trust positively impacting trust in technology. It appears that the interpersonal trust-collaboration relationship is mediated through trust in technology. Interestingly, there was no relationship between collaborative behaviors and task performance. Some potential explanations and further examination of the relationship are examined in the next section. Performance had an impact on both post-interaction interpersonal trust and trust in technology, supporting the dynamic nature of trust development. The presence of the interpersonal trust-trust in technology relationship both before and after the interaction further supports the notion that the two constructs are related to each other, and suggests that the relationship may be consistent over time.

Collaboration and performance

One potential explanation for the lack of relationship between collaborative behaviors and performance is the nature of the dyad and the task itself – these were short-term dyads focused on a short-term task. According to the temporal framework of teams and tasks proposed by Bradley, White, and Mennecke (2003), task knowledge is more relevant and important for task performance than interpersonal skills and processes when teams are formed for a short term and a short task. The limited amount of time, coupled with the expectation that team members would not work together in the future, encourages team members to focus resources on the task at hand and divert resources from building cohesive team norms.

Because dyad members were focused on the task, de-emphasizing the importance of interpersonal processes, they may not have fully realized the gains of working together, as suggested by the lack of difference between individual and group performance. Research suggests that when individuals work together they engage in behaviors which can lead to process gains or process loss (Hall & Williams, 1970). Process loss is observed when the individual outperforms the group; the group generates fewer ideas, exerts less effort, or produces a lower quality solution compared to what each group member can deliver on his/her own. Process gain, on the other hand, takes place when the group outperforms each individual; the group produces more ideas, exerts greater effort, or generates a better solution than each individual can on his/her own (Johnson & Johnson, 2009).

To gain a deeper understanding of the relationships between collaboration and performance, the dyads were separated into two groups – effective dyads (process gain dyads, where the dyad outperformed the average individual performance of each member) and ineffective dyads (process loss dyads, where the dyad did not outperform the average individual performance of the dyad's members). Process gain/loss was based on the difference between the average individual performance of dyad members and the dyad performance. Dyads that demonstrated process gains (N=37) performed significantly better than those that demonstrated process loss (N=41), $t(76)=5.89$, $p<.001$, $M_{gain} = 47.68$, $M_{loss}= 56.02$. There were no significant differences for the four collaboration variables.

I further examined the relationships between the four collaboration variables and performance for the two groups by examining the correlations between the collaboration variables and dyad performance. The correlations are presented in Table 16. The relationships for the progress gains dyads were not significant. However, for the process loss dyads, the relationship between *assent* and dyad performance was statistically significant, r=.49, p<.01. This positive relationship suggests that a greater degree of agreement was associated with a higher task score and thus a lower quality solution. Even though in this work the *assent* variable was an indicator of the conflict management process, a greater degree of agreement may also be an indicator of social conformity and groupthink, which have been shown to have a damaging impact on group performance (Johnson & Johnson, 2009). Indeed, given the operationalization of *assent*, the negative effect on dyad performance makes sense. The *assent* variable captures the percentage of words that the dyad members exchanged indicating agreement with each other. Greater use of agreement words relative to other words can point to lack of back-and-forth discussion and potential disengagement from the task, which can lead to lower quality solutions.

These findings suggest that the four collaboration processes that were of examined in this work did not influence performance for dyads were effective as indicated by process gains. However, for dyads that were ineffective as indicated by process loss, the verbal expression of agreement was associated with worse performance. This highlights the complexity of collaboration and interpersonal processes and the notion that different processes may be associated with successful and unsuccessful performance.

Interpersonal Trust and Trust in Technology

Results from this study support the notion that interpersonal trust influences trust in technology. The positive effect of interpersonal trust on trust in technology is notably smaller than the effect of propensity to trust technology, but it is clearly present. Earlier findings concerning the transfer of trust between entities within a system can help explain these findings.

Ross (2008) experimentally tested transfer of trust across different components of the same system. Results from that study indicated greater transfer across human agents compared to automated agents. For example, if a person trusts a salesperson in a particular store, she is more likely to trust another salesperson in the same store. Both salespeople are human agents within the same system, with trust transfer being greater across human agents. On the other hand, if a person trusts an ATM in a particular bank where there are five ATM, she is not necessarily more likely to experience the same level of trust in one of the other four ATMs. Even though the machines are a part of the overall system, the transfer of trust across automated agents within the system is not as strong as it is across human agents.

The present study took the findings from Ross (2008) further, and examined the transfer of trust between the human and automated elements in the same system. Similarly to Ross's results, here the transfer of trust is greater from the human element to the technology one than from the technology one to the human one.

These findings also help generalize the results obtained by Montague and Asan (2012). They observed that patient trust in one's healthcare provider and trust in medical technology is determined by the patient's trust in the healthcare provider's use of the technology. A possible explanation is that trust in the provider's use of the technology could be considered a trustworthiness signal of ability, as in "Does my doctor have the competence to use this technology?". This ability cue is then used to make a trusting judgement about both the healthcare professional and the technology. A patient can trust that her doctor is using the medical devise properly, therefore she trust her doctor and the medical devise. The findings in the current study help bring clearer understanding of the relationship between trust in the human entity and the technological one. If we assume that trust in the doctor's use of a devise is an ability trustworthiness cue, then based on that cue, a patient is more likely to trust her doctor, and thus the devise her doctor wants her to use.

The link between interpersonal trust and trust in technology also help provide further empirical support for the widely-recommended practice of ensuring that virtual team members initially interact face-to-face in order to build up initial interpersonal trust (Jarvenpaa & Leidner, 1999; Wilson et al., 2006; Hill et al., 2009). Researchers have recommended that if people are to work together virtually, especially for a short amount of time, an initial face-to-face interaction can be helpful in building trust. This initial face-to-face interaction allows participants to obtain more information about each other, because the interaction is quite rich in terms of communication cues. This greater access to information during a face-to-face interaction allows for faster development of initial trust. Since there is greater transfer of trust from the human entity to the technological one when they are in the same systems, this higher level of interpersonal trust can help facilitate trust in technology. In turn, trust in technology can support collaborative behaviors.

These results can also explain why the relationship between interpersonal trust and collaboration and/or performance is not always observed. Prior research examining the relationship between interpersonal trust and performance in short-term distributed teams has revealed similar findings; for teams that have not operated together for a long time, and have no anticipation to work together in the future, interpersonal trust is not required for effective performance (Aubert & Kelsey, 2003; Pavlova, Coovert, & Bennett, 2012). Findings from Hill et al. (2009) further support this notion. Exploratory results from their work suggest no relationship between trust and transition processes. Hill and colleagues concluded that interpersonal processes could be indicative of trust, with greater instances of behaviors indicating interpersonal processes (e.g., conflict management, affect management, and motivation and confidence building) being associated with trust later in the interaction, but not early on. Similarly, findings from de Jong and Elfring (2010) indicated that in ongoing teams interpersonal trust was related to team monitoring and team effort, but not team reflexivity. It is possible that interpersonal trust is necessary for certain collaboration behaviors but not all of them.

Findings from this study suggest that trust in technology might be mediating the relationship between interpersonal trust and collaboration when the interaction is technology-mediated. By focusing only on interpersonal trust, researchers may have been missing an important part of the process. Indeed, during a technology-mediated interaction, trust in technology is especially important. If the participants in the interaction perceive the technology as unreliable, deficient of functionality, and lacking support, they might be more likely to devote additional resources to addressing the technology issues which in turn would divert resources from the actual task at hand, resulting in diminished collaboration and suboptimal performance.

Relationships with Outcomes

The second goal of this study was to examine the different impact that interpersonal trust and trust in technology may have on certain outcomes of interest such as collaboration, communication, and intentions. I now consider each one of these in turn.

Collaboration.

Collaboration behaviors were examined through four unique variables – *future*, *questions*, *affect*, and *assent*. Each variable represents a collaborative behavior from the Marks et al. (2001) team process taxonomy – strategy formulation and planning, coordination, conflict management, and affect management, respectively. Findings from this study suggest that interpersonal trust and trust in technology have different impact on collaboration behaviors, in particular affect management (measured through the *affect* variable) and strategy formulation and planning (measured through the *future* variable). Interpersonal trust did not have a relationship with these behaviors, while all three components of trust in technology, reliability, functionality, and helpfulness, had significant, although relatively weak, relationships with each collaboration behavior. All relationships were in the expected, positive, direction except for reliability-future, which was negative. The data suggest that participants who perceived the technology to be less reliable are more likely to engage in strategy formulation and planning behaviors. One possible explanation for this relationship is that those who perceived the technology to be less reliable expected that the tool might break down. To ensure successful task completion in case the technology malfunctioned, these dyads may have engaged in more planning. Future research should explore this further.

Communication.

Two specific aspects of communication were examined – communication frequency and information disclosure. Communication frequency was assessed by examining the volume of communication (total number of words) exchanged between the partners during the interaction. Information disclosure was assessed by examining the non-task non-relevant information that was exchanged. Communication is especially important during technology-mediated interactions. Since there are few, if any, contextual cues, explicit communication is the primary way for the participants in the interaction to exchange both task relevant and task non-relevant information. Greater communication frequency may increase the likelihood of exchanging information necessary to make a trustworthiness assessment (McAllister, 1995), which can in turn impact trust.

I found no relationships between communication behaviors and interpersonal trust or trust in technology. These findings suggest that the amount of information being shared might not be an appropriate proxy for communication content. The interaction in this study was relatively brief (20 minutes) thus the participants may not have had sufficient opportunity to communicate as extensively as they might have had they not had the time constraint. Additionally, due to the limited time available for task completion the participants may not have had the opportunity to share any information that was not task relevant. According to both Social Information Processing Theory (Walther, 1992) and Time Interaction and Performance Theory (McGrath, 1991), time is an essential component when it comes to communication and trust development. Given enough time, the participants in a technology-mediated interaction would start sharing task non-relevant information which can facilitate the development of trust over time (McGrath, 2991; Walther, 1992). The time constraints imposed on the interaction in this study may be attenuating the relationships between trust and communication.

The lack of relationships between trust in technology and the communication variables is not entirely surprising. Generally, the content of an interaction focuses on the task at hand; the technology is viewed just as the vehicle utilized to facilitate the interaction. If the technology functions as expected, it would successfully support the communication process. The interactions that took place for this study can be considered to be successful from a technology standpoint - there were virtually no malfunctions, the software supported the task that had to be performed, and help was easily available when needed. This smooth technological functioning allowed the participants to focus on the task at hand and, in a way, disregard the technological aspect while performing.

Intentions.

Two specific intentions were examined – intention to continue the interpersonal interaction in the future and intention to use the technology in the future. Intentions are important as they are good predictors of future behaviors (Ajzen & Fishbein, 1969). Intentions to collaborate again and to continue using the technology are especially relevant to tasks where a one-time interaction may not be sufficient for task completion.

Both interpersonal trust and trust in technology (reliability) were related to intent to continue the collaboration and intent to continue using the technology (Table 15). These findings suggest that not only is trust important in the task currently, but it is also vital when it comes to future interactions. A successful interaction can help bolster both interpersonal trust and trust in technology, which in turn can impact future behavior.

Interestingly, only one of the trust in technology components, reliability, had a significant, positive relationship with intent to continue the interaction. This finding suggests that technology reliability might be more important than helpfulness and functionality when it comes to future collaboration behaviors. One explanation is that with time, issues related to helpfulness (e.g., inability to find instructions on how to do something) might be overcome through learning and/or training. Additionally, a collaboration tool is often chosen for a particular task because it has the functionality necessary to complete the task. The reliability of the tool, however, can be a lot more variable and might be dependent on a number of conditions outside of the user's control (e.g., connection strength, hardware characteristics for each user). This potential inconsistency may be contributing to reliability being a factor of greater importance in terms of intentions than functionality and helpfulness.

Contributions to the Trust Literature

This study makes two unique contributions to the trust literature. First, it empirically establishes the directional relationship between interpersonal trust and trust in technology. Second, it demonstrates that interpersonal trust and trust in technology have unique relationships with collaboration and intentions.

One of the main goals of this study was to examine the relationship between interpersonal trust and trust in technology. During a technology-mediated interaction the participants interact with each other as well as with the technology they are using as the communication medium. Perceptions of both the human and technological entities can have an impact on interaction behaviors. Results from the study indicate that interpersonal trust and trust in technology are related to each other. Moreover the relationship appears to be unidirectional, from interpersonal trust to trust in technology. The relationship is consistent both pre- and post-interaction. This unidirectional relationship is somewhat unexpected given the context of sociotechnical systems theory. According to the theory, only through the joint optimization of the human and technological factors can system outcomes can be improved (Walker et al., 2008). Based on the principles of the theory, there should be a bi-directional relationships between the two trust concepts. The findings from this study suggest the possibility that not all elements within the system contribute equally and directly to successful outcomes. A sociotechnical system consists of people, technology, organizational characteristics, the environment, and the task itself (Montague et al., 2013). Attitudes and characteristics associated with each one of these pieces may have different impact on one another as well as on the overall outcome. This study suggests that interpersonal trust can help drive trust in technology.

The second contribution of this study to the trust literature is the establishment of the different relationships between interpersonal trust and trust in technology and outcomes of interest, in particular collaboration and intentions.

Interpersonal trust is often examined because it is associated with desirable outcomes such as greater information sharing (Jones & George, 1998), collaboration (Smith & Barclay, 1997), and performance (McAllister, 1995; Peters & Karen, 2009). Trust in technology, on the other hand is often associated with deeper exploration of the technology (McKnight et al., 2011), technology adoption (Reid & Levy, 2008), and repeated use (Wu et al., 2010). Understanding how trust in each agent within the system impacts behaviors can help in improving system outcomes.

The present findings indicate that interpersonal trust and trust in technology have a unique impact on both the collaboration behaviors examined here as well as intentions associated with future collaboration and technology use. It is important to note that even though both interpersonal trust and trust in technology are predictive of both types of intent, interpersonal trust has greater impact on both intentions compared to trust in technology (Table 15). This suggests that even though both types of trust are important and necessary for a successful interaction, interpersonal trust is still relatively more important. By fostering interpersonal trust both interpersonal and technology-specific outcomes can be maximized.

Methodological Considerations

To my knowledge, this is one of the few studies in the field of Industrial/Organizational Psychology to utilize computerized text analysis to directly capture specific verbal behaviors during a technology-mediated interaction. Text analysis methodologies are still in a relatively early stage of development, however advances are being made briskly due to developments in information technology.

Methodologically, examination of transcripts from technology-mediated interaction are comparable to direct observations of face-to-face interactions. Both cases directly capture participant behaviors. These transcripts capture the verbal behaviors that each participant exhibits during the interaction. Using text analysis techniques to identify behaviors of interest allows for a quicker, more reliable assessment of behaviors of interest. To my knowledge, this is the first study to attempt to capture the Marks et al.'s (2001) team process taxonomy in such a manner. Because this is a relatively novel approach to studying dyadic behaviors in a technology-mediated environment, there is little available research addressing how certain verbal behaviors map on known psychological concepts. Research focusing on systematic mapping of verbal behaviors to known psychological concepts in different environmental contexts can help establish better measurement. Utilizing this approach across multiple studies can allow for the consistent capture of these behaviors and incremental learnings in the field.

Additionally, this study is the first to apply a dyadic model to examine trust within the dyad. Trust does not occur in vacuum; it requires at least two entities, a trustor and a trustee. Even though the theoretical models focusing on trust have begun integrating characteristics of both the trustor and the trustee (e.g., Mayer et al., 1995), the methodological implementation of those theories have been lacking. Often the process of trust development is examined only from the trustor or the trustee perspectives. Alternatively, if observations from both the trustor and trustee are available, they are often treated as independent observations, ignoring the potential effects resulting from belonging to the same dyad/unit. Dyadic analysis methodologies allow for the integration of both the trustor and the trustee viewpoint in the analysis while accounting for dependence of observations within the dyad, making it quite suitable as a methodology for examining trust and its associated processes.

Implications for Organizations

Technology-mediated interactions are relevant to organizations in a number of contexts, such as selection, training, and customer interactions. Hiring managers and recruiters may be conducting interviews using such technologies as Skype, Google Hangout, and GoToMeeting. Employees may be collaborating on projects with team members who are not in the same location using a number of collaborative tools. Customers may be interacting with organizational representatives to solve an issue. In each of these instances, it is important that the interaction is successful due to its impact on organizational performance.

One main takeaway for organizations from this study is that the use of the appropriate technology for the interaction may be more important than anticipated, especially when the interaction takes place over a short period of time. Technology that is reliable, has the necessary functionality, and allows for support when needed, can help facilitate the interaction. A successful interaction can, in turn, positively impact both interpersonal trust and trust in technology. These findings should be interpreted with caution, however, as they may not generalize to long-term collaborative interactions such as project teams.

The results from this study can also be used to guide technology implementation decisions within an organization. Interpersonal trust plays a central role when it comes to both people- and technology-related intention. If an organization is interested in implementing new collaboration tools for employees, it may be best to introduce these new tools in already established teams where interpersonal trust is high. Employees who already trust each other may be more willing to accept the new technology, which can facilitate tool adoption as well as drive desired behaviors, such as use of the tool, to achieve results.

Lastly, these findings also provide further support for the widely-recommended practice of having a face-to-face interaction before actual technology-mediated collaborations take place (Jarvenpaa & Leidner, 1999; Wilson et al., 2006; Hill et al., 2009). Face-to-face interactions provide an opportunity for the exchange of a greater number of information cues, which can be used to make a more accurate trustworthiness assessment (Rusman et al., 2010). These interactions also allow members to exchange both task relevant and task non-relevant information, which aids in the development of trust (McAllister, 1995). Higher interpersonal trust can then result in greater trust in technology, which in turn helps facilitate collaboration behaviors and future technology adoption behaviors.

Limitations

This study is not without limitations – the task was not particularly high-stakes, the participants formed short-term dyads, and the manipulation involved manipulating perceptions and not actual behaviors. I now consider implications for each of these three limitations.

First, the task utilized for this study was not a high-stakes one. Participants knew that they would receive credit for taking part in the study regardless of their performance. Even though the participants were clearly attentive and engaged to the task at hand, they might not have been sufficiently motivated to perform as best they could on the task. Having participants take part in an activity that is meaningful to them and has meaningful consequences may motivate the participants to work together more closely and perform at a higher level.

Second, this was a one-time activity that did not involve participants working together at a later point. This knowledge that future collaboration is unlikely may have impacted participant behavior. Because there were no long-term consequences associated with the collaboration, the participants might not have been sufficiently motivated to collaborate with one another. Indeed, prior research suggests that high levels of trust are not a prerequisite for effective task performance for one-time project teams (Aubert & Kelsey, 2003). The dyads that participated in this study were together only for the duration of completing the task. There were no expectations that the participants would work together at a later date. It is possible that if the participants were in an environment where future collaborations are more likely, they might have behaved differently.

Third, the manipulation preceding the task was targeted at influencing perceptions about the partner and the technology to be used, but not actual behaviors. During the interaction, participants were allowed to behave as they chose. In most of the cases, both participants were well-meaning, somewhat knowledgeable on the topics related to the task, and willing to work together. Additionally, the technology functioned virtually without fail, help was readily available when needed, and all necessary functionality was supported. Introducing a behavioral manipulation where the partner actually engages in behaviors that impact trustworthiness perceptions, and the technology characteristics vary, can allow for stronger conclusions to be drawn.

Future Research

The focus of this study was to examine the relationship between interpersonal trust and trust in technology and their unique effects on collaboration, communication, and performance. Future research should examine the cross-partner effects within the dyad and their impact on the trust development process. The development of trust requires at least two entities, the trustor and the trustee. Not only is it important to consider the characteristics of both the trustor and the trustee during the interaction, but also how each entity impacts the other during the interaction. The attitudes and behaviors of each party involved in the interaction determine how the interaction progresses. Understanding these cross-partner effects can bring additional clarity regarding how trust develops during technology-mediated interactions. Knowledge of specific partner behavior influencing the interaction as well as the development of trust, can be helpful for team members. By emphasizing these behaviors to people who have to collaborate through technology on a regular basis, managers can facilitate the development of trust within the team.

Future research should also examine the effect that personal characteristics, such as age, have on the development of both interpersonal trust and trust in technology. The sample used in this study was restricted to college students (mean age of the sample was 19.4 years). The participants could be classified as being the so-called digital natives (Prensky, 2001). These are people who have been exposed to information and communication technologies all their lives. As Prensky puts it "Computer games, email, the Internet, cell phones, and instant messaging are an integral part of their lives." (Prensky, 2001, pg. 1). A counterpart to the digital natives are digital immigrants, individuals who were born at a time when information and communication technology did not permeate every aspect of one's live. The experiences of each group have shaped their attitudes towards technology and their behaviors during these technology-mediated interactions. Both digital natives and digital immigrants participate in these types of technology-mediated interactions on a daily basis. Examining these relationships with a more diverse sample can help identify differences, if any, in how trust develops and impacts outcomes of interest while considering individual experience with technology.

Additionally, the impact of both trust in technology and interpersonal trust should be examined longitudinally, in a more high-stakes environment. Research has demonstrated that the role of trust varies with time (Aupert & Kelsey, 2003; Pavlova, Coovert, & Bennett, 2012; Hill et al., 2009). Early on trust might be less important for collaboration and performance in situations where the interaction is relatively short-lived and there is no expectation for future collaboration. However, most real-world teams and dyads have to collaborate for longer and multiple time-periods, compared to the time spent in this study. Understanding how participant behaviors and technology performance impact the development of both interpersonal trust and trust in technology should be considered.

Lastly, this is one of the first studies to map some of the behaviors in the Marks et al. (2001) team process taxonomy on actual verbal behaviors. The methodology used here allows for a relatively quick and consistent coding across observations and studies. Technology-mediated interactions, especially chat-based ones, provide the unprecedented ability to capture collaborative behaviors with less effort. Developing standardized taxonomies for each of the processes and associated behaviors can help in consistently studying these behaviors, allowing for greater incremental learning and consistent theory building.

Conclusions

The goal of this study was twofold – to examine the relationship between interpersonal trust and trust in technology during a technology-mediated dyadic interaction and to determine whether interpersonal trust and trust in technology had different relationships with outcomes of interest. The Mayer et al. (1995) interpersonal trust model was augmented by including trust in technology. An interchangeable member dyadic model was fit to the data to test the impact of interpersonal trust and trust in technology on collaboration, communication, and future intentions. The model revealed that interpersonal trust affects trust in technology, which in turn impacts collaboration behaviors. Task performance impacted both interpersonal trust and trust in technology. Both types of trust had an effect on intentions to continue the interpersonal interaction and intentions to use the technology in the future, however interpersonal trust had a stronger influence on both intentions. The results of the study help us understand how trust operates in technology-mediated environment. Future research should focus on examining how trust in both the person and the technology unfolds over time, and account for both within and across partner influences.

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FIGURES

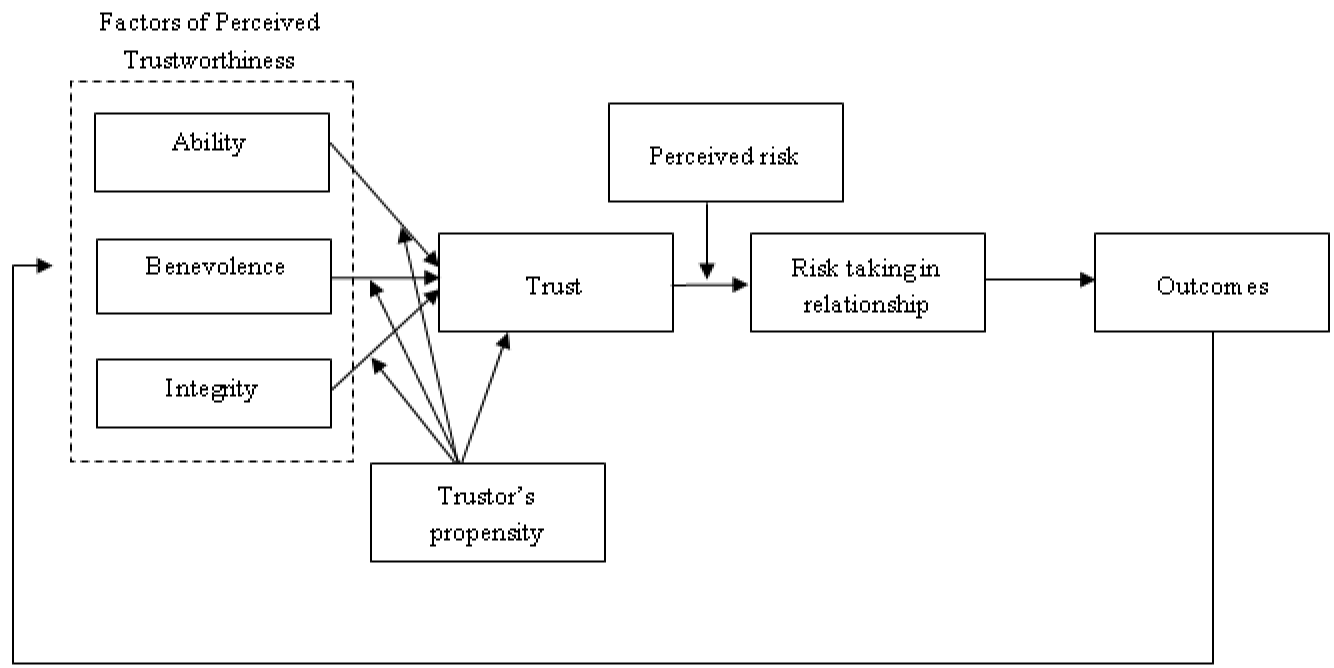


Figure 1. Model of interpersonal trust (Mayer et al., 1995, pg. 715).

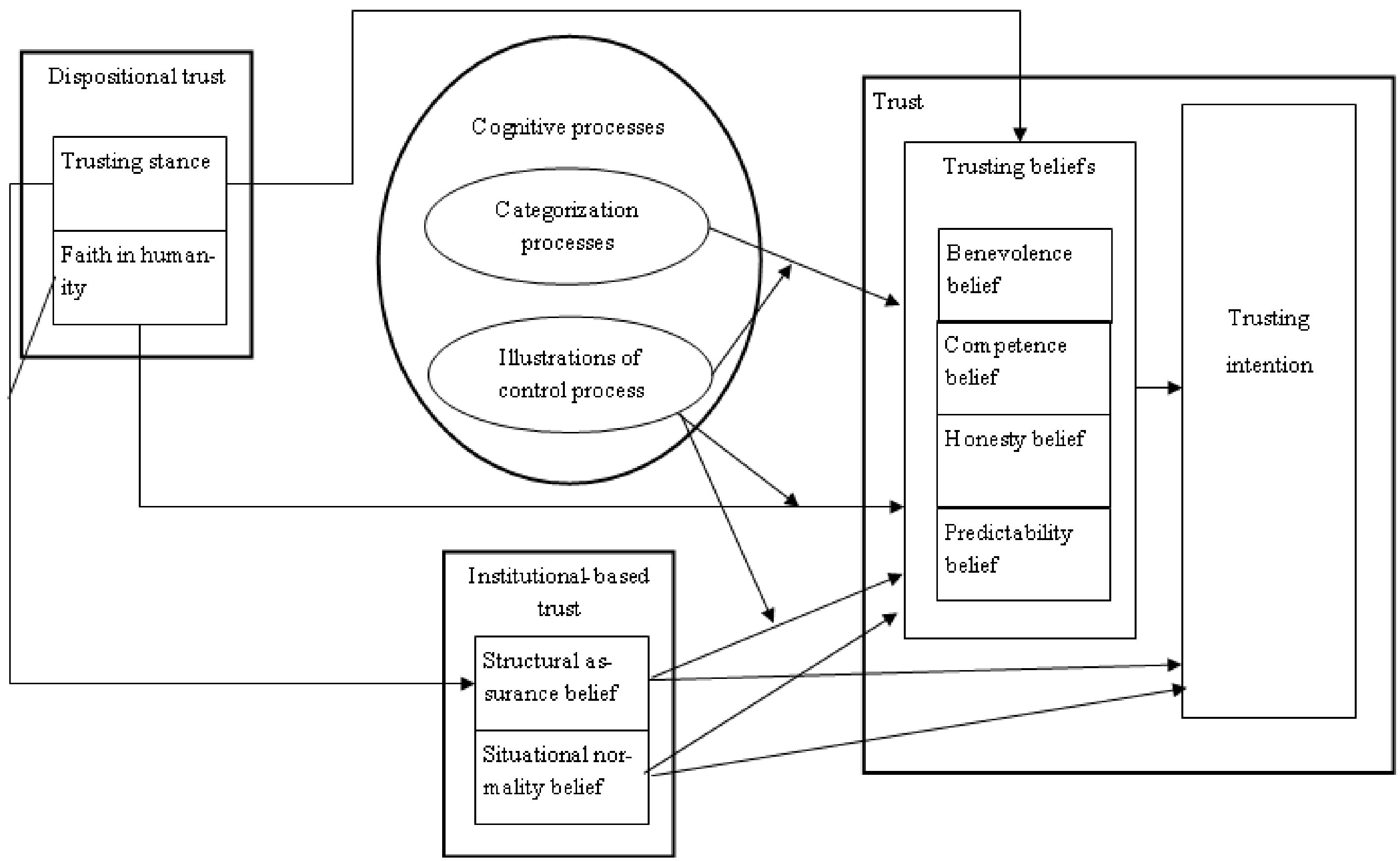


Figure 2. Model of interpersonal trust (McKnight et al, 1998, pg. 476).

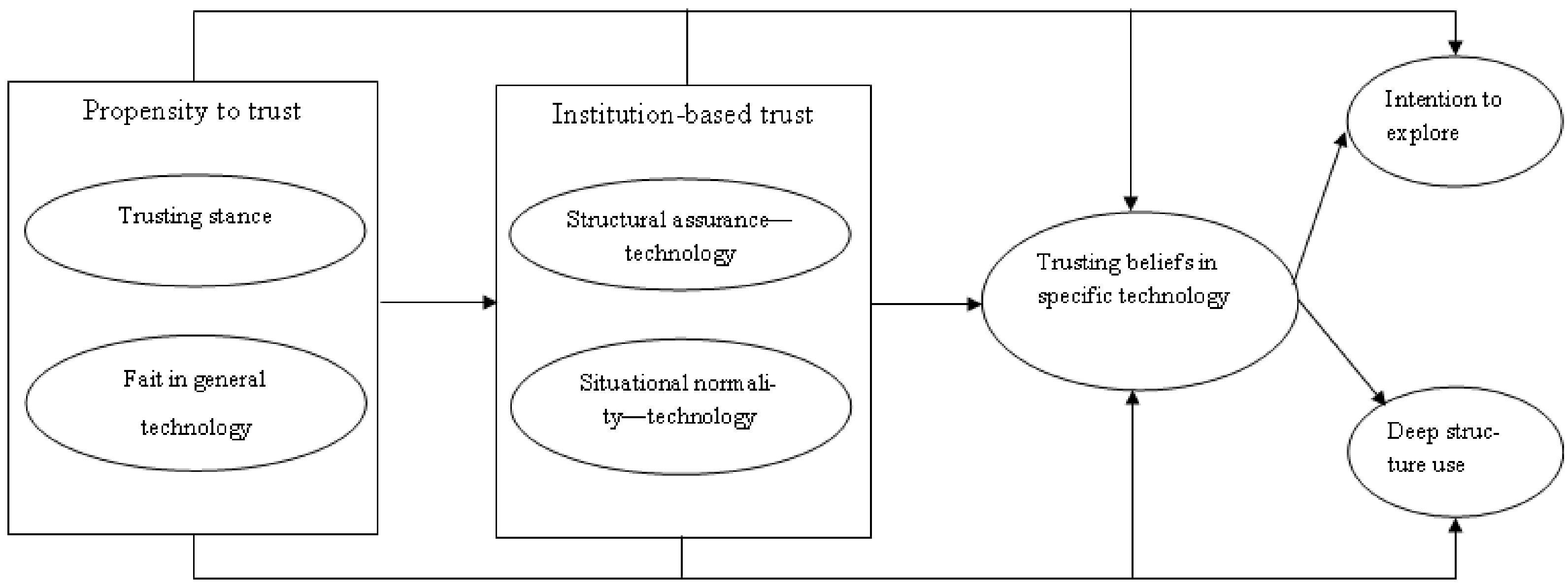


Figure 3. Model of trust in technology (McKnight et al., 2011, pg. 18).

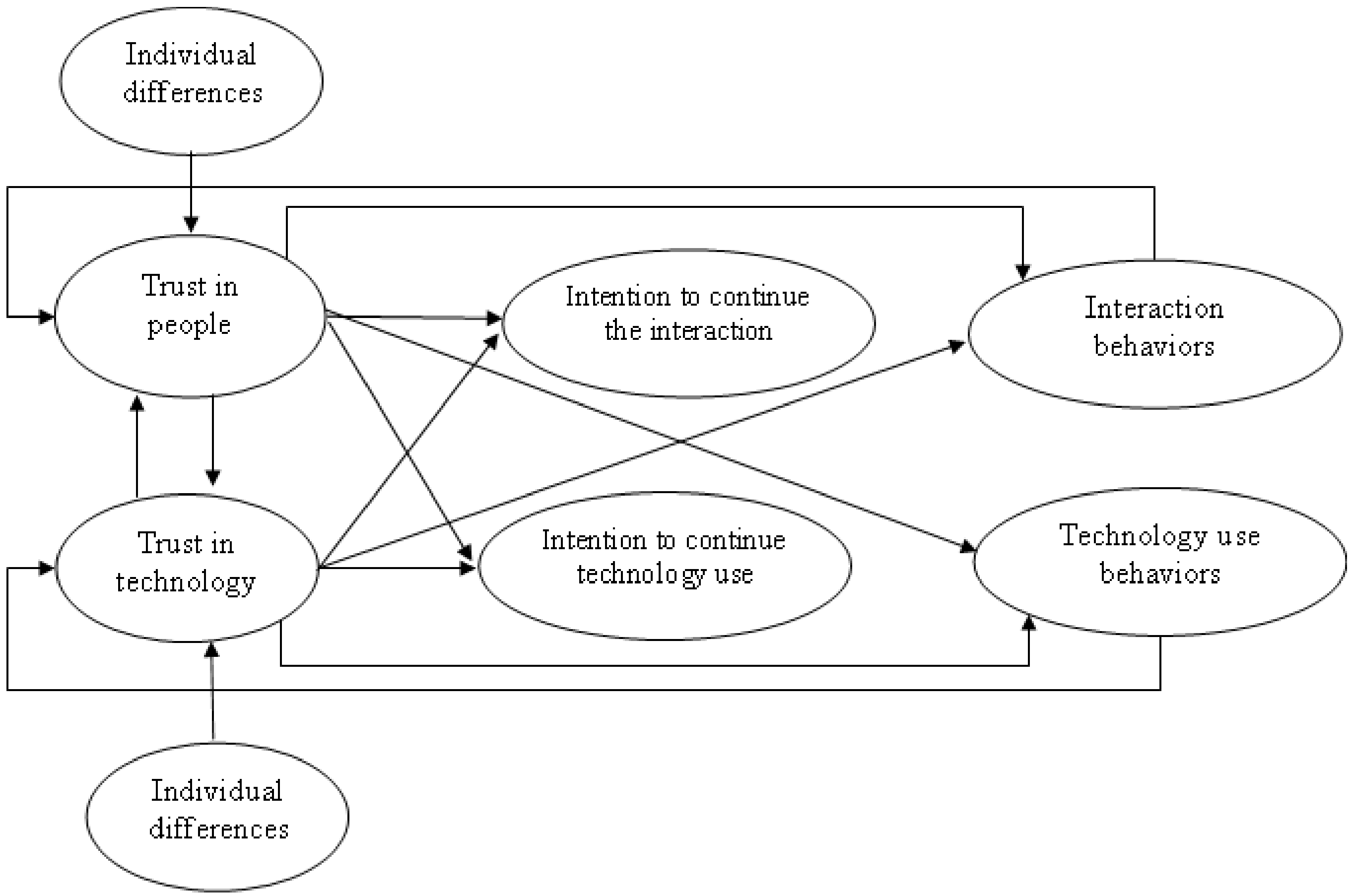


Figure 4. Underlying model linking the constructs of interest.

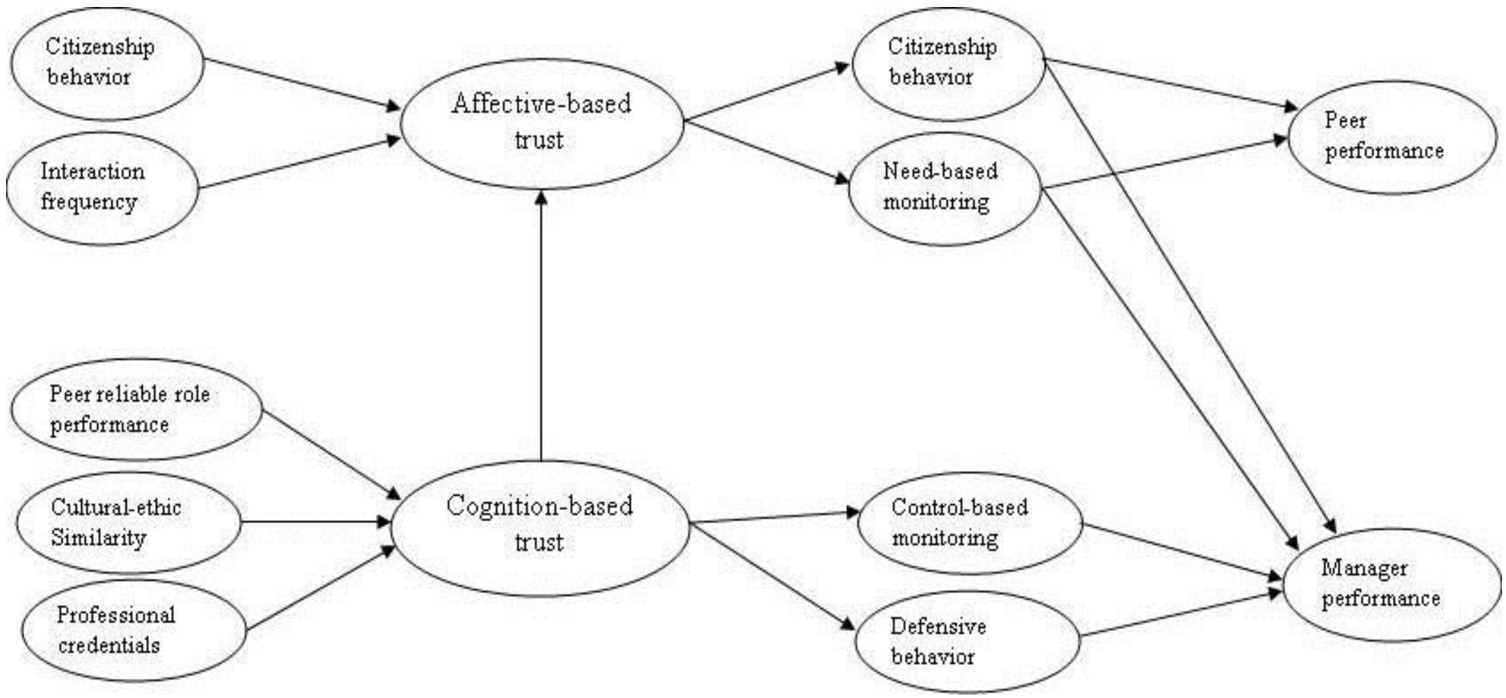


Figure 5. McAllister's model of interpersonal trust (McAllister, 1995, pg. 27).

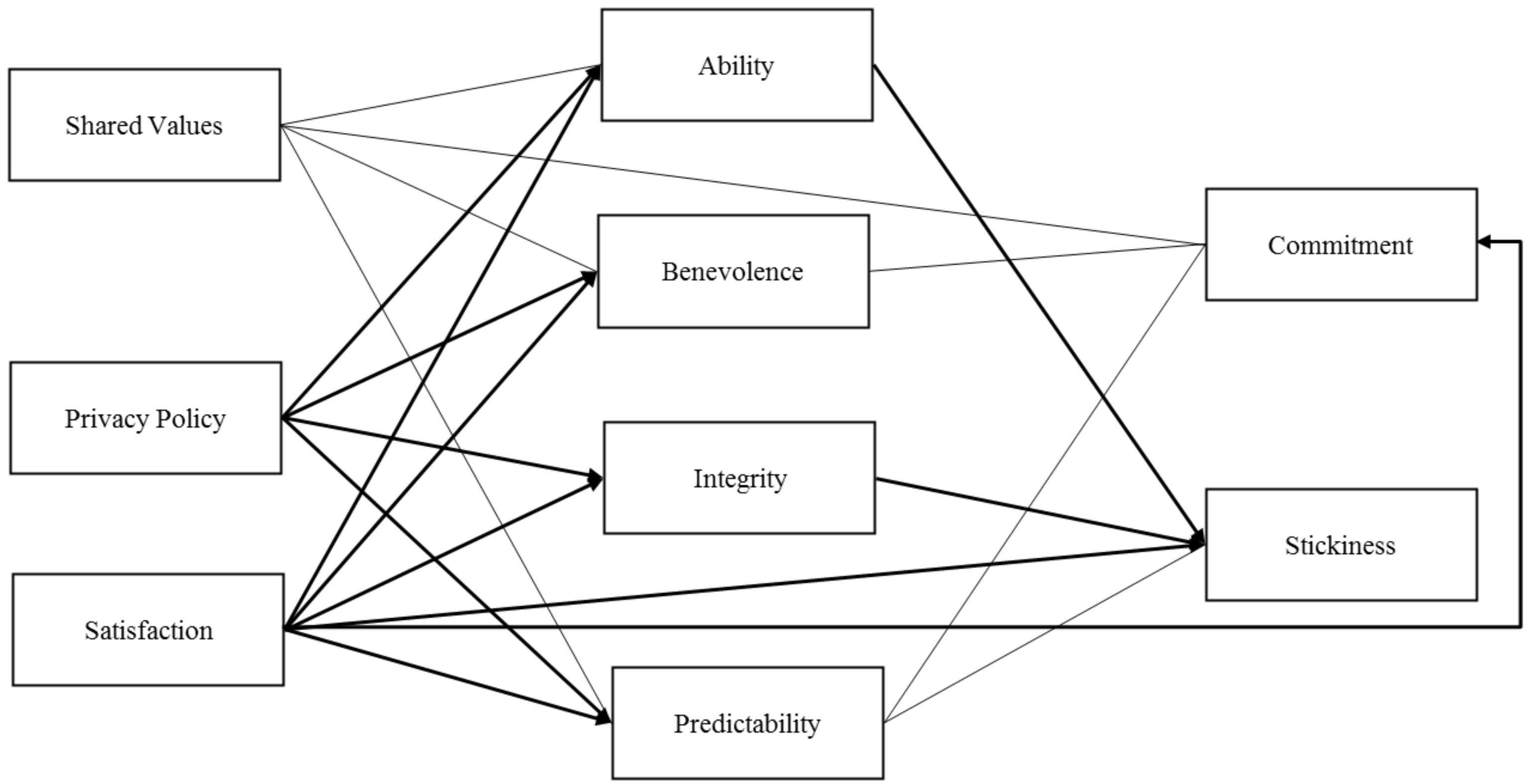
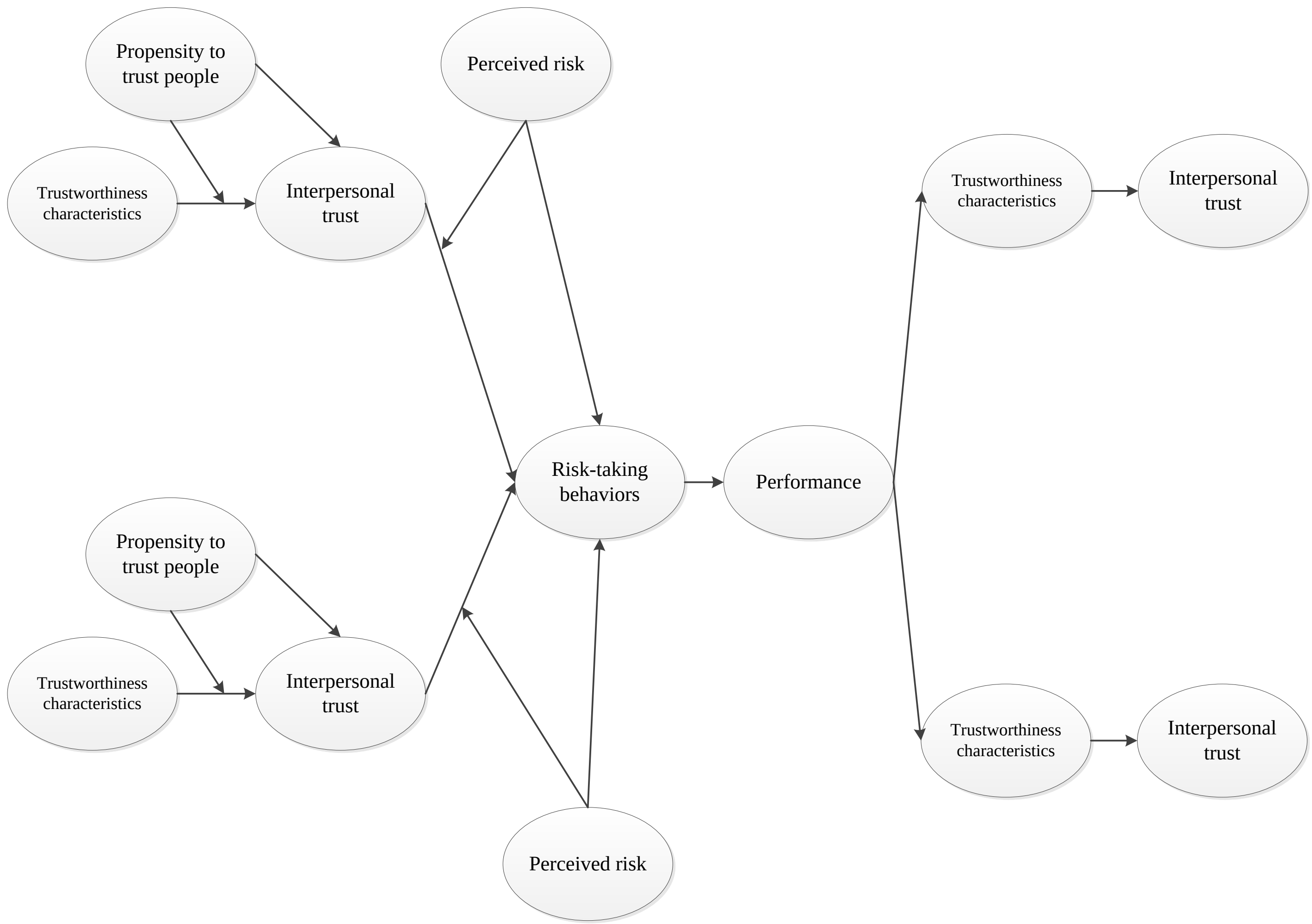
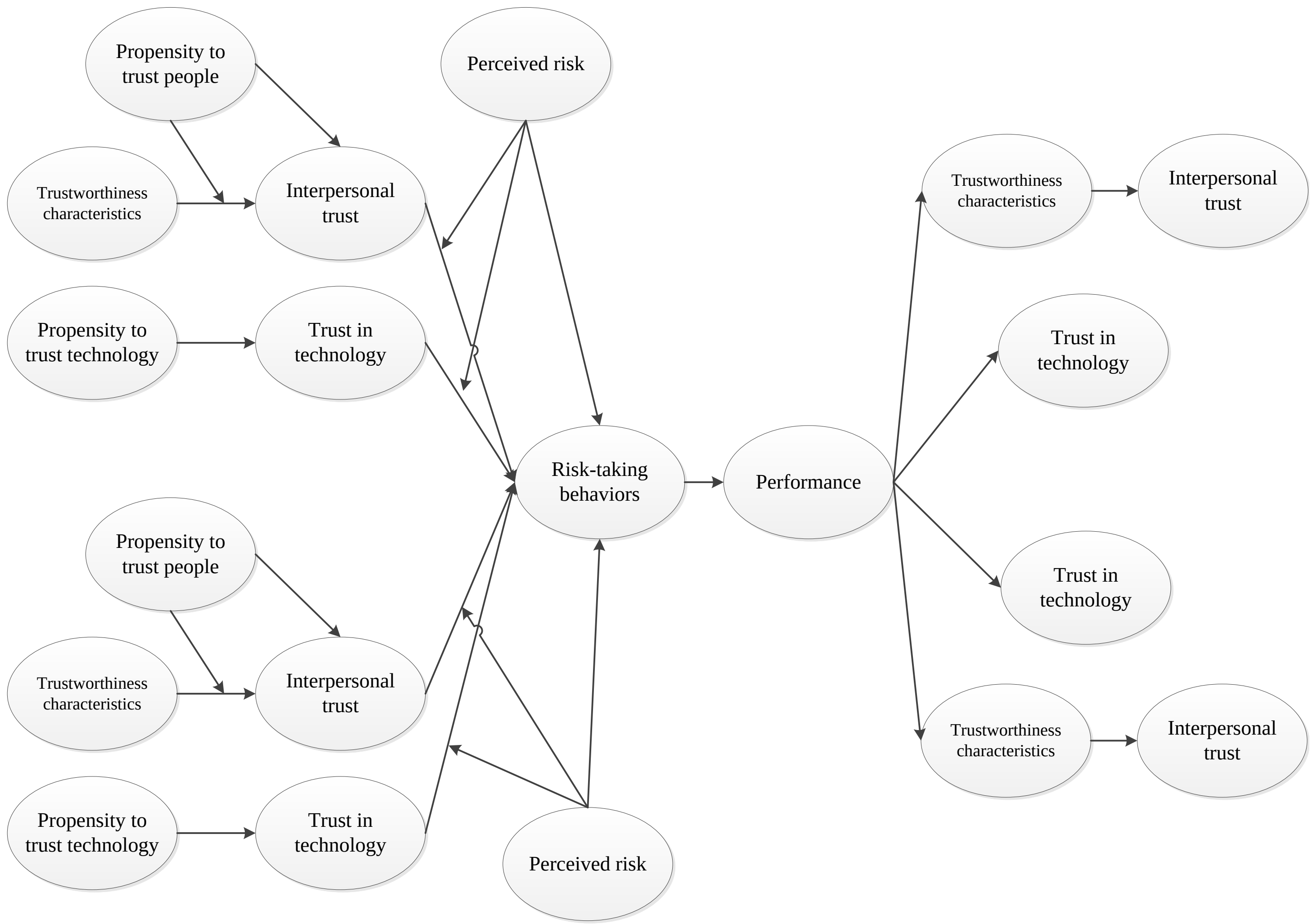


Figure 6. Graphical representations of the results obtained by Wu and colleagues (2010).



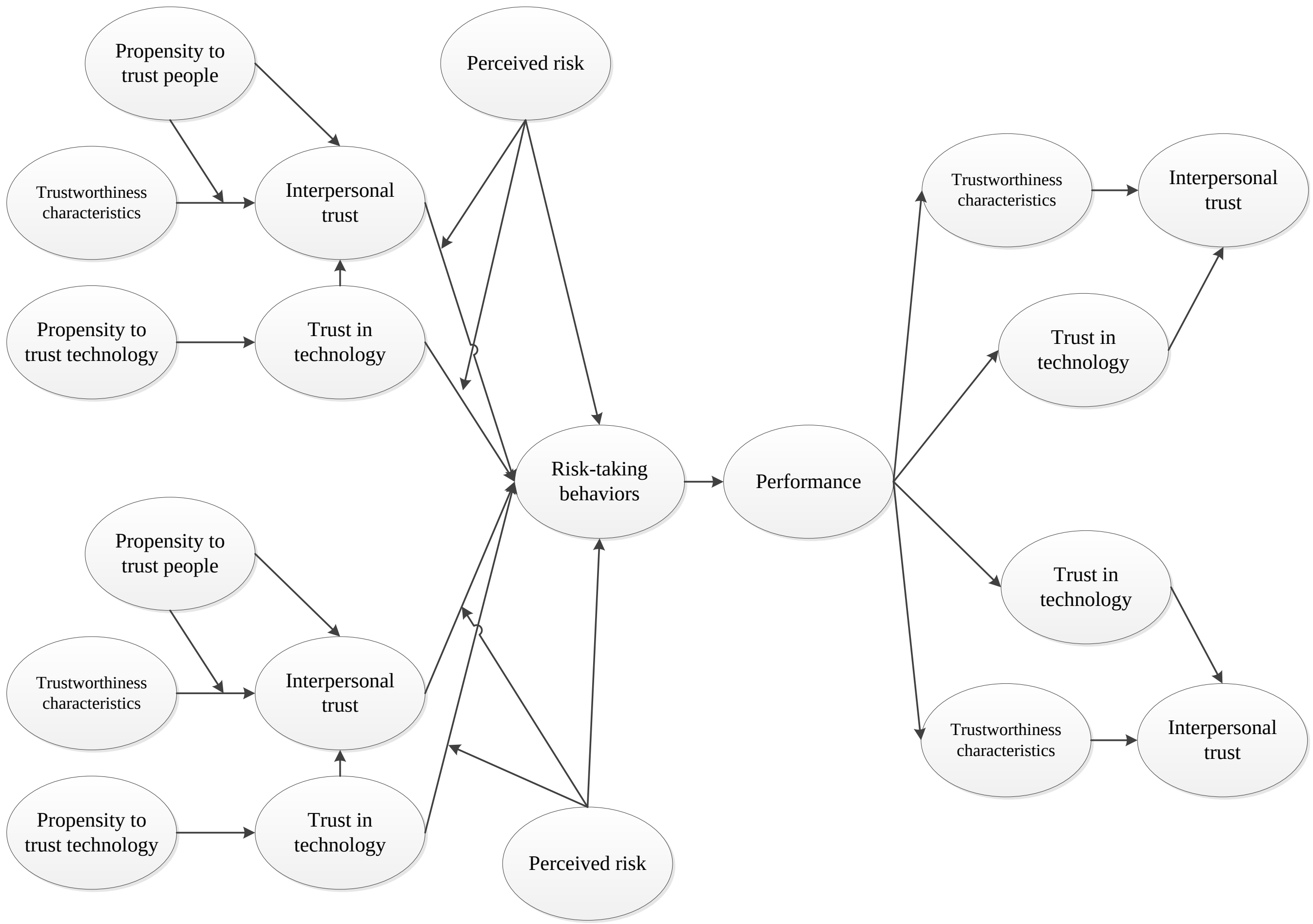
Model 0. Trust in technology is irrelevant to the interaction (Mayer et al.'s interpersonal trust model).

Figure 7. Interpersonal trust model (Mayer et al., 1995).



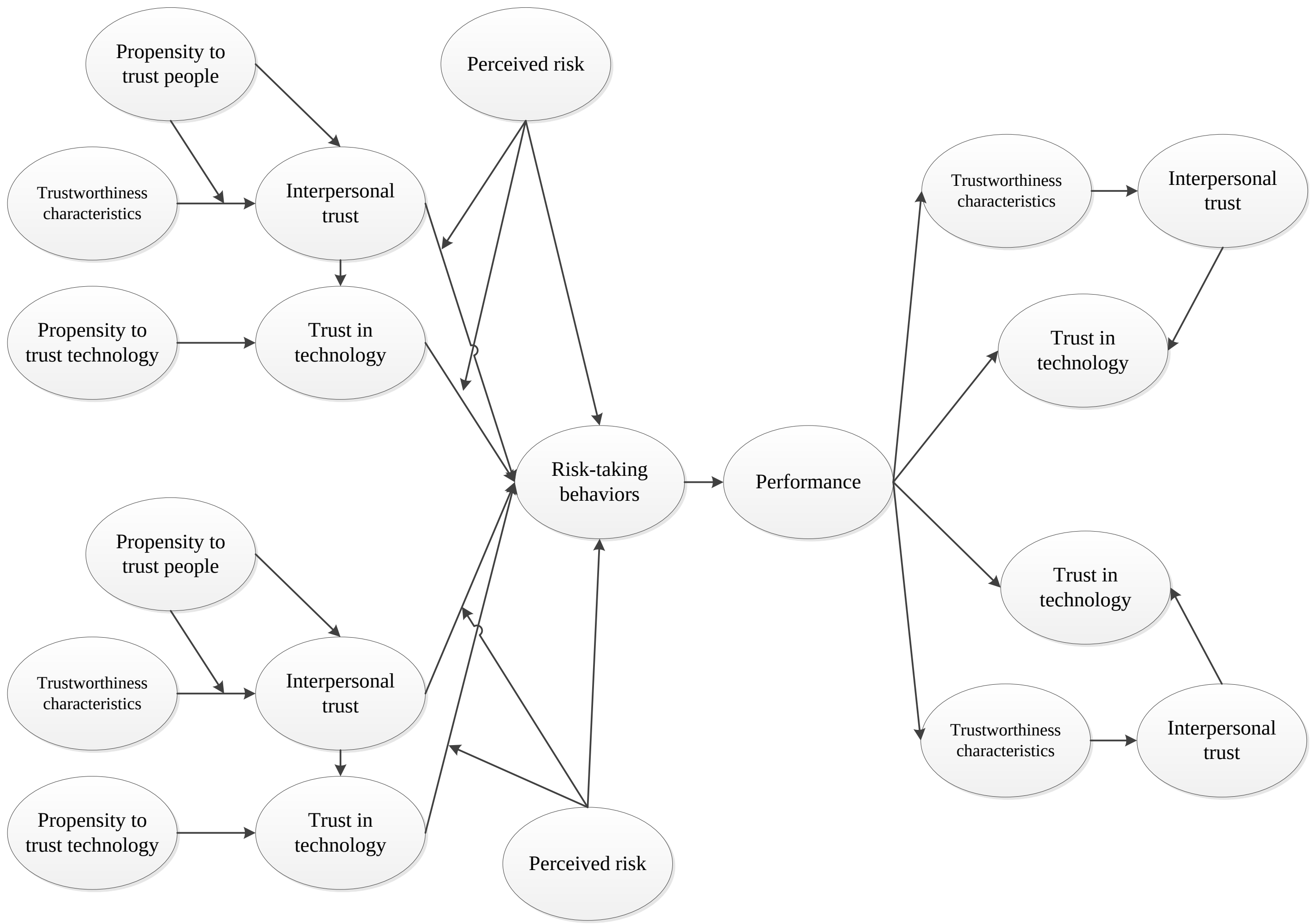
Model 1. Trust in technology and interpersonal trust are not related and they impact risk-taking behaviors independently.

Figure 8. Augmented interpersonal trust and trust in technology model (Model 1).



Model 2. Trust in technology impacts interpersonal trust and both impact risk-taking behaviors.

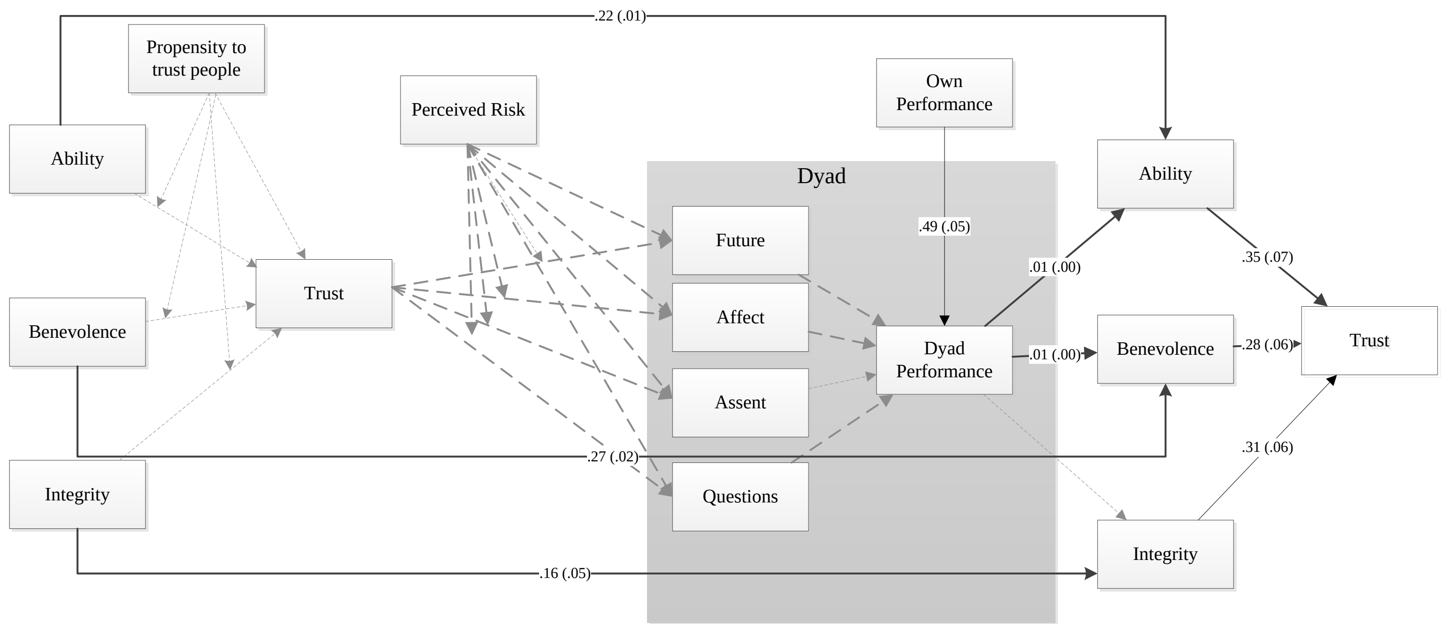
Figure 9. Augmented interpersonal trust and trust in technology model (Model 2).



Model 3. Interpersonal trust impacts trust in technology and both impact risk-taking behaviors.

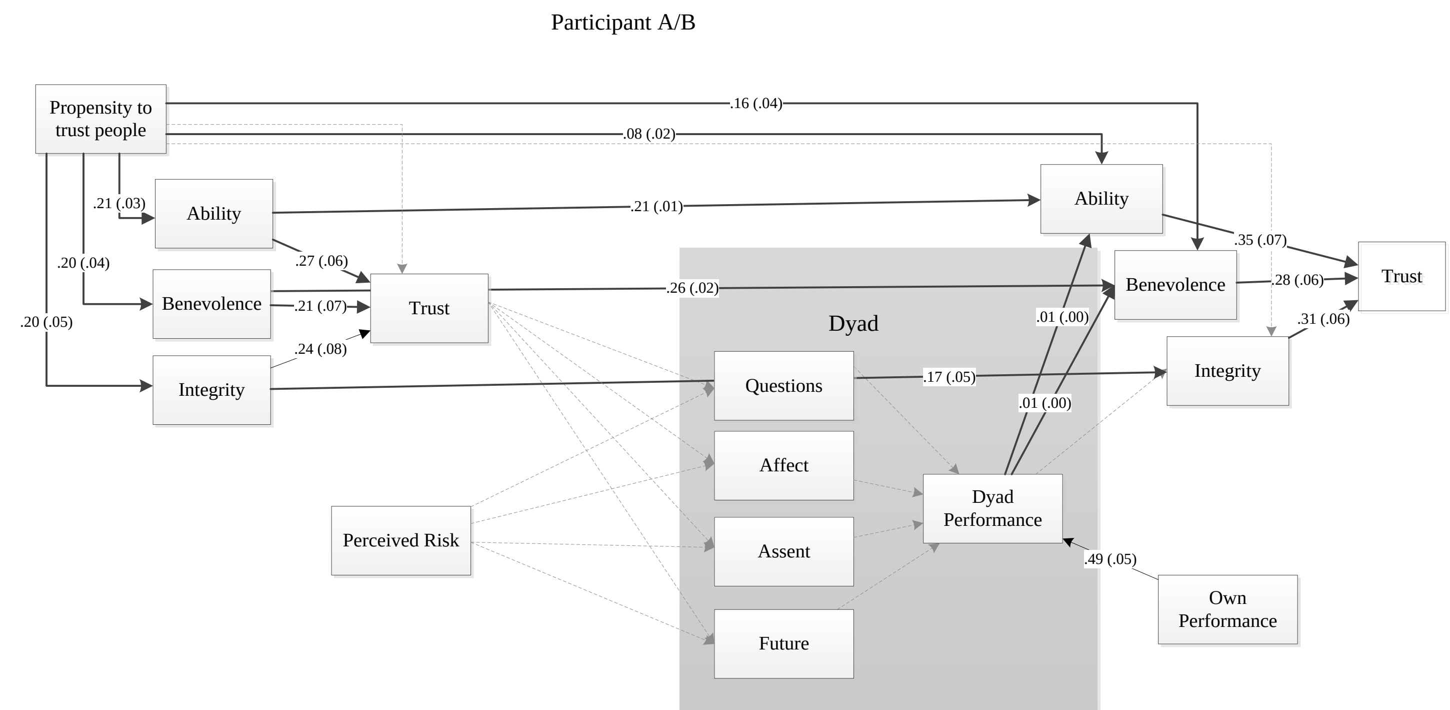
Figure 10. Augmented interpersonal trust and trust in technology model (Model 3).

Participant A/B



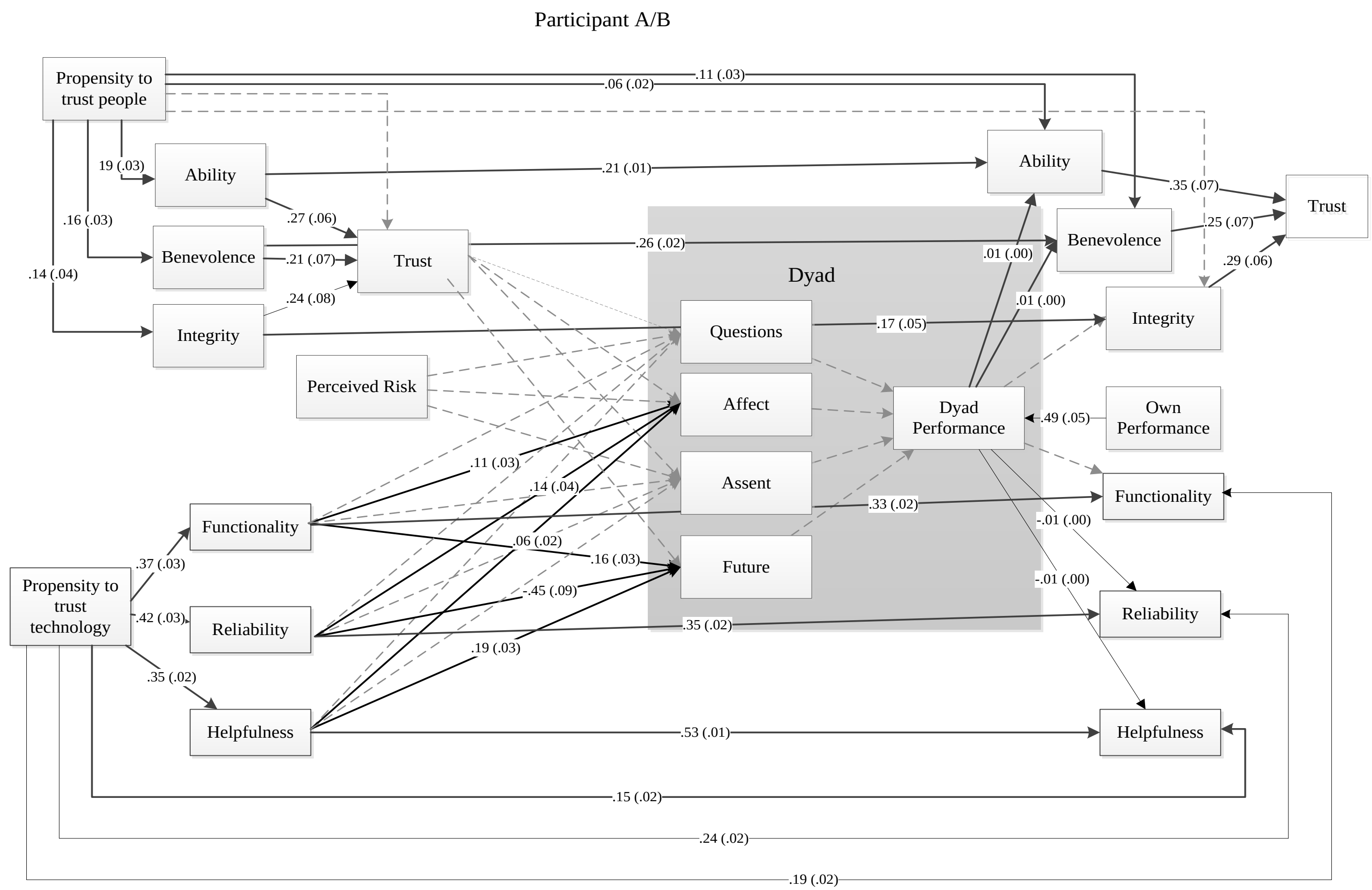
	χ2'	df'	TLI	RMSEA	AIC	GFI	PGFI
Model 0 Interpersonal trust	190.67	24	0.78	0.22	712.66	0.98	0.09

Figure 11. Interpersonal trust model – Model 0. Graphical representation captures the structural relationships for only one participant. Path coefficients were constrained to be equal for both participants. Path coefficients are unstandardized.



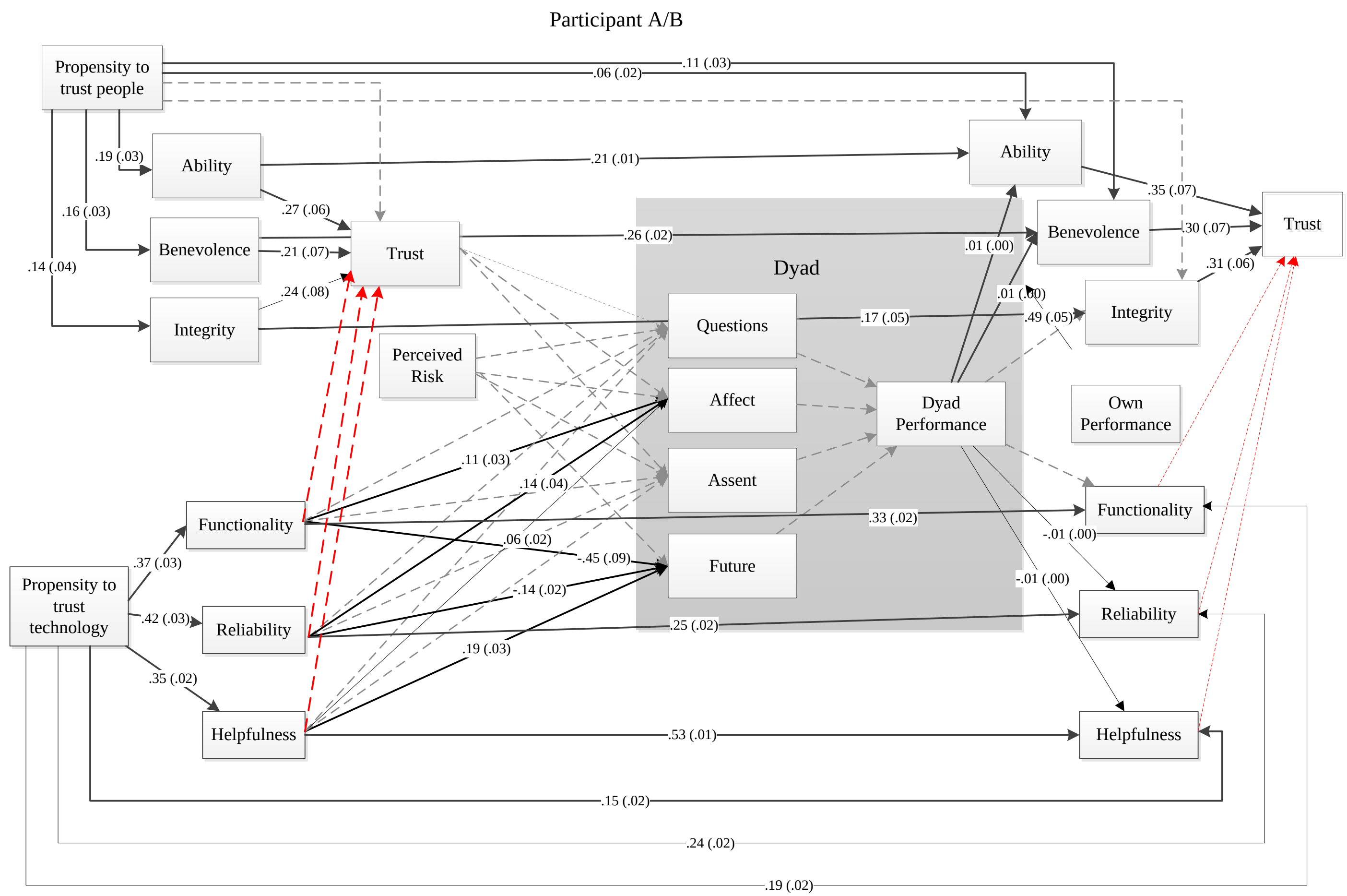
	χ2'	df'	TLI	RMSEA	AIC	GFI	PGFI
Model 0.3 Interpersonal trust - Final	742.3	101	0.81	0.21	934.3	0.88	0.51

Figure 12. Interpersonal trust model – Model 0.3. Graphical representation captures the structural relationships for only one participant. Path coefficients were constrained to be equal for both participants. Path coefficients are unstandardized.



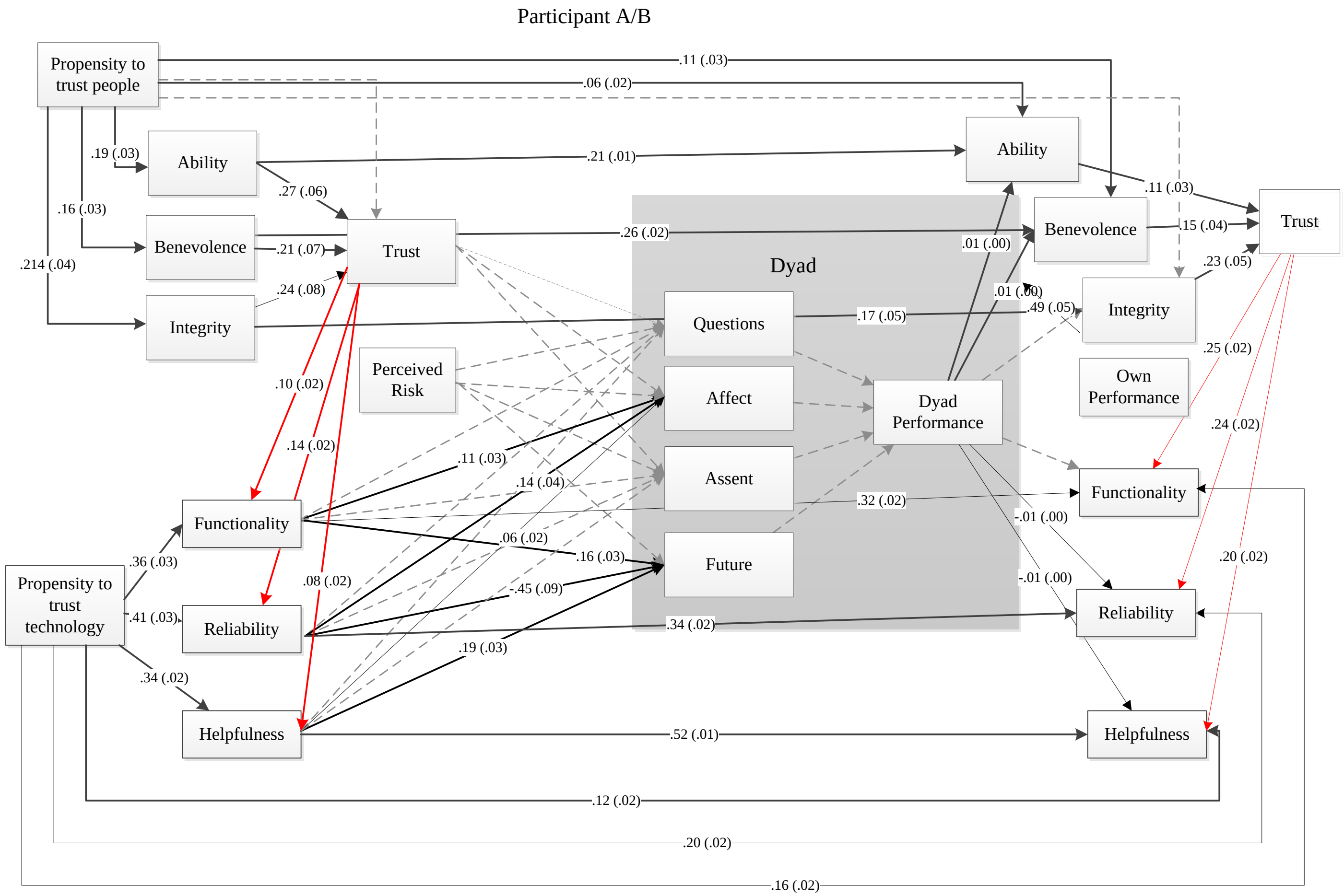
	$\chi2'$	df'	TLI	RMSEA	AIC	GFI	PGFI
Model 1 Interpersonal trust & trust in technology	4410.06	338	0.68	0.29	4738.06	0.76	0.55

Figure 13. Augmented trust model – Model 1 (interpersonal trust and trust in technology are not related). Graphical representation captures the structural relationships for only one participant. Path coefficients were constrained to be equal for both participants. Path coefficients are unstandardized.



	χ2'	df'	TLI	RMSEA	AIC	GFI	PGFI
Model 2 Interpersonal trust & trust in technology	4418.9	344	0.69	0.29	4734.9	0.76	0.55

Figure 14. Augmented trust model – Model 2 (trust in technology predict interpersonal trust). Graphical representation captures the structural relationships for only one participant. Path coefficients were constrained to be equal for both participants. Path coefficients are unstandardized.



	χ2'	df'	TLI	RMSEA	AIC	GFI	PGFI
Model 3 Interpersonal trust & trust in technology	4089.39	344	0.71	0.28	4405.39	0.78	0.57

Figure 15. Augmented trust model – Model 3 (interpersonal trust predicts trust in technology). Graphical representation captures the structural relationships for only one participant. Path coefficients were constrained to be equal for both participants. Path coefficients are unstandardized.

TABLES

Table 1. Summary of the parallels between interpersonal trust and trust in technology (Reproduced from McKnight et al., 2011, pg. 17).

Trust in People		**Trust in Technology**	
Label	Definition	Label	Definition
General trusting belief			
Propensity to trust (Mayer et al. 1995) Disposition to trust (McKnight et al. 1998)	A general willingness to trust others. [The] extent [to which one] demonstrates a consistent tendency to be willing to depend on others across a broad spectrum of situations and persons.	Propensity to trust in general technology	The general tendency to be willing to depend on technology across a broad spectrum of situations and technologies.
Faith in humanity (McKnight et al. 1998)	Others are typically well-meaning and reliable.	Faith in general technology	One assumes technologies are usually consistent, reliable, functional, and provide the help needed.
Trusting stance (McKnight et al. 1998)	Irrespective of whether people are reliable or not, one will obtain better interpersonal outcomes by dealing with people as though they are well-meaning and reliable.	Trusting stance-general technology	Regardless of what one assumes about technology generally, one presumes that one will achieve better outcomes by assuming the technology can be relied on.
Trusting belief in a context			
Situational normality (McKnight et al. 1998)	The belief that success is likely because the situation is normal, favorable, or well- ordered.	Structural normality-technology	The belief that success with the specific technology is likely because one feels comfortable when one uses the general type of technology of which a specific technology may be an instance.
Structural assurance (McKnight et al. 1998)	The belief that success is likely because contextual conditions like promises, contracts, regulations and guarantees are in place.	Structural assurance-technology	The belief that success with the specific technology is likely because, regardless of the characteristics of the specific technology, one believes structural conditions like guarantees, contracts, support, or other safeguards exist in the general type of technology that make success likely.

Table 1. (Continued).

Trust in People		Trust in Technology	
Label	Definition	Label	Definition
Specific trust			
Trust (Mayer et al., 1995)	Reflects beliefs that the other party has suitable attributes for performing as expected in a specific situation... irrespective of the ability to monitor or control that other party.	Trust in specific technology	Reflects beliefs that a specific technology has the attributes necessary to perform as expected in a given situation in which negative consequences are possible.
Factor of trustworthiness: Ability (Mayer et al., 1995) Trusting belief-Competence (McKnight & Chervany, 2001-2002)	That group of skills, competencies, and characteristics that enable a party to have influence within some specific domain. One has the ability to do for the other person what the other person needs to have done. The essence of competence is efficacy.	Trusting belief-specific technology - Functionality	The belief that a specific technology has the capacity, functionality, or features to do for one what one needs to be done.
Factor of trustworthiness: Benevolence (Mayer et al., 1995) Trusting belief-Benevolence (McKnight & Chervany, 2001-2002)	The extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive. One cares about the welfare of the other person and is therefore motivated to act in the other person's interest….does not act opportunistically toward the other...	Trusting belief-specific technology - Helpfulness	The belief that the specific technology provides adequate and responsive help for users.
Factor of trustworthiness: Integrity (Mayer et al., 1995) Trusting belief-Predictability (McKnight & Chervany, 2001-2002)	The extent to which a trustee adheres to a set of principles that the trustor finds acceptable. One's actions are consistent enough that another can forecast what one will do in a given situation.	Trusting belief-specific technology - Reliability	The belief that the specific technology will consistently operate properly.

Table 2. Use of six different communication modes for collaboration reported by participants.

Q: How frequently do collaborate (work on a project with one or more partners) using the following methods?

	Never	Occasionally	Monthly	Weekly	Daily	no answer
Email	15%	39%	11%	18%	17%	0%
Chat messenger	41%	27%	9%	13%	10%	0%
Text message	5%	15%	4%	29%	46%	1%
Voice messages	32%	23%	12%	18%	14%	0%
Video chat	46%	30%	8%	14%	2%	0%
Face-to-face	2%	10%	3%	34%	51%	1%

Table 3. Descriptives for row standard deviations for each of the three measurement sections of the study.

	N	Min.	Max.	Mean	SD
SDrow1	164	0.56	2.68	1.48	0.40
SDrow2	164	0.00	2.71	1.47	0.50
SDrow3	164	0.69	2.94	1.45	0.39

Table 4. Descriptives for all measured variables.

	N	α	Mean (SD)	Min	Max	Skew. (S. E.)	Kurt. (S. E.)	r_I
Individual level mesures								
Propensity to Trust Technology (PTT)	164	0.91	5.48 (0.98)	1.29	7.00	-1.24 (0.19)	2.68 (0.38)	0.03
Propensity to Trust People (PTP)	164	0.76	4.39 (0.75)	1.43	6.25	-0.31 (0.19)	0.88 (0.38)	0.27 *
Perceived risk	164	0.89	3.77 (1.23)	1.00	7.00	-0.01 (0.19)	-0.14 (0.38)	-0.01
Ability_pre (Apre)	164	0.97	4.60 (1.67)	1.00	7.00	-0.42 (0.19)	-0.65 (0.38)	0.22 *
Benevolence_pre (Bpre)	164	0.95	3.74 (1.52)	1.00	7.00	-0.05 (0.19)	-0.38 (0.38)	0.12 *
Integrity_pre (Ipre)	164	0.83	3.99 (1.14)	1.00	7.00	-0.18 (0.19)	0.94 (0.38)	0.05
Trust_pre (Tpre)	164	0.73	3.65 (1.24)	1.00	6.75	-0.32 (0.19)	-0.14 (0.38)	0.08
Reliability_pre (Rpre)	164	0.95	4.92 (1.48)	1.00	7.00	-0.79 (0.19)	0.35 (0.38)	-0.08
Functionality_pre (Fpre)	164	0.92	5.33 (1.36)	1.00	7.00	-1.04 (0.19)	0.98 (0.38)	-0.18 *
Helpfulness_pre (Hpre)	164	0.97	4.73 (1.61)	1.00	7.00	-0.78 (0.19)	0.21 (0.38)	-0.13 *
Ability_post (Apost)	164	0.95	5.95 (1.07)	2.00	7.00	-1.44 (0.19)	2.79 (0.38)	0.23 *
Benevolence_post (Bpost)	164	0.90	5.39 (1.19)	1.00	7.00	-0.72 (0.19)	0.51 (0.38)	0.28 *
Integrity_post (Ipost)	164	0.53	5.19 (1.04)	2.00	7.00	-0.08 (0.19)	-0.08 (0.38)	0.01
Trust_post (Tpost)	164	0.68	4.83 (1.16)	1.00	7.00	-0.36 (0.19)	0.56 (0.38)	0.20 *
Reliability_post (Rpost)	164	0.94	5.86 (1.15)	1.00	7.00	-1.32 (0.19)	2.07 (0.38)	-0.09
Functionality_post (Fpost)	164	0.94	6.00 (1.08)	1.00	7.00	-1.50 (0.19)	3.20 (0.38)	0.03
Helpfulness_post (Hpost)	164	0.97	5.29 (1.42)	1.00	7.00	-0.73 (0.19)	0.28 (0.38)	-0.12 *
Survival Score	164	-	1.32 (0.95)	0.00	4.00	0.43 (0.19)	-0.14 (0.38)	0.02
Performance_own	164	-	52.09 (7.21)	24	66	-0.77 (0.19)	1.04 (0.38)	0.07
Intent to continue the interaction (Intppl)	164	0.94	5.42 (1.23)	1.00	7.00	-0.93 (0.19)	1.39 (0.38)	0.26 *
Intent to continue use of the technology (Inttx)	164	0.96	4.40 (1.69)	1.00	7.00	-0.40 (0.19)	-0.58 (0.38)	-0.14 *
Dyad level measures								
Performance (perf)	82	-	52.10 (7.55)	26	64	-1.46 (0.26)	2.51 (0.52)	-
Word count (wc)	82	-	356.62 (164.70)	109	808	0.67 (0.26)	-0.04 (0.52)	-
Future (ftr)	82	-	2.40 (1.60)	0.00	10.63	2.30 (0.26)	8.59 (0.52)	-
Affect (aff)	82	-	4.75 (1.73)	0.39	11.20	0.27 (0.26)	2.16 (0.52)	-
Assent (asnt)	82	-	3.56 (1.58)	0.43	7.39	0.30 (0.26)	-0.30 (0.52)	-
Questions (q)	82	-	4.24 (2.20)	0.00	9.87	0.43 (0.26)	-0.25 (0.52)	-
Personal (pers)	82	-	3.97 (1.39)	1.48	7.33	0.60 -(0.27)	-0.27 (0.53)	-

Note: The following variable notation was used:

_pre - measures prior to the collaborative task

_post - measures after the collaborative task

* denoted significant intraclass correlations (p <.20)

Table 5. Pattern of dyad-level data entry.

Dyad	Condition	Trust (Actor)	Risk (Actor)	Trust (Partner)	Risk (Partner)	Dyad performance (Actor)	Dyad performance (Partner)
1	Cond 1	3.41	3.55	4.11	4.21	58	58
2	Cond 2	3.52	3.12	3.67	3.91	52	52

Table 6. Correlation table of all measured variables.

	1	2	3	4	5	6	7	8	9	10	11
1 Propensity to trust people (participant A)	1.00										
2 Propensity to trust technology (participant A)	0.26	1.00									
3 Perceived risk (participant A)	0.03	0.05	1.00								
4 Ability pre-collaboration (participant A)	0.24	0.19	-0.15	1.00							
5 Benevolence pre-collaboration (participant A)	0.25	0.21	-0.07	0.79	1.00						
6 Integrity pre-collaboration (participant A)	0.26	0.11	-0.10	0.74	0.88	1.00					
7 Interpersonal trust pre-collaboration (participant A)	0.20	0.05	-0.18	0.73	0.72	0.68	1.00				
8 Reliability pre-collaboration (participant A)	0.19	0.29	-0.06	0.28	0.12	0.05	0.17	1.00			
9 Functionality pre-collaboration (participant A)	0.24	0.28	0.05	0.26	0.16	0.12	0.17	0.88	1.00		
10 Helpfulness pre-collaboration (participant A)	0.10	0.34	0.03	0.19	0.07	0.04	0.08	0.80	0.79	1.00	
11 Ability post-collaboration (participant A)	0.26	0.17	-0.08	0.41	0.36	0.24	0.30	0.33	0.25	0.29	1.00
12 Benevolence post-collaboration (participant A)	0.28	0.24	0.07	0.39	0.38	0.25	0.33	0.49	0.44	0.40	0.72
13 Integrity post-collaboration (participant A)	0.19	-0.01	-0.06	0.24	0.21	0.17	0.24	0.37	0.27	0.31	0.57
14 Interpersonal trust post-collaboration (participant A)	0.17	0.01	-0.23	0.27	0.22	0.08	0.37	0.25	0.12	0.15	0.63
15 Reliability post-collaboration (participant A)	0.18	0.26	0.01	0.15	0.12	0.04	0.06	0.56	0.53	0.53	0.44
16 Functionality post-collaboration (participant A)	0.10	0.19	0.08	0.10	0.07	0.00	0.01	0.46	0.51	0.48	0.31
17 Helpfulness post-collaboration (participant A)	0.06	0.22	0.19	0.01	-0.02	-0.10	-0.05	0.59	0.59	0.69	0.38
18 Survival score (participant A)	0.12	-0.02	-0.17	0.10	-0.10	-0.03	0.08	0.07	0.12	0.02	0.00
19 Own performance (participant A)	0.10	-0.01	0.02	0.06	0.12	0.08	0.07	-0.06	-0.24	-0.13	0.18
20 Interpersonal intent (participant A)	0.32	0.21	-0.09	0.34	0.32	0.26	0.29	0.37	0.37	0.31	0.72
21 Technology intent (participant A)	0.16	0.20	-0.23	0.30	0.28	0.17	0.19	0.38	0.34	0.37	0.45
22 Propensity to trust people (participant B)	-0.35	-0.09	0.12	-0.03	-0.02	0.00	-0.06	0.18	0.15	0.22	-0.08
23 Propensity to trust technology (participant B)	0.05	0.00	-0.02	0.08	0.04	0.10	0.09	0.17	0.14	0.14	0.13
24 Perceived risk (participant B)	-0.04	0.08	0.00	-0.09	-0.08	-0.11	-0.01	0.20	0.13	0.07	0.04
25 Ability pre-collaboration (participant B)	-0.01	0.08	0.09	0.45	0.43	0.34	0.41	0.19	0.15	0.18	0.27
26 Benevolence pre-collaboration (participant B)	0.03	0.07	0.07	0.41	0.41	0.36	0.41	0.20	0.20	0.22	0.27
27 Integrity pre-collaboration (participant B)	-0.10	0.03	0.04	0.40	0.41	0.36	0.44	0.18	0.18	0.21	0.30
28 Interpersonal trust pre-collaboration (participant B)	-0.01	-0.02	0.06	0.45	0.51	0.45	0.44	0.09	0.04	0.15	0.24
29 Reliability pre-collaboration (participant B)	-0.13	0.24	-0.11	0.06	-0.05	-0.11	-0.01	0.20	0.21	0.24	-0.01
30 Functionality pre-collaboration (participant B)	-0.09	0.30	-0.14	0.04	-0.10	-0.14	-0.04	0.17	0.14	0.30	0.01
31 Helpfulness pre-collaboration (participant B)	-0.06	0.28	-0.08	0.03	-0.13	-0.17	-0.06	0.12	0.11	0.22	0.04
32 Ability post-collaboration (participant B)	0.11	0.06	0.17	0.05	0.19	0.13	0.13	0.03	0.00	-0.04	0.25
33 Benevolence post-collaboration (participant B)	0.11	0.07	0.13	0.06	0.09	0.02	0.11	0.18	0.17	0.12	0.35
34 Integrity post-collaboration (participant B)	0.04	0.01	0.04	0.07	0.03	0.09	0.14	-0.05	0.05	-0.01	0.13

Table 6 (Continued).

	1	2	3	4	5	6	7	8	9	10	11
35 Interpersonal trust post-collaboration (participant B)	0.07	0.14	0.08	0.09	0.16	0.14	0.19	0.13	0.13	0.13	0.34
36 Reliability post-collaboration (participant B)	-0.08	0.08	-0.16	0.02	0.09	0.02	0.17	0.04	0.05	0.02	0.09
37 Functionality post-collaboration (participant B)	0.02	0.07	-0.15	0.09	0.14	0.09	0.23	0.10	0.13	0.08	0.16
38 Helpfulness post-collaboration (participant B)	-0.02	0.22	-0.06	0.03	0.03	0.00	0.11	0.01	-0.02	0.02	0.05
39 Survival score (participant B)	0.16	-0.06	-0.08	0.09	0.16	0.22	0.13	0.19	0.14	0.09	0.08
40 Own performance (participant B)	0.08	0.00	0.24	-0.01	-0.02	-0.02	-0.03	0.01	-0.01	0.03	0.14
41 Interpersonal intent (participant B)	0.09	0.01	0.22	-0.05	0.02	-0.02	-0.02	0.07	0.06	0.07	0.20
42 Technology intent (participant B)	-0.03	0.12	0.13	0.10	0.05	0.07	0.05	0.18	0.19	0.19	0.17
43 Team performance	0.05	-0.04	0.26	-0.03	-0.08	-0.12	-0.11	-0.12	-0.22	-0.17	0.00
44 Word count (WC)	-0.05	0.06	0.10	0.01	0.04	0.10	0.04	-0.15	-0.12	-0.06	-0.07
45 Future (ftr)	-0.02	-0.21	0.10	-0.07	-0.03	-0.07	-0.03	-0.02	0.00	-0.05	-0.06
46 Affect (aff)	0.03	0.27	-0.24	0.16	0.14	0.11	0.04	0.12	0.04	0.06	0.07
47 Assent (asnt)	0.11	0.16	-0.05	0.03	0.07	0.05	-0.01	-0.02	-0.02	0.01	0.05
48 Questions (q)	0.14	0.10	-0.08	0.07	0.06	0.03	0.07	0.09	0.11	0.10	-0.11
49 Personal (pers)	-0.08	-0.06	0.04	-0.11	0.00	-0.05	-0.03	-0.04	-0.02	-0.12	-0.03

Table 6. (Continued).

	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12	1.00																	
13	0.60	1.00																
14	0.56	0.65	1.00															
15	0.56	0.42	0.31	1.00														
16	0.44	0.37	0.22	0.87	1.00													
17	0.40	0.32	0.21	0.72	0.65	1.00												
18	-0.03	0.03	0.03	-0.04	-0.01	-0.13	1.00											
19	0.10	0.18	0.12	0.07	0.03	0.00	-0.20	1.00										
20	0.74	0.53	0.48	0.38	0.27	0.31	0.00	0.04	1.00									
21	0.41	0.44	0.45	0.48	0.44	0.38	-0.03	0.10	0.46	1.00								
22	0.04	-0.11	-0.11	0.07	0.12	0.02	-0.17	-0.14	-0.06	-0.05	1.00							
23	0.28	-0.01	-0.08	0.17	0.06	0.00	0.03	0.02	0.22	0.06	0.28	1.00						
24	0.15	0.06	0.14	0.22	0.15	0.18	-0.15	-0.08	0.11	0.07	0.18	0.21	1.00					
25	0.34	0.20	0.24	0.09	0.08	0.09	0.04	0.17	0.16	0.15	0.06	0.15	-0.04	1.00				
26	0.32	0.19	0.16	0.08	0.11	0.17	0.02	0.16	0.21	0.10	0.06	0.07	0.00	0.87	1.00			
27	0.34	0.21	0.18	0.06	0.10	0.12	0.03	0.14	0.26	0.14	0.16	0.12	-0.05	0.76	0.82	1.00		
28	0.26	0.19	0.17	0.02	0.00	0.08	-0.02	0.26	0.16	0.10	0.09	0.09	-0.09	0.76	0.76	0.65	1.00	
29	0.16	-0.04	0.01	0.13	0.10	0.08	0.08	-0.04	0.00	0.02	0.25	0.27	0.08	0.23	0.21	0.28	0.11	1.00
30	0.11	-0.03	-0.01	0.16	0.12	0.12	0.12	0.01	0.06	0.10	0.21	0.25	0.03	0.13	0.13	0.17	0.05	0.86
31	0.05	-0.02	0.04	0.06	0.05	0.10	0.10	0.02	0.02	0.00	0.20	0.13	0.14	0.15	0.22	0.24	0.09	0.82
32	0.29	0.19	0.15	-0.05	-0.04	-0.07	-0.07	0.26	0.38	-0.01	0.01	0.26	0.04	0.31	0.22	0.22	0.25	0.00
33	0.32	0.27	0.19	0.08	0.15	0.10	0.06	0.26	0.37	0.10	0.09	0.32	0.07	0.31	0.32	0.27	0.26	0.09
34	0.14	0.12	0.04	0.03	0.10	0.01	0.14	0.05	0.22	0.01	-0.02	0.13	-0.14	0.20	0.16	0.17	0.14	0.12

Table 6. (Continued).

	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
35	0.31	0.14	0.21	0.05	0.09	0.09	0.03	0.13	0.39	0.04	0.20	0.21	0.04	0.26	0.23	0.22	0.27	0.00
36	0.17	0.00	0.08	-0.02	-0.06	-0.06	-0.03	-0.02	0.15	-0.12	0.20	0.40	-0.07	-0.03	-0.02	0.11	-0.01	0.46
37	0.27	0.08	0.20	0.12	0.08	0.07	-0.08	0.04	0.19	0.07	0.24	0.40	0.02	0.05	0.05	0.14	0.10	0.38
38	0.01	-0.07	0.06	0.07	0.02	-0.01	-0.02	0.04	-0.01	-0.10	0.22	0.25	0.11	0.06	0.16	0.14	-0.02	0.40
39	0.09	0.16	0.03	0.14	0.07	-0.01	0.02	-0.05	0.10	-0.07	0.12	0.04	-0.13	-0.05	-0.08	-0.04	-0.08	-0.18
40	0.19	0.04	0.13	-0.01	-0.03	0.02	0.12	0.09	0.12	0.05	-0.02	-0.05	-0.03	0.05	-0.09	-0.03	-0.07	0.02
41	0.23	0.12	0.09	-0.04	-0.01	-0.01	-0.06	0.24	0.28	0.00	0.19	0.33	0.07	0.24	0.21	0.21	0.23	0.18
42	0.20	0.03	0.05	0.14	0.11	0.13	-0.05	0.07	0.19	-0.07	0.18	0.43	0.06	0.17	0.16	0.25	0.09	0.41
43	0.05	-0.07	0.01	-0.10	-0.07	-0.16	-0.04	0.43	-0.07	-0.05	-0.07	-0.06	-0.04	0.05	-0.05	0.00	-0.03	0.01
44	-0.06	-0.03	-0.14	0.04	0.11	0.04	0.10	-0.06	-0.01	-0.20	-0.04	0.02	0.00	0.00	0.12	0.08	0.09	-0.02
45	-0.10	-0.04	-0.05	-0.07	-0.09	0.11	-0.17	-0.05	-0.04	-0.14	-0.07	-0.13	0.13	-0.13	-0.01	-0.08	0.02	-0.26
46	0.07	-0.04	-0.05	-0.06	-0.13	-0.20	0.10	0.12	0.10	0.02	0.19	0.16	-0.01	0.06	-0.01	0.10	0.04	0.23
47	0.02	-0.11	-0.06	-0.16	-0.20	-0.18	-0.06	0.17	0.10	0.00	0.03	0.00	0.01	-0.01	0.00	0.00	0.06	0.20
48	-0.05	-0.12	-0.05	-0.11	-0.09	-0.13	0.00	0.05	-0.08	0.08	0.05	-0.05	0.00	-0.01	-0.04	0.01	-0.06	0.14
49	-0.02	0.01	0.17	-0.06	-0.09	-0.14	-0.05	-0.07	-0.13	-0.10	0.06	-0.06	-0.03	0.11	-0.01	0.05	0.04	0.05

Table 6. (Continued).

	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
1																				
2																				
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25																				
26																				
27																				
28																				
29																				
30	1.00																			
31	0.84	1.00																		
32	0.02	-0.01	1.00																	
33	0.13	0.13	0.71	1.00																
34	0.22	0.07	0.54	0.55	1.00															

Table 6. (Continued).

	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
35	0.04	0.06	0.70	0.75	0.54	1.00														
36	0.44	0.36	0.28	0.34	0.41	0.32	1.00													
37	0.43	0.35	0.31	0.43	0.49	0.42	0.84	1.00												
38	0.44	0.56	0.19	0.33	0.24	0.26	0.59	0.59	1.00											
39	-0.15	-0.15	-0.08	-0.07	-0.14	0.05	0.05	0.01	0.00	1.00										
40	0.01	-0.05	0.19	0.04	0.14	0.15	0.05	0.02	-0.06	-0.12	1.00									
41	0.22	0.21	0.77	0.77	0.44	0.68	0.38	0.44	0.26	-0.11	0.12	1.00								
42	0.40	0.38	0.41	0.37	0.26	0.36	0.49	0.42	0.51	0.06	-0.01	0.47	1.00							
43	-0.01	0.05	0.15	0.05	0.00	0.06	-0.06	-0.07	-0.02	-0.09	0.63	0.11	-0.05	1.00						
44	0.06	0.02	-0.09	0.02	0.04	0.02	0.08	0.11	0.05	-0.04	-0.28	0.07	0.03	-0.30	1.00					
45	-0.22	-0.17	-0.06	0.04	0.02	-0.10	-0.07	-0.06	-0.05	0.01	0.03	-0.03	-0.09	-0.07	-0.11	1.00				
46	0.22	0.11	0.06	0.00	-0.03	0.05	0.29	0.20	0.06	0.01	0.12	0.06	0.11	0.08	-0.04	-0.37	1.00			
47	0.19	0.13	0.20	0.03	0.15	0.15	0.18	0.12	0.08	-0.07	0.26	0.25	0.13	0.30	-0.31	-0.22	0.56	1.00		
48	0.12	0.12	0.11	-0.04	0.07	-0.02	-0.02	-0.03	0.05	-0.05	0.08	0.03	0.07	0.16	-0.49	-0.26	0.30	0.57	1.00	
49	-0.12	-0.10	0.10	-0.01	-0.05	0.15	-0.13	-0.10	-0.07	0.03	0.03	0.04	-0.04	0.04	-0.33	-0.09	-0.08	0.06	-0.04	1.00

Table 7. Fit statistics for all tested models.

		χ2	df	χ2'	df'	TLI	RMSEA	Model AIC	GFI	PGFI
Model 0 Interpersonal trust	Model 0	10324.52	404	190.66	24	0.78	0.22	712.66	0.98	0.09
	I-Null	18304.44	630							
	I-Sat	10133.86	380							
Model 0.1 Interpersonal trust	Model 0.1	10115.73	279	792.22	71	0.70	0.27	1044.22	0.87	0.35
	I-Null	15309.65	382							
	I-Sat	9323.52	208							
Model 0.2 Interpersonal trust	Model 0.2	10405.78	307	894.45	98	0.75	0.24	1090.45	0.85	0.48
	I-Null	15309.65	382							
	I-Sat	9511.33	209							
Model 0.3 Interpersonal trust - Final	Model 0.3	10112.80	309	742.30	101	0.81	0.21	934.30	0.88	0.51
	I-Null	15309.65	382							
	I-Sat	9370.50	208							
Model 1 Interpersonal trust & trust in technology (no relationship)	Model 1	21888.48	738	4410.06	338	0.68	0.29	4738.06	0.76	0.55
	I-Null	35863.17	871							
	I-Sat	17478.42	400							
Model 2 Interpersonal trust & trust in technology (tech->trust)	Model 2	21897.32	744	4418.90	344	0.69	0.29	4734.90	0.76	0.55
	I-Null	35863.17	871							
	I-Sat	17478.42	400							
Model 3 Interpersonal trust & trust in technology (trust->tech)	Model 3	21567.81	744	4089.39	344	0.71	0.28	4405.39	0.78	0.57
	I-Null	35863.17	871							
	I-Sat	17478.42	400							
Model3i Interpersonal trust & trust in technology & intentions	Model 3i	24998.69	908	4857.93	479	0.73	0.25	5201.93	0.77	0.60
	I-Null	41670.64	1048							
	I-Sat	20140.76	429							

Table 8. Unstandardized and standardized coefficients for Model 0 Interpersonal trust model (Figure 11).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Trust_pre							
	Propensity to trust people	0.21	(0.23)	0.14	(0.14)	0.95	
	Ability_pre	0.10	(0.30)	0.04	(0.13)	0.34	
	Benevolence_pre	0.46	(0.46)	0.23	(0.23)	0.99	
	Integrity_pre	0.47	(0.46)	0.32	(0.31)	1.02	
	Ability*Propensity	0.04	(0.07)	0.15	(0.27)	0.56	
	Benevolence*Propensity	-0.05	(0.10)	-0.19	(0.37)	-0.51	
	Integrity*Propensity	-0.06	(0.10)	-0.24	(0.43)	-0.56	
Assent							
	Trust_pre	0.18	(0.31)	0.08	(0.13)	0.60	
	Risk	0.13	(0.30)	0.03	(0.08)	0.44	
	Trust*Risk	-0.04	(0.08)	-0.09	(0.16)	-0.55	
Affect							
	Trust_pre	-0.25	(0.33)	-0.10	(0.13)	-0.76	
	Risk	-0.44	(0.32)	-0.11	(0.08)	-1.39	
	Trust*Risk	0.07	(0.08)	0.14	(0.16)	0.87	
Questions							
	Trust_pre	0.15	(0.43)	0.05	(0.13)	0.34	
	Risk	0.06	(0.41)	0.01	(0.08)	0.14	
	Trust*Risk	-0.04	(0.11)	-0.05	(0.16)	-0.34	
Future							
	Trust_pre	0.04	(0.31)	0.02	(0.13)	0.12	
	Risk	0.17	(0.30)	0.05	(0.08)	0.59	
	Trust*Risk	-0.01	(0.08)	-0.02	(0.16)	-0.10	
Dyad performance							
	Assent	0.51	(0.49)	0.11	(0.11)	1.02	
	Affect	-0.63	(0.39)	-0.15	(0.09)	-1.61	
	Future	-0.35	(0.36)	-0.08	(0.08)	-0.98	
	Questions	0.19	(0.30)	0.06	(0.09)	0.63	
	Performance own	0.49	(0.05)	0.45	(0.04)	10.69	*
Ability_post							
	Dyad performance	0.01	(0.00)	0.32	(0.07)	4.36	*
	Ability_pre	0.22	(0.01)	0.25	(0.01)	20.76	*
Benevolence_post							
	Dyad performance	0.01	(0.00)	0.25	(0.07)	3.44	*
	Benevolence_pre	0.27	(0.02)	0.25	(0.02)	15.68	*
Integrity_post							
	Dyad performance	0.00	(0.01)	-0.03	(0.07)	-0.38	
	Integrity_pre	0.16	(0.05)	0.11	(0.03)	3.47	*
Trust_post							
	Ability_post	0.35	(0.07)	0.12	(0.03)	4.74	*
	Benevolence_post	0.28	(0.06)	0.15	(0.03)	4.50	*
	Integrity_post	0.31	(0.06)	0.31	(0.05)	5.65	*

*p<.05

Table 9. Unstandardized and standardized coefficients for Model 0.3 Final interpersonal trust model (Figure 12).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Ability_pre							
	Propensity to trust people	0.21	(0.03)	0.31	(0.04)	8.27	*
Benevolence_pre							
	Propensity to trust people	0.20	(0.04)	0.24	(0.04)	6.05	*
Integrity_pre							
	Propensity to trust people	0.20	(0.05)	0.18	(0.04)	4.24	*
Trust_pre							
	Propensity to trust people	-0.03	(0.07)	-0.02	(0.05)	-0.41	
	Ability_pre	0.27	(0.06)	0.12	(0.02)	4.78	*
	Benevolence_pre	0.21	(0.07)	0.11	(0.04)	3.03	*
	Integrity_pre	0.24	(0.08)	0.17	(0.06)	3.11	*
Assent							
	Trust_pre	0.02	(0.08)	0.01	(0.04)	0.23	
	Risk	-0.03	(0.10)	-0.01	(0.03)	-0.25	
Affect							
	Trust_pre	0.03	(0.09)	0.01	(0.04)	0.29	
	Risk	-0.18	(0.11)	-0.04	(0.03)	-1.66	
Questions							
	Trust_pre	0.00	(0.12)	0.00	(0.04)	0.02	
	Risk	-0.08	(0.14)	-0.01	(0.03)	-0.55	
Future							
	Trust_pre	0.01	(0.08)	0.00	(0.04)	0.08	
	Risk	0.15	(0.10)	0.04	(0.03)	1.45	
Dyad performance							
	Questions	0.19	(0.30)	0.06	(0.09)	0.63	
	Future	-0.35	(0.36)	-0.08	(0.08)	-0.98	
	Assent	0.51	(0.49)	0.113	(0.11)	1.02	
	Affect	-0.63	(0.39)	-0.15	(0.09)	-1.61	
	Performance own	0.49	(0.05)	0.45	(0.04)	10.64	*
Ability_post							
	Propensity to trust people	0.08	(0.02)	0.14	(0.04)	3.47	*
	Dyad performance	0.01	(0.00)	0.31	(0.07)	4.50	*
	Ability_pre	0.21	(0.01)	0.25	(0.01)	18.48	*
Benevolence_post							
	Propensity to trust people	0.16	(0.04)	0.19	(0.04)	4.76	*
	Dyad performance	0.01	(0.00)	0.23	(0.07)	3.31	*
	Benevolence_pre	0.26	(0.02)	0.24	(0.02)	14.86	*

Table 9. (continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Integrity_post							
	Propensity to trust people	-0.11	(0.08)	-0.07	(0.05)	-1.41	
	Dyad performance	0.00	(0.01)	-0.02	(0.07)	-0.34	
	Integrity_pre	0.17	(0.05)	0.12	(0.03)	3.66	*
Trust_post							
	Ability_post	0.35	(0.07)	0.12	(0.03)	4.74	*
	Benevolence_post	0.28	(0.06)	0.15	(0.03)	4.50	*
	Integrity_post	0.31	(0.06)	0.31	(0.05)	5.63	*

*p<.05

Table 10. Unstandardized and standardized coefficients for Model 1 – Augmented trust model (Figure 13).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Ability_pre							
	Propensity to trust people	0.19	(0.03)	0.28	(0.04)	7.52	*
Benevolence_pre							
	Propensity to trust people	0.16	(0.03)	0.20	(0.04)	5.06	*
Integrity_pre							
	Propensity to trust people	0.14	(0.04)	0.13	(0.04)	3.39	*
Reliability_pre							
	Propensity to trust technology	0.42	(0.03)	0.34	(0.02)	17.87	*
Helpfulness_pre							
	Propensity to trust technology	0.35	(0.02)	0.33	(0.02)	16.85	*
Functionality_pre							
	Propensity to trust technology	0.37	(0.03)	0.26	(0.02)	12.89	*
Trust_pre							
	Propensity to trust people	-0.03	(0.07)	-0.02	(0.05)	-0.89	
	Ability_pre	0.27	(0.06)	0.12	(0.02)	4.96	*
	Benevolence_pre	0.21	(0.07)	0.11	(0.04)	2.53	*
	Integrity_pre	0.24	(0.08)	0.17	(0.05)	3.66	*
Assent							
	Trust_pre	0.00	(0.09)	0.00	(0.04)	0.03	
	Risk	-0.04	(0.10)	-0.01	(0.03)	-0.40	
	Reliability_pre	-0.06	(0.14)	-0.01	(0.03)	-0.46	
	Helpfulness_pre	0.10	(0.18)	0.02	(0.04)	0.55	
	Functionality_pre	0.13	(0.12)	0.03	(0.02)	1.12	
Affect							
	Trust_pre	-0.02	(0.09)	-0.01	(0.04)	-0.18	
	Risk	-0.21	(0.11)	-0.05	(0.03)	-1.88	
	Reliability_pre	0.14	(0.04)	0.03	(0.01)	3.29	*
	Helpfulness_pre	0.06	(0.02)	0.01	(0.01)	2.56	*
	Functionality_pre	0.11	(0.03)	0.02	(0.01)	3.45	*
Questions							
	Trust_pre	-0.02	(0.12)	-0.01	(0.04)	-0.13	
	Risk	-0.09	(0.14)	-0.02	(0.03)	-0.67	
	Reliability_pre	-0.11	(0.07)	-0.02	(0.01)	-1.56	
	Helpfulness_pre	0.25	(0.22)	0.05	(0.04)	1.12	
	Functionality_pre	0.08	(0.18)	0.01	(0.03)	0.46	
Future							
	Trust_pre	0.04	(0.08)	0.02	(0.04)	0.46	
	Risk	0.15	(0.10)	0.04	(0.03)	1.48	
	Reliability_pre	-0.45	(0.09)	-0.10	(0.02)	-4.98	*
	Helpfulness_pre	0.19	(0.03)	0.05	(0.01)	6.28	*
	Functionality_pre	0.16	(0.03)	0.03	(0.01)	4.69	*

Table 10 (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Dyad performance							
	Questions	0.19	(0.30)	0.06	(0.09)	0.63	
	Future	-0.35	(0.36)	-0.08	(0.08)	-0.98	
	Assent	0.51	(0.49)	0.11	(0.11)	1.02	
	Affect	-0.63	(0.39)	-0.15	(0.09)	-1.61	
	Performance own	0.49	(0.05)	0.45	(0.04)	10.65	*
Ability_post							
	Propensity to trust people	0.06	(0.02)	0.10	(0.04)	2.60	*
	Dyad performance	0.01	(0.00)	0.31	(0.07)	4.53	*
	Ability_pre	0.21	(0.01)	0.25	(0.01)	18.65	*
Benevolence_post							
	Propensity to trust people	0.11	(0.03)	0.13	(0.04)	3.49	*
	Dyad performance	0.01	(0.00)	0.24	(0.07)	3.35	*
	Benevolence_pre	0.26	(0.02)	0.25	(0.02)	15.11	*
Integrity_post							
	Propensity to trust people	-0.11	(0.07)	-0.07	(0.04)	-1.57	
	Dyad performance	0.00	(0.01)	-0.02	(0.07)	-0.34	
	Integrity_pre	0.17	(0.05)	0.11	(0.03)	3.67	*
Reliability_post							
	Dyad performance	-0.01	(0.00)	-0.16	(0.06)	-2.58	*
	Reliability_pre	0.35	(0.02)	0.38	(0.02)	25.21	*
	Propensity to trust technology	0.24	(0.02)	0.20	(0.02)	10.32	*
Helpfulness_post							
	Dyad performance	-0.01	(0.00)	-0.24	(0.06)	-3.94	*
	Helpfulness_pre	0.53	(0.01)	0.51	(0.01)	40.69	*
	Propensity to trust technology	0.15	(0.02)	0.14	(0.02)	7.57	*
Functionality_post							
	Dyad performance	0.00	(0.00)	-0.04	(0.07)	-0.63	
	Functionality_pre	0.33	(0.02)	0.43	(0.02)	25.46	*
	Propensity to trust technology	0.19	(0.02)	0.18	(0.02)	9.09	*
Trust_post							
	Ability_post	0.35	(0.07)	0.13	(0.03)	4.68	*
	Benevolence_post	0.25	(0.07)	0.13	(0.04)	3.79	*
	Integrity_post	0.29	(0.06)	0.30	(0.06)	5.04	*

*p<.05

Table 11. Unstandardized and standardized coefficients for Model 2 – Augmented trust model (Figure 14).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/S.E.	
Ability_pre							
	Propensity to trust people	0.19	(0.03)	0.28	(0.04)	7.52	*
Benevolence_pre							
	Propensity to trust people	0.16	(0.03)	0.20	(0.04)	5.06	*
Integrity_pre							
	Propensity to trust people	0.14	(0.04)	0.13	(0.04)	3.39	*
Reliability_pre							
	Propensity to trust technology	0.42	(0.03)	0.34	(0.02)	17.87	*
Helpfulness_pre							
	Propensity to trust technology	0.35	(0.02)	0.33	(0.02)	16.85	*
Functionality_pre							
	Propensity to trust technology	0.37	(0.03)	0.26	(0.02)	12.89	*
Trust_pre							
	Propensity to trust people	-0.02	(0.07)	-0.01	(0.05)	-0.23	
	Ability_pre	0.27	(0.06)	0.12	(0.03)	4.71	*
	Benevolence_pre	0.21	(0.07)	0.11	(0.04)	3.02	*
	Integrity_pre	0.24	(0.08)	0.17	(0.05)	3.12	*
	Reliability_pre	0.01	(0.08)	0.00	(0.04)	0.08	
	Helpfulness_pre	-0.05	(0.06)	-0.02	(0.03)	-0.92	
	Functionality_pre	0.02	(0.08)	0.01	(0.05)	0.21	
Assent							
	Trust_pre	0.00	(0.09)	0.00	(0.04)	0.03	
	Risk	-0.04	(0.10)	-0.01	(0.03)	-0.40	
	Reliability_pre	-0.06	(0.14)	-0.01	(0.03)	-0.46	
	Helpfulness_pre	0.10	(0.18)	0.02	(0.04)	0.55	
	Functionality_pre	0.13	(0.12)	0.03	(0.02)	1.12	
Affect							
	Trust_pre	-0.02	(0.09)	-0.01	(0.04)	-0.18	
	Risk	-0.21	(0.11)	-0.05	(0.03)	-1.88	
	Reliability_pre	0.14	(0.04)	0.03	(0.01)	3.29	*
	Helpfulness_pre	0.06	(0.02)	0.01	(0.01)	2.56	*
	Functionality_pre	0.11	(0.03)	0.02	(0.01)	3.45	*
Questions							
	Trust_pre	-0.02	(0.12)	-0.01	(0.04)	-0.13	
	Risk	-0.09	(0.14)	-0.02	(0.03)	-0.67	
	Reliability_pre	-0.11	(0.07)	-0.02	(0.01)	-1.56	
	Helpfulness_pre	0.25	(0.22)	0.05	(0.04)	1.12	
	Functionality_pre	0.08	(0.18)	0.01	(0.03)	0.46	

Table 11 (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/S.E.	
Future							
	Trust_pre	0.04	(0.08)	0.02	(0.04)	0.46	
	Risk	0.15	(0.10)	0.04	(0.03)	1.48	
	Reliability_pre	-0.45	(0.09)	-0.10	(0.02)	-4.98	*
	Helpfulness_pre	0.19	(0.03)	0.05	(0.01)	6.28	*
	Functionality_pre	0.16	(0.03)	0.03	(0.01)	4.69	*
Dyad performance							
	Questions	0.19	(0.30)	0.06	(0.09)	0.63	
	Future	-0.35	(0.36)	-0.08	(0.08)	-0.98	
	Assent	0.51	(0.49)	0.11	(0.11)	1.02	
	Affect	-0.63	(0.39)	-0.15	(0.09)	-1.61	
	Performance own	0.49	(0.05)	0.45	(0.04)	10.65	*
Ability_post							
	Propensity to trust people	0.06	(0.02)	0.10	(0.04)	2.60	*
	Dyad performance	0.01	(0.00)	0.31	(0.07)	4.53	*
	Ability_pre	0.21	(0.01)	0.25	(0.01)	18.65	*
Benevolence_post							
	Propensity to trust people	0.11	(0.03)	0.13	(0.04)	3.49	*
	Dyad performance	0.01	(0.00)	0.24	(0.07)	3.35	*
	Benevolence_pre	0.26	(0.02)	0.25	(0.02)	15.11	*
Integrity_post							
	Propensity to trust people	-0.11	(0.07)	-0.07	(0.04)	-1.57	
	Dyad performance	0.00	(0.01)	-0.02	(0.07)	-0.34	
	Integrity_pre	0.17	(0.05)	0.11	(0.03)	3.67	*
Reliability_post							
	Dyad performance	-0.01	(0.00)	-0.16	(0.06)	-2.59	*
	Reliability_pre	0.35	(0.02)	0.38	(0.02)	25.20	*
	Propensity to trust technology	0.24	(0.02)	0.20	(0.02)	10.41	*
Helpfulness_post							
	Dyad performance	-0.01	(0.00)	-0.24	(0.06)	-3.93	*
	Helpfulness_pre	0.53	(0.01)	0.51	(0.01)	40.73	*
	Propensity to trust technology	0.15	(0.02)	0.13	(0.02)	7.51	*
Functionality_post							
	Dyad performance	0.00	(0.00)	-0.04	(0.07)	-0.61	
	Functionality_pre	0.33	(0.02)	0.43	(0.02)	25.46	*
	Propensity to trust technology	0.19	(0.02)	0.18	(0.02)	8.92	*

Table 11 (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/S.E.	
Trust_post							
	Ability_post	0.35	(0.07)	0.12	(0.03)	4.81	*
	Benevolence_post	0.30	(0.07)	0.16	(0.03)	4.53	*
	Integrity_post	0.31	(0.06)	0.31	(0.06)	5.57	*
	Reliability_post	-0.09	(0.09)	-0.04	(0.04)	-1.00	
	Helpfulness_post	-0.01	(0.05)	0.00	(0.02)	-0.18	
	Functionality_post	0.07	(0.10)	0.03	(0.04)	0.69	

*p<.05

Table 12. Unstandardized and standardized coefficients for Model 3 – Augmented trust model (Figure 15).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Ability_pre							
	Propensity to trust people	0.19	(0.03)	0.28	(0.04)	7.52	*
Benevolence_pre							
	Propensity to trust people	0.16	(0.03)	0.20	(0.04)	5.06	*
Integrity_pre							
	Propensity to trust people	0.14	(0.04)	0.13	(0.04)	3.39	*
Reliability_pre							
	Propensity to trust technology	0.41	(0.03)	0.32	(0.02)	16.37	*
	Trust_pre	0.14	(0.02)	0.26	(0.04)	6.93	*
Helpfulness_pre							
	Propensity to trust technology	0.34	(0.02)	0.31	(0.02)	15.95	*
	Trust_pre	0.08	(0.02)	0.18	(0.04)	4.56	*
Functionality_pre							
	Propensity to trust technology	0.36	(0.03)	0.25	(0.02)	12.24	*
	Trust_pre	0.10	(0.02)	0.16	(0.04)	4.08	*
Trust_pre							
	Propensity to trust people	-0.03	(0.07)	-0.02	(0.05)	-0.41	
	Ability_pre	0.27	(0.06)	0.12	(0.02)	4.78	*
	Benevolence_pre	0.21	(0.07)	0.11	(0.04)	3.03	*
	Integrity_pre	0.24	(0.08)	0.17	(0.05)	3.11	*
Assent							
	Trust_pre	0.00	(0.09)	0.00	(0.04)	0.03	
	Risk	-0.04	(0.10)	-0.01	(0.03)	-0.40	
	Reliability_pre	-0.06	(0.14)	-0.01	(0.03)	-0.46	
	Helpfulness_pre	0.10	(0.18)	0.03	(0.05)	0.55	
	Functionality_pre	0.13	(0.12)	0.03	(0.02)	1.12	
Affect							
	Trust_pre	-0.02	(0.09)	-0.01	(0.04)	-0.18	
	Risk	-0.21	(0.11)	-0.05	(0.03)	-1.88	
	Reliability_pre	0.14	(0.04)	0.03	(0.01)	3.29	*
	Helpfulness_pre	0.06	(0.02)	0.01	(0.01)	2.56	*
	Functionality_pre	0.11	(0.03)	0.02	(0.01)	3.45	*
Questions							
	Trust_pre	-0.02	(0.12)	-0.01	(0.04)	-0.13	
	Risk	-0.09	(0.14)	-0.02	(0.03)	-0.67	
	Reliability_pre	-0.11	(0.07)	-0.02	(0.01)	-1.56	
	Helpfulness_pre	0.25	(0.22)	0.05	(0.04)	1.12	
	Functionality_pre	0.08	(0.18)	0.01	(0.03)	0.46	

Table 12. (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Future							
	Trust_pre	0.04	(0.08)	0.02	(0.04)	0.46	
	Risk	0.15	(0.10)	0.04	(0.03)	1.48	
	Reliability_pre	-0.45	(0.09)	-0.10	(0.02)	-4.97	*
	Helpfulness_pre	0.19	(0.03)	0.05	(0.01)	6.27	*
	Functionality_pre	0.16	(0.03)	0.03	(0.01)	4.69	*
Dyad performance							
	Questions	0.19	(0.30)	0.06	(0.09)	0.63	
	Future	-0.35	(0.36)	-0.08	(0.08)	-0.98	
	Assent	0.51	(0.49)	0.11	(0.11)	1.02	
	Affect	-0.63	(0.39)	-0.15	(0.09)	-1.61	
	Performance own	0.49	(0.05)	0.45	(0.04)	10.65	*
Ability_post							
	Propensity to trust people	0.06	(0.02)	0.10	(0.04)	2.60	*
	Dyad performance	0.01	(0.00)	0.31	(0.07)	4.53	*
	Ability_pre	0.21	(0.01)	0.25	(0.01)	18.65	*
Benevolence_post							
	Propensity to trust people	0.11	(0.03)	0.13	(0.04)	3.49	*
	Dyad performance	0.01	(0.00)	0.24	(0.07)	3.35	*
	Benevolence_pre	0.26	(0.02)	0.25	(0.02)	15.11	*
Integrity_post							
	Propensity to trust people	-0.11	(0.07)	-0.07	(0.04)	-1.57	
	Dyad performance	0.00	(0.01)	-0.02	(0.07)	-0.34	
	Integrity_pre	0.17	(0.05)	0.11	(0.03)	3.67	*
Reliability_post							
	Dyad performance	-0.01	(0.00)	-0.18	(0.06)	-3.13	*
	Reliability_pre	0.34	(0.02)	0.34	(0.02)	21.34	*
	Propensity to trust technology	0.20	(0.02)	0.16	(0.02)	8.62	*
	Trust_post	0.24	(0.02)	0.46	(0.03)	15.02	*
Helpfulness_post							
	Dyad performance	-0.01	(0.00)	-0.24	(0.06)	-4.42	*
	Helpfulness_pre	0.52	(0.01)	0.46	(0.01)	33.87	*
	Propensity to trust technology	0.12	(0.02)	0.10	(0.02)	6.00	*
	Trust_post	0.20	(0.02)	0.42	(0.03)	13.92	*
Functionality_post							
	Dyad performance	0.00	(0.00)	-0.07	(0.06)	-1.27	
	Functionality_pre	0.32	(0.02)	0.37	(0.02)	21.09	*
	Propensity to trust technology	0.16	(0.02)	0.13	(0.02)	7.07	*
	Trust_post	0.25	(0.02)	0.50	(0.03)	17.18	*

Table 12. (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Trust_post							
	Ability_post	0.35	(0.07)	0.12	(0.03)	4.74	*
	Benevolence_post	0.28	(0.06)	0.15	(0.03)	4.50	*
	Integrity_post	0.31	(0.06)	0.31	(0.05)	5.64	*

*p<.05

Table 13. ANOVA results before and after accounting for nonindependence.

	Original F	Corrected F	η^2	r_I
Ability_pre	F(3,160)=23.02	F(3,171.34)=18.66	0.30	0.22
Benevolence_pre	F(3,160)=26.90	F(3,164.86)=23.77	0.34	0.12
Integrity_pre	F(3,160)=19.97	F(3,162.42)=19.01	0.27	0.05
Trust_pre	F(3,160)=20.56	F(3,163.07)=19.01	0.28	0.08
Reliability_pre	F(3,160)=18.68	F(3,163.07)=20.32	0.26	-0.08
Functionality_pre	F(3,160)=19.75	F(3,167.54)=24.14	0.27	-0.18
Helpfulness_pre	F(3,160)=24.70	F(3,164.85)=28.43	0.32	-0.13

Table 14. Means, standard deviations, and condition differences for each of the seven pre-collaboration trust measures (interpersonal trust and trust in technology).

	Condition 1 (High people, High technology)	Condition 2 (High people, Low technology)	Condition 3 (Low people, High technology)	Condition 4 (Low people, Low technology)	Significant differences between conditions
N	40	44	44	36	
Ability _pre M	5.36	5.60	3.70	3.63	C1-C3, C1-C4,
SD	1.19	0.91	1.95	1.34	C2-C3, C2-C4
Benevolence_pre M	4.54	4.64	2.80	2.89	C1-C3, C1-C4,
SD	1.19	1.05	1.95	1.34	C2-C3, C2-C4
Integrity_pre M	4.49	4.55	3.08	3.13	C1-C3, C1-C4,
SD	1.11	0.85	1.47	1.17	C2-C3, C2-C4
Trust_pre M	4.09	4.43	2.89	3.15	C1-C3, C1-C4,
SD	1.11	0.76	1.47	1.17	C2-C3, C2-C4
Reliability_pre M	5.47	4.76	5.62	3.65	C1-C2, C1-C4, C2-C3, C2-C4,
SD	0.91	1.37	1.14	1.65	C3-C4
Functionality_pre M	6.00	5.07	5.90	4.19	C1-C2, C1-C4, C2-C3, C2-C4,
SD	0.91	1.20	1.14	1.65	C3-C4
Helpfulness_pre M	5.56	4.44	5.47	3.25	C1-C2, C1-C4, C2-C3, C2-C4,
SD	0.97	1.48	1.00	1.82	C3-C4

Table 15. Standardized and unstandardized coefficients for Model 3i – Augmented trust model with intention outcomes.

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Ability_pre							
	Propensity to trust people	0.19	(0.03)	0.28	(0.04)	7.52	*
Benevolence_pre							
	Propensity to trust people	0.16	(0.03)	0.20	(0.04)	5.06	*
Integrity_pre							
	Propensity to trust people	0.14	(0.04)	0.13	(0.04)	3.39	*
Reliability_pre							
	Propensity to trust technology	0.41	(0.03)	0.32	(0.02)	16.37	*
	Trust_pre	0.14	(0.02)	0.26	(0.04)	6.93	*
Helpfulness_pre							
	Propensity to trust technology	0.34	(0.02)	0.31	(0.02)	15.95	*
	Trust_pre	0.08	(0.02)	0.18	(0.04)	4.56	*
Functionality_pre							
	Propensity to trust technology	0.36	(0.03)	0.25	(0.02)	12.24	*
	Trust_pre	0.10	(0.02)	0.16	(0.04)	4.08	*
Trust_pre							
	Propensity to trust people	-0.03	(0.07)	-0.02	(0.05)	-0.41	
	Ability_pre	0.27	(0.06)	0.12	(0.02)	4.78	*
	Benevolence_pre	0.21	(0.07)	0.11	(0.04)	3.03	*
	Integrity_pre	0.24	(0.08)	0.17	(0.05)	3.11	*
Assent							
	Trust_pre	0.00	(0.09)	0.00	(0.04)	0.03	
	Risk	-0.04	(0.10)	-0.01	(0.03)	-0.40	
	Reliability_pre	-0.06	(0.14)	-0.01	(0.03)	-0.46	
	Helpfulness_pre	0.10	(0.18)	0.03	(0.05)	0.55	
	Functionality_pre	0.13	(0.12)	0.03	(0.02)	1.12	
Affect							
	Trust_pre	-0.02	(0.09)	-0.01	(0.04)	-0.18	
	Risk	-0.21	(0.11)	-0.05	(0.03)	-1.88	
	Reliability_pre	0.14	(0.04)	0.03	(0.01)	3.29	*
	Helpfulness_pre	0.06	(0.02)	0.01	(0.01)	2.56	*
	Functionality_pre	0.11	(0.03)	0.02	(0.01)	3.45	*
Questions							
	Trust_pre	-0.02	(0.12)	-0.01	(0.04)	-0.13	
	Risk	-0.09	(0.14)	-0.02	(0.03)	-0.67	
	Reliability_pre	-0.11	(0.07)	-0.02	(0.01)	-1.56	
	Helpfulness_pre	0.25	(0.22)	0.05	(0.04)	1.12	
	Functionality_pre	0.08	(0.18)	0.01	(0.03)	0.46	

Table 15. (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Future							
	Trust_pre	0.04	(0.08)	0.02	(0.04)	0.46	
	Risk	0.15	(0.10)	0.04	(0.03)	1.48	
	Reliability_pre	-0.45	(0.09)	-0.10	(0.02)	-4.97	*
	Helpfulness_pre	0.19	(0.03)	0.05	(0.01)	6.27	*
	Functionality_pre	0.16	(0.03)	0.03	(0.01)	4.69	*
Dyad performance							
	Questions	0.19	(0.30)	0.06	(0.09)	0.63	
	Future	-0.35	(0.36)	-0.08	(0.08)	-0.98	
	Assent	0.51	(0.49)	0.11	(0.11)	1.02	
	Affect	-0.63	(0.39)	-0.15	(0.09)	-1.61	
	Performance own	0.49	(0.05)	0.45	(0.04)	10.65	*
Ability_post							
	Propensity to trust people	0.06	(0.02)	0.10	(0.04)	2.60	*
	Dyad performance	0.01	(0.00)	0.31	(0.07)	4.53	*
	Ability_pre	0.21	(0.01)	0.25	(0.01)	18.65	*
Benevolence_post							
	Propensity to trust people	0.11	(0.03)	0.13	(0.04)	3.49	*
	Dyad performance	0.01	(0.00)	0.24	(0.07)	3.35	*
	Benevolence_pre	0.26	(0.02)	0.25	(0.02)	15.11	*
Integrity_post							
	Propensity to trust people	-0.11	(0.07)	-0.07	(0.04)	-1.57	
	Dyad performance	0.00	(0.01)	-0.02	(0.07)	-0.34	
	Integrity_pre	0.17	(0.05)	0.11	(0.03)	3.67	*
Reliability_post							
	Dyad performance	-0.01	(0.00)	-0.18	(0.06)	-3.13	*
	Reliability_pre	0.34	(0.02)	0.34	(0.02)	21.34	*
	Propensity to trust technology	0.20	(0.02)	0.16	(0.02)	8.62	*
	Trust_post	0.24	(0.02)	0.46	(0.03)	15.02	*
Helpfulness_post							
	Dyad performance	-0.01	(0.00)	-0.24	(0.06)	-4.42	*
	Helpfulness_pre	0.52	(0.01)	0.46	(0.01)	33.87	*
	Propensity to trust technology	0.12	(0.02)	0.10	(0.02)	6.00	*
	Trust_post	0.20	(0.02)	0.42	(0.03)	13.92	*
Functionality_post							
	Dyad performance	0.00	(0.00)	-0.07	(0.06)	-1.27	
	Functionality_pre	0.32	(0.02)	0.37	(0.02)	21.09	*
	Propensity to trust technology	0.16	(0.02)	0.13	(0.02)	7.07	*
	Trust_post	0.25	(0.02)	0.50	(0.03)	17.18	*
Trust_post							
	Ability_post	0.35	(0.07)	0.12	(0.03)	4.74	*
	Benevolence_post	0.28	(0.06)	0.15	(0.03)	4.50	*
	Integrity_post	0.31	(0.06)	0.31	(0.05)	5.64	*

Table 15. (Continued).

Variable	on:	Estimate	(S.E.)	St. Estimate	(S.E.)	St. Estimate/ S.E.	
Intent to continue the interaction							
	Reliability_post	0.24	(0.04)	0.17	(0.03)	5.64	*
	Functionality_post	-0.04	(0.04)	-0.03	(0.03)	-0.87	
	Helpfulness_post	0.04	(0.02)	0.03	(0.02)	1.72	
	Trust_post	0.54	(0.02)	0.73	(0.02)	45.64	*
Intent to continue using the technology							
	Reliability_post	0.44	(0.05)	0.30	(0.03)	9.16	*
	Functionality_post	-0.05	(0.05)	-0.03	(0.03)	-1.02	
	Helpfulness_post	0.24	(0.03)	0.15	(0.02)	8.89	*
	Trust_post	0.38	(0.03)	0.51	(0.02)	20.85	*

*p<.05

Table 16. Correlations between Collaboration Variables and Dyadic Performance for Process Gain (N=37) and Process Loss (N=41) Dyads

Process Gain Dyads

	Future	Affect	Assent	Questions
Performance_dyad	-.01	.01	.23	.08
Future		-.48**	-.39*	-.21
Affect			.54**	.14
Assent				.44**

Process Loss Dyads

	Future	Affect	Assent	Questions
Performance_dyad	-.16	.30	.49**	.24
Future		-.24	-.08	-.35*
Affect			.55**	.37*
Assent				.62**

**p<.01
*p<.05

APPENDICES

Appendix A:Definition of Terms

Trusting belief – a belief that the other party has suitable attributes for performing as expected in a specific situation…irrespective of the ability to monitor or control the other party (Mayer, Schoorman, & Davis, 1995 from McKnight, Carter, Thatcher, & Clay, 2011, pg. 17).

Interpersonal trust – the willingness to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the trustor's ability to monitor or control that other party (Mayer, Davis, & Schoorman, 1995, pg. 712)

Trust in technology – a belief that a specific technology has the attributes necessary to perform as expected in a given situation in which negative consequences are possible (McKnight et al., 2011, pg. 17).

Trustor – a participant in an interaction who is dependent on another participant

Trustee – a participant in an interaction that another (the trustor) depends on

Technology-mediated communication – a communication process during which the members of the interaction are not communicating face-to-face but rather through a technological medium (e.g. telephone, computer)

ICTs – Information and Communication Technologies (e.g. computers, mobile phones)

Appendix B: Experimental Conditions

Condition 1 (high trust in people, high trust in technology)

You will work on this task with another person. You have to work virtually and use the present technology. Your final score on the task will determine the points you will receive for completing this study. The person you are working with has the necessary knowledge and abilities to complete this task. Also, the person you are working with wants to do well on the task because they want you to get the maximal points possible. This person is honest and reliable. The software that you will be using has all the features and functions that you will need to complete the task. If you need technical assistance, the "Help" menu has all the information you may need. Also, this software is very reliable and never breaks down.

Condition 2 (high trust in people, low trust in technology)

You will work on this task with another person. You have to work virtually and use the present technology. Your final score on the task will determine the points you will receive for completing this study. The person you are working with has the necessary knowledge and abilities to complete this task. Also, the person you are working with wants to do well on the task because they want you to get the maximal points possible. This person is honest and reliable. The software that you will be using doesn't have all the features and functions that you will need to complete the task. If you need technical assistance, you'll have to figure it out because the "Help" menu doesn't have the information you may need. Also, this software isn't very reliable and we have been experiencing some issues with it.

Condition 3 (low trust in people, high trust in technology)

You will work on this task with another person. You have to work virtually and use the present technology. Your final score on the task will determine the points you will receive for completing this study. The person you are working with doesn't have the necessary knowledge and abilities to complete this task. Also, the person you are working with does not care how well they do on the task because they don't want you to get the maximal points possible. This person is not very honest and reliable. The software that you will be using has all the features and functions that you will need to complete the task. If you need technical assistance, the "Help" menu has all the information you may need. Also, this software is very reliable and never breaks down.

Condition 4 (low trust in people, low trust in technology)

You will work on this task with another person. You have to work virtually and use the present technology. Your final score on the task will determine the points you will receive for completing this study. The person you are working with doesn't have the necessary knowledge and abilities to complete this task. Also, the person you are working with does not care how well they do on the task because they don't want you to get the maximal points possible. This person is not very honest and reliable. The software that you will be using doesn't have all the features and functions that you will need to complete the task. If you need technical assistance, you'll have to figure it out because the "Help" menu doesn't have the information you may need. Also, this software isn't very reliable and we have been experiencing some issues with it.

Appendix C: Measurement Scales

Propensity to trust technology (McKnight et al., 2011)

Faith in general technology

1. I believe that most technologies are effective at what they are designed to do.
2. A large majority of technologies are excellent.
3. Most technologies have the features needed for their domain.
4. I think most technologies enable me to do what I need.

Trusting stance – general technology

1. My typical approach is to trust new technologies until they prove to me that I shouldn't trust them.
2. I usually trust a technology until it gives me a reason not to trust it.
3. I generally give a technology the benefit of the doubt when I first use it.

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Propensity to trust people (McKnight et al., 2011)

1. One should be cautious with strangers.
2. Most experts tell the truth about the limits of their knowledge
3. Most people can be counted on to do what they said they will do
4. These days, you must be alert or someone is likely to take advantage of you
5. Most salespeople are honest in describing their products
6. Most repair people will not overcharge people who are ignorant of their specialty
7. Most people answer public opinion polls honestly
8. Most adults are competent at their jobs

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Trust in technology (McKnight et al., 2011)

Reliability (Predictability/Integrity)

1. The office instant messenger is a very reliable piece of software.
2. The office instant messenger does not fail me
3. The office instant messenger does not malfunction for me

Functionality (Ability/Competence)

1. The office instant messenger has the functionality I need.
2. The office instant messenger has the features required for my tasks.
3. The office instant messenger has the ability to do what I want it to do.

Helpfulness (Benevolence)

1. The office instant messenger provides competent guidance (as needed) through a help function.
2. The office instant messenger provides whatever help I need.

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Trust in people (Serva et al., 2005)

Ability

1. I feel that my coworker is very capable of performing this job.
2. I have confidence in the skills of my coworker
3. I believe that my coworker is well qualified.

Benevolence

1. My coworker really looks out for what was important to me.
2. My needs and desires were very important to my coworker.

Integrity (Mayer et al 1995)

1. I never have to wonder whether my partner will stick to his/her word
2. My partner's actions and behaviors are not very consistent.
3. Sound principles seem to guide my partner's behavior.

Trusting intention

1. If I had my way, I wouldn't have let my partner any influence over issues that were important to this task.
2. I would have been comfortable giving my partner a task or problem that was critical to our success, even if I could not monitor his/her actions.
3. I would have been willing to let my partner have complete control over this task.
4. I really wished that I had a good way to keep an eye on my partner.

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Intention to continue the interpersonal relationship (Venkatesh et al., 2003)

1. I intend to work with this coworker again the next time I have to work with someone.
2. I would like to work with this coworker again.
3. I would choose to work with this coworker again.

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Intention to continue the use of technology (Venkatesh et al., 2003)

1. I intend to use this instant messenger system the next time I have to work with someone.
2. I predict I would use this instant messenger system the next time I have to work with someone.
3. I plan to use this instant messenger system the next time I have to work with someone

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Perceived risk (adapted from Ma & Wang, 2008)

1. Participating in this technology-mediated interaction involves more risk when compared to fact-to-face interactions.
2. Generally speaking, taking part in technology-mediated interactions is risky.
3. Using technology-mediated interactions to complete a task is risky.
4. Technology-mediated interactions are dangerous to get involved in.
5. Participating in technology-mediated interactions exposes me to overall risk.
6. The thought participating in a technology-mediated interaction causes me to experience unnecessary tension.

1	2	3	4	5	6	7
Strongly Disagree			Neither Agree nor Disagree			Strongly Agree

Survival proficiency

1. Which of the following is the best survival strategy when stranded in the desert with limited amounts of water?
    a) Wear as little clothing as possible
    b) Shield yourself from the wind (correct)
    c) Conserve water by drinking as little as possible
    d) If food is available, eat as much as you can

2. When selecting a site to build your shelter what should you NOT consider?
    a) It must contain material to make the type of shelter you need.
    b) It must be large enough and level enough for you to lie down comfortably.

c) It must be on a hill so you can signal rescuers and keep an eye on your surroundings. (correct)
d) It must be free from insects, reptiles, and poisonous plants

3. When in a desert environment what should you do to conserve water?
    a) Try to keep your eyes and mouth closed so they stay moist.
    b) Dig a hole or cover yourself with sand.
    c) Keep moving to build up sweat to cool you down.
    d) Do not eat. (correct)

4. When signaling with fire how do you form the international distress signal?
    a) 4 fires in a diamond.
    b) 4 fires in a square.
    c) 3 fires in a triangle. (correct)
    d) 3 fires in a line.

5. Mark the FALSE statement.
    a) You can use the roots of some plants to get drinkable water.
    b) When stranded in a cold place, you can eat snow to keep hydrated. (correct)
    c) You can purify water using heat and a piece cloth.
    d) When stranded in a desert, you can use cactus pulp to stay hydrated.

Appendix D: Demographic Survey

Gender
- Male
- Female
- Prefer not to answer

Sexual orientation:
- Homosexual
- Heterosexual
- Bisexual
- Other
- Prefer not to answer

Age

Ethnicity
- White/Non-Hispanic
- Hispanic/Latino
- African American/Black
- Asian
- American Indian/Alaska Native
- Native Hawaiian/ Pacific Islander
- Other
- Prefer not to answer

How frequently do share/communicate information using the following methods?

□	In person	1 (never)	2	3	4	5 (always)
□	Email	1 (never)	2	3	4	5 (always)
□	Cell phone	1 (never)	2	3	4	5 (always)
□	Chat room	1 (never)	2	3	4	5 (always)
□	Instant messenger	1 (never)	2	3	4	5 (always)
□	Video chat	1 (never)	2	3	4	5 (always)

Appendix E: Desert Survival Task (Johnson & Johnson, 2009)

You are one of the members of a geology club that is on a field trip to study unusual formations in the New Mexico desert. It is the last week in July. You have been driving over old trails, far from any road, in order to see out-of-the-way formations. At about 10:30 AM the specially equipped minibus in which your club is riding overturn, rolls into a twenty-foot ravine, and burns. The driver and the professional adviser to the club are killed. The rest of you are relatively uninjured.

You know that the nearest ranch is approximately 45 miles east of where you are. There is no closer habitation. When your club does not report to its motel that evening, you will be missed. Several persons know generally where you are, but because of the nature of your outing they will not be able to pinpoint your exact whereabouts.

The area around you is rather rugged and very dry. There is a shallow water hole nearby, but the water is contaminated by worm, animal feces and urine, and several dead mice. You heard from a weather report before you left that the temperature would reach 108^{o}F, making the surface temperature 128^{o}F. You are all dressed in lightweight summer clothing and you have hats and sunglasses.

While escaping from the minibus, each member of your group salvaged a couple of items; there are twelve in all. Your task is to rank these items according to their importance to your survival, from 1 (most important) to 12 (least important).

You may assume that the number of club members is the same as the number of persons in your group and that the group has agreed to stick together.

Rank the following items according to their importance to your survival, from 1 (most important) to 12 (least important).

- ☐ Magnetic compass
- ☐ 20 x20-ft piece of heavy-duty light blue canvas
- ☐ Book, *Plants of the Desert*
- ☐ Rearview mirror
- ☐ Large knife
- ☐ Flashlight (four-battery size)
- ☐ One jacket per person
- ☐ One transparent plastic ground cloth (6 x 4 ft) per person
- ☐ .38 caliber loaded pistol
- ☐ One 2-quart plastic canteen per person, full of water
- ☐ Accurate map of the area
- ☐ Large box of kitchen matches

Expert Solution

1. Rearview mirror
2. One jacket per person
3. One 2-quart plastic canteen per person, full of water
4. One transparent plastic ground cloth (6 x 4 ft) per person
5. Large knife
6. Large box of kitchen matches
7. 20 x20-ft piece of heavy-duty light blue canvas
8. Flashlight (four-battery size)
9. .38 caliber loaded pistol
10. Book, *Plants of the Desert*
11. Accurate map of the area
12. Magnetic compass

Appendix F: Institutional Review Board (IRB) Approval Letter

USF
UNIVERSITY OF SOUTH FLORIDA

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

April 8, 2014

Evgeniya Pavlova
Psychology
4202 East Fowler Ave, PCD4118G
Tampa, FL 33620

RE: **Exempt Certification**
IRB#: Pro00013474
Title: The effects of trust in technology and interpersonal trust on technology-mediated interactions

Study Approval Period: 4/8/2014 to 4/8/2019

Dear Ms. Pavlova:

On 4/8/2014, the Institutional Review Board (IRB) determined that your research meets USF requirements and Federal Exemption criteria as outlined in the federal regulations at 45CFR46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Approved Documents:

StudyProtocol for IRB.doc

Consent form.docx

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures. Please note that changes to this protocol may disqualify it from exempt status. Please note that you are responsible for notifying the IRB prior to implementing any changes to the currently approved protocol.

The Institutional Review Board will maintain your exemption application for a period of five years from the date of this letter or for three years after a Final Progress Report is received, whichever is longer. If you wish to continue this protocol beyond five years, you will need to submit a new application at least 60 days prior to the end of your exemption approval period. Should you complete this study prior to the end of the five-year period, you must submit a request to close the study.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John A Schinka, Ph.D.

John Schinka, Ph.D., Chairperson
USF Institutional Review Board