Talk, Trust, Succeed – The Impact of Communication in Virtual Groups on Trust in Leaders and on Performance

ABSTRACT

Although trust is widely acknowledged as critical in virtual settings, little is known regarding the antecedents and consequences of trust in leaders of virtual groups. Adopting a multi-level perspective, we propose the leadership’s communication behavior and the broader cultural context in which the group operates determine trust in leaders of virtual groups, which in turn affects the performance of the group. Combining survey and logfile data from a massively multiplayer online game (MMOG) played in 24 countries, this study’s findings showed that leaders of virtual groups who demonstrate a more expansive communication behavior are more trusted by followers. Furthermore, reasoning that culture creates a shared context that qualifies followers’ experiences, we found that collectivistic values enhanced the benefits of breadth of communication. In addition, we find that trust in leaders of virtual groups had a positive relationship to group performance. A detailed discussion of the findings for building trust in leaders of virtual groups is provided in the conclusion of the paper.

Keywords: Communication repertoire, communication breadth, trust, online games, massively multiplayer, virtual groups, virtual group work, leadership of virtual groups, media richness, performance
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INTRODUCTION

Virtual work has become a pervasive component of organizations (Hertel et al. 2005; Martins et al. 2004). Indeed, most organizations today employ some degree of virtualness (Martins et al. 2004). The defining features of virtual groups or organizations are the geographic, temporal and/or relational dispersion among members and the reliance of communication technology in lieu of face-to-face interaction (Kirkman et al. 2005). Similarly, Griffith, Sawyer and Neale (Griffith et al. 2003) conceptualize virtualness along the three dimensions of physical dispersion, level of technological support for interaction and percentage of time spent apart on tasks. As well, virtual groups and organizations are often characterized by permeable boundaries and relatively impermanent structures (Martins et al. 2004). On the one hand, these features of virtualness enable organizations to utilize diverse knowledge and resources across a wide array of persons and regions. On the other hand, they also pose significant challenges to groups and organizations that may undermine their effective functioning. Primary challenges are trust (Paul et al. 2004; Pauleen 2003) and leadership (Avolio et al. 2003; Zhang et al. 2006).

Trust among group members is considered a critical success factor in virtual work but one that is difficult to achieve (Jarvenpaa et al. 1999; Kirkman et al. 2005). Handy (Handy 1995, p. 46) famously stated that “trust needs touch,” arguing that it would be unwise to trust people with whom one does not have direct interpersonal contact. The need for trust is nevertheless evident in the nature of virtual work, which is characterized by high uncertainty, risk of
opportunism, constrained communication, and the danger of isolation and detachment (Jarvenpaa et al. 1999; Kiesler et al. 2002; Malhotra et al. 2007). These conditions require correspondingly high degrees of trust (McKnight et al. 1998) as alternative measures to regulate behavior and to protect one’s interests are limited (e.g., contracts and monitoring).

Leadership in virtual groups is equally challenging and important (Bell et al. 2002). Leaders of virtual groups must thus balance varying degrees of accountability and autonomy while working within the constraints of communication technologies and geographical dispersion of followers without personal contact (Cascio 2000; DeRosa et al. 2004; Zigurs 2003).

Despite the espoused importance of trust and leadership, research on these issues has been limited in two important ways. First, there is scant empirical research on leadership in virtual groups (e.g. Avolio et al. 2003; Zhang et al. 2006), and in particular, we know little about the leadership behaviors that are uniquely essential to effectively managing in a virtual environment. Moreover, although the antecedents and consequences of trust in virtual groups have been the subject of considerable investigation (Martins et al. 2004), we could find no studies on trust in leaders of virtual groups. This oversight is troubling given that research in traditional settings indicates that trust in leaders has an significant impact on the performance of individuals and groups (Dirks 2000; Dirks et al. 2002; Korsgaard et al. 2008), yet scholars also warn that leadership in virtual settings poses unique challenges. Thus, the requirement for, and impact of, trust in leaders of virtual groups are not known. This research deficit is especially critical with regard to the impact on performance - an aspect that is highly relevant for business organizations.

Second, trust in virtual settings has focused almost exclusively on the group level, yet theory and research on trust indicates that trust arises both from contextual factors that are
common or shared by groups and by unique experiences within the group. In other words, trust is a multi-level phenomenon in that it arises from both group-level experiences and the shared context of the groups (Korsgaard et al. 2008). Ignoring level issues can lead to erroneous inferences, such as the ecological fallacy (Selvin 1958), yet theory and research on trust in leadership in general has largely ignored the multi-level nature of the phenomenon (Korsgaard et al. 2008).

The goal of this investigation is to address these gaps in the understanding of virtual work by focusing on trust in the leaders of virtual groups and adopting a multi-level view of the formation of trust. Building on theory and research on trust in leaders and on virtual groups, we examine the joint effects of the communication behavior of leaders of virtual groups and cultural context on trust in leaders and examine the consequences of trust in leaders of virtual groups for performance. Specifically, we examine a defining feature of virtual work – communication –and how it effects are influenced by the shared context of groups. We examine these relationships utilizing a combination of survey and unobtrusive trace data in the context of a massively multiplayer online game (MMOG). In doing so, we seek to establish the theoretical and practical value of adopting a multi-level perspective on the study of trust in virtual settings. Further, we provide evidence of the importance of trust in leaders of virtual groups to the performance of groups.

**THEORETICAL FOUNDATIONS AND HYPOTHESES**

**Leading in a Virtual Context**

Scholars have argued that the task of leading in virtual settings is unique and challenging (e.g., Cascio 2000; Wakefield et al. 2008; Zigurs 2003). Unlike traditional settings virtual work is dispersed across physical, temporal, organizational or social boundaries and relies on
communication technology in order to interact with one another (Kirkman et al. 2005; Martins et al. 2004). There is some debate regarding the distinction between virtual and non-virtual settings. For example, co-located workers may opt to employ information or communication technology over face-to-face interaction. Similarly, even geographically dispersed workers may periodically interact in face-to-face settings. There are different conceptualizations of virtualness in the literature. While some researchers define virtualness as an opposite to face-to-face, others consider virtualness as a continuous variable (Kristof et al. 1995; Kirkman et al. 2005), depending on a number of dimensions such as physical and temporal dispersion and reliance on communication technology. Following Jarvenpaa and Leidner (1999), we define a virtual setting as one in which workers are temporally and geographically dispersed, and rely on information and communication technology to communicate and coordinate work (Thomas & Bostrom, 2010; Kanawattanachai & Yoo, 2007; O’Leary & Cummings, 2007; Piccoli & Ives, 2003; Griffith et al., 2003; Majchrzak et al, 2000). Note that in our study, we do not seek to investigate the effect of virtualness on our model but rather take the virtualness as our research environment. Nevertheless, it is important to note this context since the virtual environment poses significant challenges for leaders of virtual groups. Thus, within the virtual context, we focus on processes that are considered especially important to effective leadership, in our case leader communication behavior and culture.

The demands and activities of leaders may differ in a virtual setting as opposed to a traditional setting. Because of the physical separation of followers and its deleterious effects on collective trust, leaders of virtual groups are apt to face more impediments to the social integration and motivation of followers. Moreover, the nature of technology and autonomy of virtual settings may result in alternative forms of leadership, such as emergent leadership and
shared leadership (Muethel et al. 2007; Zigurs 2003). It is the responsibility of leaders to define, facilitate and encourage the groups’ performance (DeRosa et al. 2004). These responsibilities require monitoring performance, providing timely feedback, managing conflicts, and addressing other problems as they arise (c.f. Carte et al. 2006; Wakefield et al. 2008). Dispersion and technology will constrain how these activities will be performed (Thomas et al. 2010; DeRosa et al. 2004). Research in traditional settings suggests that the effectiveness of leaders in motivating employees is contingent upon followers’ trust in leaders (Dirks et al. 2002). Inspirational leadership was found to promote greater commitment and trust among virtual group members (Joshi et al. 2009). Yet, there is a notable deficit of empirical work on the antecedents and trust in leaders of virtual groups (Zhang et al. 2006). Is not clear whether the findings of traditional groups can be translated to the virtual context since leaders of virtual groups often face significant and unique communication challenges that may impede key leadership activities such as motivating and monitoring the group (Martins et al. 2004). Thus, a significant gap exists in understanding the factors that contribute to trust in leaders of virtual groups and what impact this trust has on the functioning of the group. We therefore focus the present investigation on trust in leaders of virtual groups and how it is shaped by leaders’ communication behavior.

**Trust in Leaders**

One of the primary challenges for virtual groups are trust (Paul et al. 2004; Pauleen 2003) and leadership (Avolio et al. 2003; Zhang et al. 2006) since they are critical success factors in virtual work but are especially difficult to achieve (Jarvenpaa et al. 1999; Kirkman et al. 2005) in this context. In the literature, trust has been defined in many different ways (Colquitt et al. 2007). It has been defined as the “willingness of a party to be vulnerable to the actions of another party
based on the expectation 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: 712). Others define trust as “…a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau, Sitkin, Burt & Camerer, 1998: 395), or as “the extent to which a person is confident in, and willing to act on the basis of the words, actions and decisions of another” (McAllister, 1995: 25). Trust is especially important in leadership since it positively influences performance of groups (Colquitt et al. 2007; Dirks & Ferrin, 2002).

Insight into trust in leaders of virtual groups can be drawn from the considerable body of theory and research on trust in leaders and managers (for reviews, see Colquitt et al. 2007, Korsgaard, et al., 2008). This literature suggests that there are three broad categories of determinants of trust in the leader: individual attributes, context, and experience (Korsgaard et al., 2008). Individual attributes refer to individual differences among followers in the tendency to trust, and include traits such as the propensity to trust and demographic characteristics (Colquitt et al. 2007). Contextual factors are shared features of the task or social environment that provide cues regarding risk, vulnerability and trustworthiness. Direct experiences refer to the on-going exchanges between group member and their leaders, which shape the trust group members place in leaders (Kramer 1999). In the present investigation, we focus on direct experience as it encompasses communication processes, which as noted above, are a defining feature of, and principal challenge to, leading in virtual settings.

Followers’ direct experience with leaders involves the quality of interactions and exchanges between leaders and followers (Lewicki et al. 2006). For example, theories of social exchange (e.g. Blau 1964) and of organizational justice (e.g. Tyler et al. 1992) suggest that
leaders are trusted more when they provide followers with resources and benefits in exchange for followers’ efforts and loyalty. To the extent that followers’ efforts and loyalty are not fairly reciprocated, followers question the character of the leader and trust in the leader falters. Hence, these exchanges inform followers about the trustworthiness of leaders. The role of direct experience in building trust in leadership underscores the impact of leader behavior on trust. Research shows that leaders who engage in certain behaviors that indicate trustworthiness – that is, behaviors that indicate the leaders’ integrity, benevolence and ability (Mayer et al. 1995) – are more trusted (Colquitt et al. 2007; Whitener et al. 1998).

Included among leadership behaviors that build trust is communication (Whitener et al. 1998). Quite simply, what is communicated matters. Hallmarks of an effective communication include the quantity, frequency, and accuracy of information exchange. Ceteris paribus, the more information leaders share, the more followers trust the leader (Dirks & Ferrin, 2002). Especially important is information regarding the rationale and process of decision making, both anticipating what followers might need to know and responding to their queries. Such communication enhances perceptions of the fair exchanges, thereby building trust (Colquitt Wesson, Porter, Conlon & Yee, 2001; Colquitt et al., 2007). As well, timely and accurate information from leadership is important to followers. Employees feel empowered and see their leaders as trustworthy when leaders are accurate and forthcoming in their communications (Whitener et al., 1998). Therefore, we focus on leaders’ communication behavior as a key antecedent of trust in leaders of virtual groups.

However, virtual forms of communication may constrain leaders’ ability to communicate freely and fully with followers. The technology itself may be a hindrance: asynchronous forms of communication that are common to virtual settings may limit leaders’ ability to provide two-way
communication in a timely and accurate manner. Research indicates that the effect of communication channel on trust over time strongly increases if groups switch from the electronic communication condition to the face-to-face condition (Wilson et al. 2006). Further, the dynamics of virtual communication may be an impediment. Research suggests that dispersed groups tend to communicate less frequently (O’Leary et al. 2007); thus there may be fewer opportunities for the leader to respond to the queries of followers. Thus, leader’s communication behaviour also includes the choice of communication media as this is critical to instilling trust and motivating collective action (Jarvenpaa et al. 1999). Therefore, we examine leadership communication behavior as antecedents to trust in leaders of virtual groups.

**Communication Media and Leadership of Virtual Groups**

In our study, communication media is one of the dimensions of leadership communication behavior. Over the last three decades scholars have developed numerous models to explain the impact of communication media on the effectiveness of virtual work. Early approaches suggest that computer-based communication media may eliminate the type of communication cues that individuals use to convey trust and other interpersonal affections. Theories such as media richness theory (Daft et al. 1986), social presence theory (Short et al. 1976), and social cues theory (Kiesler et al. 1984) focus on attributes of communication technology that affect the quality of information exchanges (e.g., richness, social presence, availability of social cues) that determine its effectiveness. A similar approach was adopted by Dennis and Valacich (Dennis et al. 1999; Dennis et al. 2008) who argued in media synchronicity theory that the effectiveness of communication media is determined by five critical factors – immediacy of feedback, symbol variety, parallelism, rehearsability, and reproccessability. As
well, media naturalness theory (Kock, 2004) posits that the functionality of communication technology depends on the range of cognitive obstacles posed by the medium.

Many of these and subsequent models specify a contingency, suggesting that the focal attributes of communication media are more or less effective depending on other task or person characteristics. For example, Daft and Lengel (1986) posited that the richness of the media should match the equivocality of the task, such that tasks with more conflicting viewpoints require more information-rich media. Media synchronicity theory (Dennis et al. 2008) suggests that the impact of the technology depends on the relative importance of exchanging of information (“conveyance”) or establishing shared meaning (“convergence”) to the task. Another important contingency factor, specified in channel expansion theory (Carlson et al. 1999), is the degree of experience and facility users have with the particular communication media.

Most of the empirical research on these models has focused on the impact of communication media use, social processes and task output (Kock, 2009; Maruping et al. 2004). This literature also provides strong implications for the impact of communication media on trust, generally indicating that trust is lower when individuals utilize communication media (i.e., visual, audio and text-based communication media) as compared to face-to-face interactions (Bos et al. 2001; Jensen et al. 2000; Brosig et al. 2003; Bos et al. 2002; Sheffield 1989). One reason for this deficit might be that computer-based communication media may limit communication cues that facilitate shared understanding and build trust. This implication is consistent with media richness theory (Daft et al. 1986), social presence theory (Short et al. 1976), and reduced social cues theory (Kiesler et al. 1984).

Further, certain communication media that may stall trust is the timing of communication cycles. That is, many forms of computer-mediated communication common to virtual groups
have a slower rate of transfer and feedback in comparison to face-to-face communication 
(Walther 1996). Synchronous forms of communication allow for simultaneous exchange of 
information to occur in real time, whereas asynchronous forms of communication involve a time 
delay between each communication step (Goel et al. 2003; Pinelle et al. 2003). Such delays can 
result in less timely feedback and knowledge of results of exchanges, increasing uncertainty 
about the trustworthiness of exchange partners.

Research also suggests that the relationship between communication media and trust is 
more nuanced than the aforementioned theories suggest. As noted above, these relationships are 
apt to be moderated by task characteristics (Dennis et al. 2008; Maruping et al. 2004) and 
individual differences in user experience (Carlson et al. 1999; Kayworth et al. 2000; Kelly et al. 
1990; King et al. 1997). However, even when task characteristics are held constant and users 
share similar levels of experience, the relationship between media and trust is not a simple 
statement of superior technology builds more trust. Much of the empirical research on 
comparisons of computer mediated technology and face-to-face communication over-simplifies 
the way these media are used. In practice, groups able to use a variety of media and, in doing so, 
compensate for the limitations of one medium over another.

Shachaf and Hara (2007) argue precisely this point in their theory of behavioral 
complexity, asserting that combining different communication media can offset the limitations of 
a given medium of communication. In fact, what might be a more critical factor in building trust 
might be what Shachaf and Hara (2007) refer to as channel repertoire, or the range of media 
channels used to communicate. The authors argue that a larger repertoire can balance the 
limitations of virtual communication, since different media provide the transmission of visual 
and contextual cues. In our study we use this approach to study the communication in virtual
groups by looking at the influence of channel repertoire on trust in leaders of virtual groups.

As noted previously, trust is, in part, an inference that arises from exchanges between parties (Dirks et al. 2002). A larger channel repertoire can affect both the quality of these exchanges and the subsequent inferences that arise from these exchanges. It is within the leader’s discretion to select certain channels of communication media and to share more or less information with followers. Thus, each group of followers will have their own unique patterns of communication repertoire and content influenced by the style and preferences of the leader. Leaders, who use a broad array of communication media, thereby compensating for the deficits of any given channel, provide more context cues regarding their communications. As such, utilizing a large channel repertoire should provide greater clarity regarding leaders’ intentions and enhance followers’ trust in the leaders. In short, a large repertoire of communication media should have a positive effect on trust in leaders of virtual groups. Specifically:

Hypothesis 1: The use of a large repertoire of communication media is positively related to trust in leaders of virtual groups.

Communication Content and Leadership of Virtual Groups

In their model of managerial trustworthiness, Whitener et al (1998) identify the quality of communication as an essential element in building trust in leaders. Empirical evidence reviewed by these authors and reported in a subsequent quantitative review (Colquitt et al., 2007) support this assertion. Leaders who communicate more openly and provide more feedback are more likely to be trusted by followers. We expect the importance of communication content as the second dimension of leadership communication behavior that we look at in this study to hold in virtual settings, and, indeed, may be especially important for leaders of virtual groups. Without
the ability to directly observe the actions of leaders of virtual groups, followers must rely on what is said and what information is exchanged in order to make inferences of the leaders’ competence and character. Further, without shared, face-to-face experiences with leaders of virtual groups, social bonds with followers may be slow to form (Hertel, Geister, & Konradt, 2005).

Research on communication in virtual settings suggests at least two distinct types of communication that may be important: social communication, in which group members discuss things other than the project (e.g., their hobbies, families, and weekend plans; Chidambaram 1996; Jarvenpaa et al. 1999) and task relevant communication, which is characterized by the extent to which the communication is perceived to be useful (e.g., timely and helpful with regard to the project; Jarvenpaa et al. 1999; Zack 1993). Task-related communications are related to leaders’ core task of directing and coordinating (Bell & Koslowski, 2002); leaders who engage in these communications are apt to be perceived as competent and trustworthy. In contrast, social communication behaviors indicate the leaders interest and concern for follower (Bell & Koslowski, 2002), and thereby facilitate social bonding and trust (Suchan et al. 2001; Walther et al. 2005). Given the importance of these two dimensions, leaders who exchange information with followers across a broader array of task and social content should be perceived as more trustworthy. Thus, trust in a leader of a virtual group is likely to be enhanced when the leader shares information across a broad range of content. Therefore, we hypothesize:

**Hypothesis 2:** The breadth of communication between leaders of virtual groups and followers is positively related to the trust in leaders of virtual groups.

**Cultural Context of Leadership of Virtual Groups**
We have argued that trust in virtual leaders of virtual groups is influenced by the leaders’ choice of media and the content of communications. We maintain that these factors are unique to the leader. That is, it is within the leader’s discretion to select certain channels of communication and to share more or less information with followers. Thus, each group of followers will have their own unique patterns of communication repertoire and content influenced by the style and preferences of the leader. That said groups share certain contextual factors that are likely to shape how communication influences trust in the leader. One important contextual factor that includes the impact of virtual communication is culture (Bell and Kozlowski, 2002). Particularly relevant to the issue of trust is the cultural value of individualism-collectivism (Hofstede 1980).

The value of individualism-collectivism reflects difference in an emphasis on the self versus group. In individualistic cultures, the needs, values, and goals of the individual take precedence over the needs, values, and goals of the in-group. In collectivist cultures, the needs, values, and goals of the in-group take precedence over the needs, values, and goals of the individual (Gudykunst 1997; Hofstede 1980). This value also reflects differences between cultures in the basis of trust (Brewer & Yuki, 2007). In comparison to those from collectivistic cultures, persons from individualistic cultures are more likely to trust strangers based on impersonal, and even arbitrary categorical membership (Buchan, et al. 2002; Buchan, Croson, & Johnson, 2003). That is, trust can form swiftly if members are representatives of the same group or organization because the group or organization conveys information about the attributes of its members and the shared rules and norms of the groups (Kramer, 1996). In contrast, persons from collectivistic cultures are more likely to trust based on relational or network ties, regardless of whether the other party nominally part of the same group (Yuki, Maddox, Brewer, & Takamura, 2005). That is, trust builds through interpersonal ties. In other words, individualists are more
likely to form a depersonalized trust based on minimal group membership whereas collectivists base their trust on interpersonal relationships with groups (Brewer & Yuki, 2007).

These findings have important implications to how individuals respond to communication with leaders of virtual groups. Specifically, it suggests that in collectivistic societies, individuals will be more sensitive to communications that facilitate forming an interpersonal relationship with the leader of a virtual group. Thus, the content of communication may be more or less influential depending on the cultural context of the group in virtual settings where direct contact is limited.

On the other hand, research also argues, that individualistic cultures tend to adopt a more self-interested stance and expect others to act on their independent interests (Branzai et al. 2007). In such cases trust is contingent upon beneficial exchanges with the other party (Bhawuk et al. 1992). This world view leads individualists to rely on cues about the disposition of the leader to act in a manner that protects the team member’s interest. Individualistic cultures are therefore more likely to base trust on direct experiences with the other party. Thus, in virtual settings where direct contact is limited, individualistic cultures may be slower to develop trust in the team’s leadership than are collectivistic cultures. As discussed above, leaders can overcome the obstructions to direct contact and experience by taking the opportunity to communicate over a broad range of topics because doing so conveys the leaders’ trustworthy character and intent. This stream of research thus argues that individualistic cultures should be more sensitive to greater breadth of communication from their team leaders. Team members who communicate with leaders across a greater breadth of topics should thus trust their leaders more.

As noted above, we proposed that communication across a breadth of topics facilitates interpersonal bonding and building trust. We follow the reasoning that in collectivistic societies,
individuals should be more sensitive to greater breadth of communication from their leaders. We therefore hypothesize:

_Hypothesis 3:_ The relationship between breadth of communication and trust in the virtual leaders is moderated by individualism-collectivism such that the relationship will be stronger in cultures higher in collectivism.

**Trust in Leaders of Virtual Groups and Performance**

As noted previously, empirical research on trust in leadership is still lacking. As a result, we have only a very limited understanding of the relationships between trust-inducing conditions, trust in leadership and the performance of groups in virtual contexts. Thus, while the importance of trust for performance in virtual groups has been validated (Kanawattanachai et al. 2002; Parks et al. 1996), empirical evidence of the impact of trust in leaders of virtual groups is lacking. There is, however, previous conceptual and empirical research on the consequences of trust for follower performance in conventional organizational settings (Colquitt et al. 2007; Korsgaard et al. 2008), which strongly suggests that trust in leaders of virtual groups has a positive impact on the group performance. Meta-analytic results suggest that individuals who feel that their leader has demonstrated care and consideration will reciprocate this sentiment in the form of desired behaviors (Dirks et al. 2002). Drawing on this reasoning, we hypothesize:

_Hypothesis 4:_ Trust in leaders of virtual groups is positively related to group performance.

**METHOD**

The Online Game Context
Researching the dynamics of virtual groups creates considerable difficulties. Whereas field studies of virtual groups are typically small in scale and often lack quantitative or objective data (e.g. Kankanhalli et al. 2007; Yoo et al. 2004), laboratory studies, though allowing for large scale, rigorous quantitative data collecting, involve relatively short-lived simulations with rather small groups in which the participants have little psychological investment (e.g. Hambley et al. 2007; Staples et al. 2006). In this study, we employed an alternative setting of an online game in which people interact in a realistic manner over an extended period of time in a virtual setting and in various group sizes. As recently described in an article in *Science* (Bainbridge 2007), scholars in the social sciences are beginning to discover the potential of such virtual setting as a research context. The availability of a vast amount of behavioral data from users, collected in an unobtrusive way, bears the capacity of innovative research in social, behavioral and economic sciences. In our investigation we obtained quantitative trace data directly from the server archives of the game (log-files) as well as perceptual and attitudinal data from surveying the players themselves. Although laboratory simulations allow for similar sorts of data collection, this context has advantages over such an approach because online games tend to be highly engaging and psychologically meaningful to participants (Williams 2006; Yee 2006). Recent studies indicate that Massively Multiplayer Online Games (MMOGs) could function as online labs for leadership studies (Reeves et al. 2008).

The data for this study were derived from a popular browser-based MMOG called Travian (www.travian.com). The advantages of this game are manifold: it is playable without subscription fees or initial costs opening the game. Further, being browser based, no special client software or device has to be installed on the computer. Thus, the entry barrier for new and casual players is low. Moreover, Travian is one of the very few games that can be played on
different country servers, whereby each server is run in the native language of the specific country. These factors provide for a broad user base and make the context particularly interesting for cross-cultural research.

Travian is a real-time strategy game. Players start out as chieftains of their own villages and seek to gain natural resources, build armies and expand their realms. Playing with up to 20,000 users on one server with scarce resources, actors soon find themselves in a social dilemma (Dawes 1980), which is typical for project groups, organizations, and economies where parties need to both coordinate and compete with one another. The players must cooperate with other players to protect their territory and resources and to successfully expand their reach. In the race to dominate, players form groups of up to 60 members under a leader or a leadership group (henceforth called the leadership). The game is timed to last approximately one year, at which time one group is deemed the winner based on the fastest completion of a certain building called "wonder of the world". Groups are equipped with a shared forum, a chat room, an in-game messaging system, and a regularly updated, shared news list showing the most recent attacks on alliance members and members’ attacks on other actors. Furthermore, the leadership has the ability to admit new members or release current members. Like virtual groups at work, group work and negotiation skills play a crucial role in this context. Given these characteristics the game, it affords an excellent opportunity to study leaders of virtual groups at work in a competitive environment.

Sample and Procedure

As noted above, the game is conducted within countries and communications were conducted in the native language of the country. Multiple games servers within numerous
countries are running at any given time. We selected game servers that were running for a sufficient amount of time, on average 250 days, allowing for groups to establish. Based on this restriction, we collected data from 26 different countries, namely Argentina, Austria, Brazil, Bulgaria, Chile, China, Germany, Finland, Greece, Netherlands, Hong Kong, Hungary, Italy, Mexico, Norway, Poland, Portugal, Russia, Sweden, Switzerland, Slovakia, Slovenia, Spain, Turkey, United Kingdom, and the US. Given the ease with which players could join the game, it was possible that the survey would reach persons who were not actively engaged in the game. According to the game designers, active players need to be online at least once every three days in order to survive in the game. We therefore posted a link to the survey on the login page of the game for three days.

92,046 out of 265,020 players answered our surveys which resulted in an overall response rate of 35% and ranged from 27% to 45%. We further restricted our sample based on several criteria. First, we restricted the sample to players who were part of an alliance, instead of playing alone. Second, we focused on followers, that is, group members without any leadership responsibilities within the group. Third, participants had to be at least 18 years old. Fifth, at least 3 members of a given group had to complete the survey and fulfil the previously mentioned other sampling criteria.

These criteria resulted in the final sample size of 14420 participants from 1971 groups. The average age of the participants was 29, ranging from 18 to 75 years and 18% of the participants was female. The average group size was 45 players and ranged from 4 to 60 players.

For the analysis of possible response biases, we compared the final sample to the total number of respondents. The final sample does not differ from the initial respondents. The initial sample had the average age of 28, and 19% of the participants was female. Participants in our
final sample had an average experience with the game of 9 months while the initial sample had an average of 8 months. These findings suggest that our final sample was not biased.

Measures

**Measurement Equivalence.** All survey measures were drawn from previously validated and published scales. Given that the survey was administered in the native language of each country, we took steps to assure the measurement equivalence across translations. We used the approach discussed by Bensaou et al. (Bensaou et al. 1999), to ensure all three types of equivalence across countries: construct equivalence, sampling equivalence, and measure equivalence. All measures used were translated from English into the respective language and back-translated into English by native speakers with strong English skills. A third native speaker compared both versions and made final adjustments.

**Dependent Variables.** Ratings on *trust in leadership* were obtained from the participants’ survey. It was measured on the individual level by the average of three items derived from a measure by Brockner et al. (Brockner et al. 1997) and adapted to the online game context (e.g. “My alliance leadership can be trusted to make decisions that are also good for me.”). All items were rated on a five-point Likert-type scale with anchors of “strongly disagree” and “strongly agree”. These scores were then aggregated within alliance. The measure showed good reliability with Cronbach’s $\alpha = .90$. Data on *group performance* was obtained from the server log-files. Specifically, we used the in-game scoring system, which is the accepted measure of group performance and relative standing within the game, as our measure for group performance. A baseline measure of performance was obtained at the time of the survey administration and the performance index was obtained two weeks after the survey.
Independent Variables. Data on communication repertoire, communication breadth and culture were obtained from the participants’ survey. Communication repertoire was measured on the individual level assessing how frequently communications between the participant and the leadership involved the different communication media that are available in the game. These media channels include synchronous (i.e. Chat/Voice over IP) and asynchronous channels (i.e. in-game massages). Items were rated on a 10-point scale (1 = “never “, 10 = “always “) and averaged to produce an overall score. Communication breadth was measured on the individual level by using three items derived from Parks and Floyd (1996) and adapted to the online game context (e.g. “My communication with my alliance leadership ranges over a wide variety of topics”). Items were rated on a seven-point Likert-type scale (1= “strongly disagree;” 7= “strongly agree”) and averaged to produce an overall score (α = .70). Scores on both communication repertoire and communication breadth were aggregated within alliance.

Individualism-collectivism was assessed using the five-item in-group collectivism scale developed in the GLOBE project (House et al. 2004). This scale measures local-level (i.e., organizational-level) norms associated with individualism (e.g. “In my alliance, members feel loyalty to the alliance.”). All items were rated on a seven-point Likert-type scale with anchors of “strongly disagree” and “strongly agree”. Items were averaged to a single score per individual (Cronbach’s α = .81), and the individual scores were aggregated within country.

Control variables. Research suggests that tenure or relationship age is associated with trust (Levin, Whitener & Cross, 2007). Therefore, we controlled for the average tenure of followers within the group. Average tenure which was obtained from the log-files was measured in months. Research also indicates that competency has a positive impact on trust, thus, the performance of the group can influence subsequent trust levels. We therefore controlled for
group performance \(T1\), which was obtained at the time of the administration of the survey. Finally, the performance metric provided by the game is dependent on the size of the group, such that larger groups necessarily have larger performance statistics. We therefore controlled for group size, which was also obtained from the log-files of the game.

**Levels of Analysis.** The hypothesized model was conceptualized on two levels: communication variables, which are shaped by the leaders’ behavior, are group-level constructs. Collectivism, on the other hand, is conceptualized at the societal (i.e., country) level. Thus, we employed hierarchical linear modelling to test the hypotheses, with communication variables as level one variables and collectivism as a level two variable. To justify aggregating communication variables to the group level, we estimated intraclass correlations (ICC repertoire = .10, \(p < .001\); ICC breadth = .10, \(p < .001\)), which were in the acceptable range (Bliese 1998). The intraclass correlation coefficient for collectivism at the country level was also significant and within the acceptable range to justify aggregation. (ICC = .10, \(p < .001\)). Further, the correlation coefficient for trust in leadership at the group level was also significant and within the acceptable range to justify aggregation (ICC = .10, \(p < .001\)).

Table 1 presents descriptive statistics and bivariate correlations for all variables.

| Insert table 1 about here |

---------------------------------------------

**RESULTS**

Our hypotheses involve predictors measured at two levels of analysis, group (i.e., the
group size, the communication repertoire and communication breadth) and the country level (i.e., country collectivism). Further, one of the hypotheses concerned a cross-level effect of communication breadth and country collectivism. These nested data structures call for hierarchical linear models (HLM) rather than ordinary least square (OLS) analysis (Hox 1995; Raudenbush et al. 2002). HLM has several advantages: First, this analytical technique handles the problem with dependency between observations, arising when players’ perceptions are more closely resembled with players from their own group than with players from other groups because players in each group interacted with the same leadership. Second, the model takes into account that there are different numbers of observations at different levels, i.e. the number of groups is larger than the number of countries, and the proper sample size is included in the statistical tests at each level. Third, HLM hinders ecological fallacy, that is the nested structure is neglected, and data is analysed on one level and conclusion are made at another (Selvin 1958). All predictors were standardized prior to hypotheses testing (Hofmann et al. 1998).

Insert table 2 about here

Table 2 shows the results of HLM analyses for the predictors of trust in leadership. Hypothesis 1 predicted that the usage of a broader communication repertoire is positively related to trust in leadership. As indicated in the column marked Model 3, this hypothesis was supported ($\gamma = 0.06$, $t = 8.13$, $p < 0.001$). Hypotheses 2 stated that the relationship between breadth of communication and trust in leadership is positive. This hypothesis was also supported ($\gamma = 0.15$, $t = 18.94$, $p < 0.001$).
Hypothesis 3 stated that the positive relationship of breadth of communication and trust in leadership is moderated by collectivism. The interaction testing of this hypothesis was significant ($\gamma = -0.02, t = 2.69, p < 0.05$). The simple slopes for this effect, illustrated in figure 1, provide support for our hypothesis: breadth of communication had a slightly stronger relationship with trust for groups with a collectivistic culture as compared to those from an individualistic culture.

Hypothesis 4 predicted that trust in leadership is positively related to group performance. The results of the analyses for this hypothesis are reported in Table 3. To rule out confounds associated with the predictors of trust, we controlled for the preceding relationships (a similar effect of trust is obtained if these controls are not included). As indicated in the columns marked Model 2, this hypothesis was supported ($\gamma = 0.02, t = 2.03, p < 0.01$).

DISCUSSION

This investigation sought to address two significant gaps in the research on virtual work and trust. First, although theory and empirical evidence indicate the importance of trust in virtual setting, there is a noted absence of research on trust in leaders of virtual groups. This deficit is
noteworthy because it is well established in traditional settings that trust in leaders is positively related to group performance. Second, research on trust in both virtual and traditional settings has progressed largely within a single level of analysis (i.e., individual or group levels), overlooking the potential cross-level effects of unique group-level experiences and the shared cultural context of groups. To address these gaps, we adopted a multi-level view of the antecedents of trust in the leaders of virtual groups.

Specifically, we examined the joint effects of unique shared group attributes such as communication. We examined these relationships utilizing a unique combination of survey and longitudinal, unobtrusive data in the context of a MMOG. In general, the findings indicate that the leaders’ communication behavior and the cultural context have significant consequences for the level of trust in the leaders of virtual groups, and that trust in leaders has consequences for group performance.

Building on prior research on the effects of communication on trust in virtual settings, we hypothesized and found that the two facets of leaders’ communication behavior– repertoire and breadth – were positively correlated with trust in leaders of virtual groups. These findings suggest that the range of channel repertoire and the breadth of communication content uniquely contribute to building trust in leaders of virtual groups. This means the more followers feel able and free to discuss a wide range of topics, the more they will trust the leadership. This finding has important implications for the management of virtual groups given that past research indicated that virtual groups tend to communicate less and over a restricted range of topics in comparison to co-located groups (Webster et al. 2008).

We also examined how the effect of leaders’ communication behavior was influenced by the shared context of the group, focusing specifically on the cultural values collectivism.
Drawing on research on collectivism and sensitivity to relational cues (Brewer & Yuki, 2005) we reasoned that the impact of leaders’ breadth of communication on trust would be stronger in individualistic cultures. In contrast to persons from individualistic societies, where trust can be formed on a more impersonal basis, persons from collectivistic societies require additional information that verifies or supports relational bond, such as that provided in content of communications with leaders. Supporting our hypothesis, we found breadth of communication more strongly related to trust in leaders for groups high in collectivism. More generally this finding suggest that the joint effect of collectivism and communication breadth points to a shared context in which communication content may be particularly important.

Finally, to establish the relevance of trust in leadership to group functioning, we examined the relationship between trust in leaders and group performance. As expected, groups performed better when they trusted their leader. It is noteworthy that this relationship was observed for performance measured two weeks after assessing trust and while controlling for performance at the time of the trust assessment. Thus, the findings indicate that trust in leaders was positively associated with improvements in performance over a two week period. Further, this finding was observed beyond the influence of communication and culture. Thus, this relationship between trust and performance is not attributable to functional effects of these factors (e.g., the effect of communication). These results provide compelling evidence of the importance of building trust in leaders to the effective performance of virtual groups.

**Limitations**

A few limitations are worth noting. First, we employed a correlational design, which limits our ability to draw causal inferences. However, this limitation was offset by the use of
multiple sources of data and the temporal separation of survey data and performance data, which mitigate against self-report bias and reverse causality. Nevertheless, future research on trust in leaders would benefit by more rigorous causal designs.

In contrast to actual work settings, this study was conducted in the context of a game, which may pose a limitation to the generalizability of the findings. However, like many MMOGs, this particular game is highly engaging and requires many of the group-related skills and behaviors needed in virtual groups at work. Moreover, there are few technical and expertise barriers to playing the game, so the population is likely to be similar to the general population of computer literate adults who would be engaged in virtual groups at work. Finally, MMOGs are increasingly being used as tools in training and development and in educational settings (Reeves et al. 2008). Thus, understanding how relationships form and how individuals can be effective group members and leaders in this particular setting is of practical value in itself.

Another consideration is the size of groups within this game, which ranged from 4 to 60. There is a debate on how large groups can be in virtual settings and still be considered a group. Lipnack and Stamps (1997) suggest that in virtual groups the group size is less clearly definable than in non-virtual group. Given the ability of communication and information technology to manage and organize communications of large numbers of people, the rule of 4 to 7 people on a group may not be applicable in virtual group settings (Lipnack and Stamps, 1997). That said, group size itself was a significant predictor of trust in leaders of virtual groups. Further research is needed to examine the role of group size on leadership processes.

Additionally, future research may build upon the results of this study in a number of ways. For example, we examined groups that were homogeneous on culture, which provides important insight into transferring virtual practices across cultures. It is also likely that, as firms employ
virtual structures across countries, groups will be formed of individuals from different cultures. Thus further research should examine the role of cultural diversity on leadership and trust in virtual settings.

Finally, in our study we used the concept of communication repertoire. In our opinion this approach is closer to reality than most of the traditional theories. In doing so, we used the frequency of the use of different communication media as the communication repertoire. These findings provide support for the theory of behavioral complexity but further research involving additional measures and constructs is warranted. As well, many questions remain regarding how antecedents, development, decline and repair differ in leaders of virtual group’s context from the leadership in a face-to-face environment.

**Implications and Future Directions**

The investigation highlights the importance of the unique experience of groups and suggests that leaders and groups themselves may proactively shape the trust groups place in leaders. It is well established in traditional leadership settings that leaders can engage in a variety of exchanges that will enhance their trustworthiness in the eyes of their followers (e.g. Whitener et al. 1998). Our findings suggest that to the extent that a range of choices are available, both the leader and the followers can initiate exchanges that may enhance trust. In addition to contributing to the virtual group literature, our research also contributes to the trust literature in general for two reasons. As traditional organizations are increasingly relying on virtual technology to do work, even co-located groups employ virtual communication methods. Thus, the distinction between virtual and co-located groups is increasingly obscured.

A shortcoming in research on groups and organizations in general is the tendency to
adopt a single-level view of the phenomenon. For example, trust in leadership typically assumes the perspective of individual employees (Colquitt et al. 2007). In contrast, most work on conflict in groups approaches the issue as exclusively group level (Korsgaard et al., 2008). Our approach answers the call to incorporate multiple levels into research on individuals and groups (Hitt et al. 2007). This approach has both theoretical and practical advantages. A cross-level view offers greater precision in prediction and explanation by identifying contextual factors that qualify relationships.

This study has implications for practice as well. As we noted in the beginning of the paper, many organizations today utilize virtual groups that carry strategically important tasks. Group leader and members have a variety of communication channels that they can choose from when working on joint tasks. Not all channels fit for every task and as seen from our study, a combination of different channels can be more effective. Our study shows that this choice significantly influences group performance via trust in the leader. Therefore, managers and organizations need to recognize the strategic importance of managing communication content and communication media as well as trust in groups that are technology-enabled for improving their performance. Ensuring that the group members have certain communication media available and encouraging a certain breadth of communication will increase virtual collaboration. Additionally, leaders of virtual groups should be aware of the influence of cultural variables.

In conclusion, the results of this study provide new insights into the antecedents of trust in leaders of virtual groups and the importance of trust in leaders of virtual groups for group performance. The findings hold promise for understanding the role of leaders of virtual groups and for discovering new routes to making virtual work more effective.
REFERENCES


Zack, M.H. "Interactivity and communication mode choice in ongoing management groups," *Information systems research* (4:3) 1993, pp 207-239


Table 1. Means, standard deviations, and correlations for study variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td></td>
<td></td>
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<td></td>
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<td>Level 1 (group)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1 Performance (T2)</td>
<td>1971</td>
<td>145750</td>
<td>174083</td>
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<td></td>
<td></td>
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<td>2 Performance (T1)</td>
<td>1971</td>
<td>154494</td>
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<td>*</td>
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<td>3 Average Group Tenure</td>
<td>1971</td>
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<td>1.71</td>
<td>.60</td>
<td>*</td>
<td>.63</td>
<td>*</td>
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<td></td>
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<tr>
<td>4 Group Size</td>
<td>1971</td>
<td>40.31</td>
<td>14.26</td>
<td>.51</td>
<td>*</td>
<td>.52</td>
<td>*</td>
<td>.36</td>
<td>*</td>
</tr>
<tr>
<td>5 Communication Repertoire</td>
<td>1971</td>
<td>63.21</td>
<td>18.54</td>
<td>-.19</td>
<td>-.12</td>
<td>-.2</td>
<td>*</td>
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<td>6 Communication Breadth</td>
<td>1971</td>
<td>4.07</td>
<td>0.61</td>
<td>.15</td>
<td>*</td>
<td>.15</td>
<td>*</td>
<td>.18</td>
<td>*</td>
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<tr>
<td>7 Trust in Leadership</td>
<td>1971</td>
<td>3.77</td>
<td>0.41</td>
<td>.23</td>
<td>*</td>
<td>.22</td>
<td>*</td>
<td>.18</td>
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* p < 0.05
Table 2. HLM results for trust in leadership

<table>
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<tr>
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<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
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</thead>
<tbody>
<tr>
<td><strong>Level 2 (country)</strong></td>
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<tr>
<td>Intercept</td>
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<td>3.70 (0.04)**</td>
<td>3.70 (0.04)**</td>
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<tr>
<td>Collectivism</td>
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<td>-0.01 (0.03)</td>
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</tr>
<tr>
<td><strong>Level 1 (group)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Performance (T1)</td>
<td>0.05 (0.01)**</td>
<td>0.04 (0.01)**</td>
<td>0.04 (0.01)**</td>
</tr>
<tr>
<td>Average Group Tenure</td>
<td>0.06 (0.01)**</td>
<td>0.05 (0.01)**</td>
<td>0.05 (0.01)**</td>
</tr>
<tr>
<td>Group Size</td>
<td>0.00 (0.01)*</td>
<td>0.00 (0.00)**</td>
<td>0.00 (0.00)**</td>
</tr>
<tr>
<td>Communication Repertoire</td>
<td></td>
<td>0.06 (0.01)**</td>
<td>0.06 (0.01)**</td>
</tr>
<tr>
<td>Communication Breadth</td>
<td>0.15 (0.01)**</td>
<td>0.15 (0.01)**</td>
<td></td>
</tr>
<tr>
<td>Breadth x Collectivism</td>
<td></td>
<td></td>
<td>0.02 (0.01)**</td>
</tr>
</tbody>
</table>

N (Level 1) = 1971; N (Level 2) = 24;

Note. Unstandardized parameter estimates are reported in the body of the table, with standard errors reported in parentheses; * p < 0.05; ** p < 0.01; *** p < 0.001
Figure 1. Simple Slopes for the Interaction of Collectivism and Communication Breadth on Trust in Leadership

Low Collectivism: $Y = 0.2x + 3.5$

High Collectivism: $Y = 0.23x + 3.37$
### Table 3. HLM results for team performance (T2)

<table>
<thead>
<tr>
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<th>Performance (T2)</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Level 2 (country)</td>
<td>Level 1 (group)</td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td>162533 (15154)***</td>
<td>121755 (22525)***</td>
</tr>
<tr>
<td>Collectivism</td>
<td></td>
<td>-45178 (15255)</td>
<td>-45183 (15269)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>163833 (2254)***</td>
<td>163413 (2257)***</td>
</tr>
<tr>
<td>Performance (T1)</td>
<td></td>
<td>-5635 (2013)**</td>
<td>-6155 (2021)**</td>
</tr>
<tr>
<td>Average Group Tenure</td>
<td></td>
<td>-140 (140)</td>
<td>-161 (140)</td>
</tr>
<tr>
<td>Group Size</td>
<td></td>
<td>1022 (1584)</td>
<td>271 (1611)</td>
</tr>
<tr>
<td>Communication Repertoire</td>
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<td>137 (2681)</td>
<td>-1533 (2736)</td>
</tr>
<tr>
<td>Communication Breadth</td>
<td></td>
<td>-1712 (2842)</td>
<td>-1870 (2807)</td>
</tr>
<tr>
<td>Breadth x Collectivism</td>
<td></td>
<td>-11026 (4503)**</td>
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</tr>
<tr>
<td>Trust in Leadership</td>
<td></td>
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N (Level 1) = 1888; N (Level 2) = 24;

Note. Unstandardized parameter estimates are reported in the body of the table, with standard errors reported in parentheses; * p < 0.05; ** p < 0.01; *** p < 0.001