# INDIVIDUAL REACTIONS TO FAILURE IN VIRTUAL TEAMS

A Thesis

by

ISMAEL DIAZ

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

December 2011

Major Subject: Psychology

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# ABSTRACT

Individual Reactions to Failure in Virtual Teams. (December 2011)

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This project examines the relationship between team identification and collaboration configuration and how they affect attributions to failure. In a sample of 110 participants, collaboration configuration was manipulated by locating the participant either in the same room (collocated condition) versus a different room (distributed condition) than the teammate. Perceptions of similarity (team identity) were also manipulated between the participant and a teammate (confederate). Analysis of variance found a significant effect for collaboration configuration: locus of causality scores for participants' attributions for teammate failure were more situational (external) in distributed team conditions compared to collocated team conditions. This finding was inconsistent with the hypothesis based on previous theory and research on attributional processes in virtual teams. Only weak effects were found for the team identification manipulation as a moderator of this collaboration configuration effect. Implications of these empirical results for future research are discussed.

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# 1. INTRODUCTION

Increasingly, organizations use new work arrangements to accommodate changing employee needs and organizational demands. As organizations evolve to meet the demands of globalization and financial strain, work teams have adopted new forms of collaboration where teamwork is mediated by electronic communication technology (e.g., e-mail, online or cell phone text messaging, web-based conferencing). These distributed teams span geographic distances, time zones, national borders and cultures, and face unique challenges (Griffith, Sawyer, & Neale, 2003; Kirkman & Mathieu, 2005). As organizations continue to implement these virtual team arrangements, greater understanding of the psychological and interpersonal processes of team interactions is needed to maximize team viability and to produce desirable organizational-level outcomes (e.g., productivity, innovation, retention of high-performing employees).

## What Is a Virtual Team? Definitions and Classification Schemes

Many conceptualizations of virtual teams require that the team meet specific criteria to be considered completely virtual. Virtual teams have been conceptualized as a combination of features that contribute to team “virtualness,” from most traditional teams (e.g., face-to-face), to pure virtual teams (e.g., geographically distributed teams with full electronic communication dependence, asynchronous), or some combination of virtual and non-virtual features (e.g., hybrid teams; Cramton et al., 2007).

Griffith et al. (2003) characterize team virtuality along three dimensions:

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physical distance, level of collaboration asynchronicity, and dependence on technology for collaboration. This allows researchers to plot a team in a three-dimensional space along three construct axes. Teams at the low end (e.g., zeros on all three axes) are considered traditional teams; teams at the high end of all the axes can be considered pure virtual teams, while some are hybrid teams (Kirkman & Mathieu, 2005).

Researchers have also conceptualized virtual teams in terms of the hurdles the team must overcome. Thus, “virtualness” may be defined by the number of hurdles that must be crossed by teammates to collaborate (Griffith et al., 2003). Factors like geographic distance, reliance on communication technology to mediate collaboration, and time apart can all be conceptualized as hurdles or obstacles that team members must cross to collaborate effectively (Kirkman & Mathieu, 2005). For this project, team configurations were either collocated or distributed to approximate features of either virtual or hybrid teams.

This study was designed to explore the relationship between shared team identity and the collaboration configuration of team members to assess how these factors relate to teamwork outcomes. Specifically, an experiment was conducted to examine the effects of collaboration configuration (i.e., collocated or distributed collaboration) and perceptions of shared team identity on the causal attributions that members make about teammate failure. This study focuses on the attribution process and how people understand the actions of others. Previous research demonstrates that virtual teams suffer from poor performance outcomes in part because of dispositional attributions for teammate failure that occur due to the fundamental attribution error (Cramton, 2002; Kirkman & Mathieu, 2005; Ross, 1977).

People tend to express dissatisfaction with their virtual team and the people on that team (Kirkman & Mathieu, 2005). The empirical link between virtual teams and poor performance has been explained in terms of biases in the attribution process (Cramton, 2001; Cramton, 2002; Cramton, Orvis, & Wilson, 2007; Hinds & Mortensen, 2005). Researchers find that dispositional attributions lead to more blaming, more conflict, and a withdrawal of effort on the part of team members (Hinds & Bailey, 2003; Kirkman & Mathieu, 2005). Understanding how to influence and correct this attribution process by encouraging virtual team members to make more situational attributions for teammate failures may help address these challenges (Cramton et al. 2007; Hinds & Mortensen, 2005).

**The Mutual Knowledge Problem**

Teams face many obstacles and challenges as a function of the collaboration and communication media used to perform a task (Cramton, 2001). Reliance on electronic communication can lead to information filtering effects, specifically, the loss of nonverbal cues, reductions in informal communication, reduced information sharing, and decreased interpersonal interactions (Weisband, Schneider, & Connolly, 1995). These filtering effects prevent team members from sharing contextual or situational information and communicating expectations of behavior via interactions between teammates (e.g., Cramton, 2001; Gibson & Gibbs, 2006; Kiesler & Sproull, 1992). The physical distance associated with virtual teams also prevents members from observing one another. This inability to observe others directly and the lack of shared information cues can lead virtual team members to ignore critical contextual and situational information that is often available in face-to-face teams. This has been described by Cramton (2001) as the *mutual knowledge problem* in distributed teams.

The mutual knowledge problem has been associated with several negative outcomes in virtual teams. Due to limited information about teammates, individuals will often make assumptions about others without considering situational and contextual information (Cramton, 2001). In the face of team failure or after a violation of group expectations or performance norms, these dispositional attributions based on limited information and situational awareness can generate interpersonal tension and conflict among teammates (Driskell, Radtke, & Salas, 2003; Hinds & Bailey, 2003; Moore, Kurtzberg, Thompson, & Morris, 1999), loss of trust in other members, (Hinds & Mortensen, 2005), and lower team satisfaction (Cramton et al., 2007; McDonald, 1995). To understand how the mutual knowledge problem leads to these negative team outcomes, Cramton (2002) applied the attribution process framework of Gilbert and Malone (1995).

## The Attribution Process

People seek to understand others and make sense of the behaviors of others (Heider, 1958). Because individuals cannot observe the inner workings of a person's beliefs, desires, intentions, or motivations, people must infer these complex intrapsychic phenomena based on limited available information (i.e., past experience observing the person's actions, knowledge about the person). These inferences often follow predictable rules and stem from considerations about the actor and the situation (Jones & Davis, 1965; Kelley, 1967). When attempting to make sense of other individuals, observers sometimes consider behaviors and deeds as something the individual is disposed to do (Gilbert & Malone, 1995). Other times, when thinking about the actions of others, observers allow for situational considerations.

According to Gilbert and Malone (1995) people attribute the behavior of others—and the consequences of those behaviors—to a host of dispositional and situational factors. The attribution process starts with an event, action, or situation that violates expectations, is ambiguous, or unclear. Observers ascribe a cause to an event, action, or situation to resolve the ambiguity or uncertainty. In the context of teams, the attribution process is often set in motion when a teammate fails to meet some performance goal or criterion (LePine & Van Dyne, 2001). According to correspondent inference theory (Jones & Davis, 1965), observers may take the actions of a person as indicative of their underlying personal characteristics and traits. For example, a person who gives to charities may be seen by others as generous and altruistic because of these donations. The correspondence bias (Gilbert & Malone, 1995; Jones, 1990) describes the tendency to view others' behaviors as demonstrative of underlying personal attributes and to overlook situational factors that may constrain these behaviors. This phenomenon has also been termed the *fundamental attribution error* (Ross, 1977).

Gilbert and Malone (1995) argued that people often attribute the failure of others to personal characteristics such as a personality flaw or personal shortcoming. Thus, to the observer, failure of others is a function of the person's disposition rather than the situational constraints (i.e., the correspondence bias). Conversely, people often attribute their *own* failure to the situation, defending their own performance as caused by bad luck or unforeseen adverse circumstances. This bias is known as the *actor-observer effect* (Jones & Nisbett, 1972). This asymmetry in perceptions between actors and observers may be due to the greater ability for actors to know and consider how specific situational circumstances contribute to their own actions, while potentially lacking adequate knowledge of the situational constraints of others (Gilbert & Malone, 1995; Nisbett, Caputo, Legant, & Marecek, 1973).

Gilbert and Malone (1995) concluded their review by proposing a two-stage theoretical framework to explain the correspondence bias: people anchor initially on dispositional attributions as a “default” value, and then adjust their attributions about others to incorporate situational information in a second stage. An important boundary condition for the subsequent adjustment stage is that the observer must have the requisite cognitive capacity to engage in more controlled processing of situational information (Gilbert & Malone, 1995). If individuals are distracted because they are attending to other important tasks, high cognitive load will decrease the likelihood of corrections in the adjustment stage to the initial correspondent inference (i.e., dispositional attribution).

Limited contextual information and the susceptibility of human observers to make judgments based on erroneous assumptions (e.g., correspondence bias, fundamental attribution error) may be problematic in distributed teamwork (Cramton, 2002). For example, in pure virtual teams, the mutual knowledge problem has been hypothesized to be especially challenging to team functioning (Cramton et al., 2007).

Researchers have manipulated the collaboration configuration of teams to understand how situational awareness affects the attribution process in virtual teams. Cramton et al. (2007) and Polzer, Crisp, Jarvenpaa, and Kim (2006) demonstrated that members of collocated virtual teams (i.e., virtual teams that share a common workspace) are less likely to make dispositional attributions of their teammates compared to a distributed teams. When individuals are able to observe teammates during a task, the mutual knowledge problem was attenuated (Cramton et al., 2007). Collocated team configurations allow people the opportunity to observe the situational circumstances of others (Cramton et al., 2007; Homan, Knippenberg, Van Kleef, & De Dreu 2007; Polzer et al., 2006) and thus observers may adjust attributions of teammate performance to incorporate local situational information (Gilbert & Malone, 1995).

In summary, the literature suggests that individuals in distributed teams are more likely to make dispositional attributions for teammate failures, relative to members of collocated teams (Cramton, 2001; Cramton, 2002). However, Cramton et al. (2007) also found that when provided with relevant situational information, members of distributed teams were able to modify their attributions and make more situational attributions. Other research on relationship formation in electronic communication also suggests that situational information is useful for managing the mutual knowledge problem (Moore et al., 1999). Based on the premise that the opportunity to observe directly the behavior of others facilitates more situational attributions and previous empirical research, we propose the following:

*Hypothesis 1 (H1):* Situational attributions will be stronger in the collocated team conditions compared to distributed team conditions.

**Social Identification and the Fundamental Attribution Error**

*The social identity approach (e.g.,* Hogg & Terry, 2000; Tajfel, 1978; Tajfel & Turner, 1979; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), encompassing both social identity theory (SIT) and self-categorization theory (SCT), delineates the social psychological processes underlying intergroup differentiation and intragroup categorization. Social identity refers to the aspects of the individual self-image that arise from perceived membership in social categories or groups (Tajfel & Turner, 1979). In short, individuals will identify with groups or social categories that are important, salient, or self-enhancing. Thus, individuals seek to identify with groups or social categories that will maintain or enhance a positive self-concept. SIT emphasizes the contrast between in-groups (e.g., perceived social entities composed of people who are similar based on salient personal or social characteristics) and out-groups (e.g., individuals who are perceived to be different from the self and not part of the in-group) (Tajfel & Turner, 1979).

Researchers have identified situations in which social identification can lead to positive team outcomes in the face of failure, especially when there is a perception of shared identity between group members (McDonald, 1995; Moore et al., 1999). People tend to show bias in favor of individuals they perceive as similar to themselves (Brewer, 1979; Hinds & Mortensen, 2005). Moreover, the social identity perspective has been used to explain how shared group identity may result in more positive attributions in face-to-face and virtual teams in the face of team failure (McDonald, 1995; Moore et al., 1999). For example, research with face-to-face work teams shows that a sense of shared identity predicts higher team satisfaction and less conflict among teammates (Hinds & Mortensen, 2005).

One prediction made by the social identity approach is that people assume others in their in-group share similar characteristics and operate under similar contextual circumstances (e.g., all group members share common goals, strong motivation, and similar abilities/resources; Van Knippenberg & Schippers, 2007). When members of the in-group fail, people may adjust their assumptions and display more positive reactions about others and themselves in face-to-face teams in which a strong shared identity exists (Hinds & Mortensen, 2005). This may be due to the assumption on the part of observers that in-group members are similar in terms of abilities, knowledge, and personal characteristics. Thus, the observer may make more situational attributions about other in-group members because such attributions mirror the explanations that observers offer for their own behavior (i.e., actor-observer effect; Jones & Nisbett, 1972). This can lead to more positive group outcomes, less interpersonal conflict, and stronger group cohesion (Polzer et al., 2006). One objective of this study is to determine whether these attributional processes observed in face-to-face teams will hold for virtual teams as well.

In summary, past research has shown that people make more situational attributions for the behavior of in-group members (Polzer et al., 2006). This pattern of behavior is not due to a correction of the mutual knowledge problem. Instead, it appears to be related to the bias people have about others with a shared identity (i.e., others will extend their self-serving bias to in-group members; Hinds & Mortensen, 2005). This theoretical analysis suggests that high shared team identity will lead to more situational attributions for teammate failure in distributed teams relative to collocated teams. Our prediction is based on the proposition that individuals attribute their own failure to situational (external) causes in a self-serving way (Hinds & Mortensen, 2005; Jones & Nisbett, 1972) and extend that bias to explain behavior of in-group members. Based on this conceptual argument, we predict the following:

> *Hypothesis 2 (H2):* Situational attributions will be stronger under conditions of high team identity compared to low team identity.

**Collaboration Configuration and the Moderating Role of Team Identification**

We expected that each manipulation in this study would activate a different set of biases. Figure 1 displays the four experimental conditions and the specific attributional biases and levels of situational information expected within each condition (see the lower right quadrant of Figure 1). Collaboration configuration should be the most salient factor in terms of participants' ability to observe other team members. Thus, this manipulation (collocated vs. distributed) should change the amount and salience of situational information available to participants (mutual knowledge problem vs. shared contextual information). The team identity manipulation was designed to change the level of social identification with other team members (low vs. high team identity).

Figure 2 presents the hypothesized interaction effect between collaboration configuration and shared team identity. Lower values on the Y-axis in Figure 2 indicate more situational (external) attributions and higher values represent more dispositional (internal) attributions. The effect is expected to be in the form of an ordinal interaction, in which the main effect of team identity (H2) on situational attributions will be greater under distributed team conditions than under collocated team conditions. Inspection of Figure 1 reveals the theoretical basis for this prediction. The mutual knowledge problem is expected to occur only in the distributed team conditions. Under collocated team conditions, participants have access to shared contextual condition in both low and high identity conditions. Because H1 predicts that collocation will influence participants to make more situational attributions, this should result in a smaller difference between the low and high identity conditions, as illustrated in Figure 2. Moreover, based on the main effect for team identity (H2), we expected that situational attributions would still remain stronger among high identity participants relative to low identity participants in this collocated team condition.

In the distributed team conditions, the mutual knowledge problem should exert the same negative effect on attributions in both the low and high identity conditions (see Figure 1). However, because of the different biases operating in the two conditions (Fundamental Attribution Error vs. in-group bias) the impact of these biases should magnify the differences between participants in the low vs. high team identity conditions (see Figure 1). Thus, we expected that low team identity participants would demonstrate the typical bias toward dispositional explanations for teammate failure (fundamental attribution error), while the high team identity participants would make more situational attributions because of the generic, positive in-group bias repeatedly observed in laboratory and field settings in face-to-face teams (Brewer, 1979; Hinds & Mortensen, 2005; Tajfel, 1970). This differential response to the mutual knowledge problem should result in a more pronounced effect of shared team identity in distributed teams relative to collocated teams (see Figure 2). Thus, we propose the following:

> *Hypothesis 3 (H3):* Team collaboration configuration will moderate the relationship between shared team identity and situational attributions: the magnitude of the team identity effect (*H2*) will be greater under distributed team conditions compared to collocated team conditions.

# 2. METHOD

## Participants

Participants were 115 undergraduate students in an introductory psychology course at a large southwestern university. As part of a course requirement, participants were offered credit for participation in the study. The sex and age of participants were as follows: 52% female ($n$ = 60) and 48% males ($n$ = 55) between 18-22 years old ($m$ = 18.2 years).

## Design

The experiment used a 2 x 2 between-subjects factorial design. Two independent variables, collaboration configuration and shared team identity, were manipulated. Participants worked in dyads to complete a word search task. In terms of collaboration configuration, half of the dyads worked on the task in the same room (*collocated* condition). The other half of the dyads completed their task in separate work rooms (*distributed* condition). Each dyad was composed of a participant and a confederate of the experimenter. The confederate was instructed to perform such that each team failed to achieve the performance goal for the task. The confederate was also told to perform such that the participant would always outperform the confederate.

For this study, we operationalized the team as a dyad. To satisfy the condition that a group also be considered a team, the dyad must have a superordinate goal or objective that can only be achieved as a team (Arthur, Edwards, Bell, Villado, & Bennett, 2005). The dyad is a team because achieving performance goals set by the researchers necessitates interdependence among members. Thus, the pooled performance score of both individuals was required to achieve the performance goal (Arthur et al., 2005; Kirkman, & Mathieu, 2005).

In terms of shared team identity, this variable was manipulated by providing participants with informational cues about the teammate (i.e., confederate). In the low team identity conditions, participants were told that the other member of their dyad was a transfer student from another rival large southwestern university. To further prime the difference, participants were also provided with feedback that their teammate had a different problem solving style.

In the high team identity condition, participants were told they were working with another student from the same southwestern university. To further prime high team identity, participants were told that the teammate had a problem solving style that was similar to the participant. This approach was consistent with the minimal group paradigm of priming shared group identity (Tajfel, 1970). These two manipulations resulted in four treatment groups (collocated-low team identity, collocated-high team identity, distributed-low team identity, and distributed-high team identity).

## Measures

***Problem Solving Style Inventory.*** A faux problem solving style inventory was created for the purpose of this study; part of the cover story explained that this inventory was meant to assess a dimension of personality related to problem solving style. This inventory contained items written to appear like items on a personality inventory. At the end of the inventory, participants received a short feedback session with scripted information about their problem solving profile and the profile of their teammate. This was done to prime shared team identity using the minimal group paradigm (cf., Tajfel & Turner, 1979).

***Attribution Measures.*** Participants were asked to list three reasons for the outcome of their team's performance. Space was provided for participants to freely write their comments concerning team performance and outcomes. Responses were later coded by research assistants based on Cramton et al.'s (2007) framework. Responses were also classified by the coders as internal or external based on the locus of causality (e.g., cause of performance internal to self or cause of performance external to self), and then as either situational (e.g. outcomes due to the situation) or dispositional (e.g. outcomes due to cause located within the person).

***Scale Descriptive Statistics and Reliability.*** The locus of causality subscale of the McAuley, Duncan, and Russell's (1992) Causal Dimension Scale II (CDS II) was used as the primary dependent variable in the subsequent analyses. The first set of analyses focused on the participants' locus of causality scores. The locus of causality scale for participants' ratings of teammate performance ranged from 1 to 9 ($\alpha$ = .95, $M$ = 3.45, $SD$ = 2.78). The locus of causality subscale of the CDS II was also used by participants to code their own free response comments.

The overall locus of causality scale for free response comments ranged from 1 to 9 ($\alpha$ = .64, $M$ = 4.78, $SD$ = 1.47). Analyses were also conducted on the locus of causality scores generated by participants for each of the free response reasons separately (A, B, and C). For Reason A, the locus of causality scale ranged from 1 to 9 ($\alpha$ = .88, $M$ = 4.37 $SD$ = 2.52). For Reason B, the locus of causality scale ranged from 1 to 9 ($\alpha$ = .83, $M$ =

5.09 *SD* = 2.62). For Reason C, the locus of causality scale ranged from 1 to 9 ($\alpha$ = .82, *M* = 4.87 *SD* = 2.41). The free response comments were also coded as situational or dispositional by x raters. The total number of situational attributions generated by participants was analyzed. The number of situational attributions ranged from 0 to 3 ($\alpha$ = .72, *M* = 1.62 *SD* = 1.00). A total of five raters were used to code responses.

Analyses were conducted to ensure that other variables were not related to the study variables. Participant age, sex, and semesters completed at their current academic institution were entered as covariates in our analyses. Analyses with and without the covariates were not different in terms of variance accounted for by the model; nor did the age, sex, and semesters completed significantly relate to the dependent variables.

McAuley et al.'s (1992) Causal Dimension Scale II (CDSII) was used to measure attributions on four dimension, locus of causality, personal control, external control, and stability. Participants were asked to complete the CDS II for each of the three reasons they provided in the open-ended portion of the attribution measure. Participants were also asked to rate their own performance, their teammate's performance, and the overall team performance using the CDS II instrument. For example, in terms of locus of causality, the CDS II was used to measure the extent to which participants considered teammate performance to be internal or external to the teammate. Responses were made on a 9-point scale. Participants read the following: "Thinking about your teammate's performance, is your partner's contribution something that:" This stem was followed by a rows of numbers from 1 to 9 with the end points anchored 1 ("Reflects an aspect of the situation") and 9 ("That reflects an aspect of yourself). Three items from the CDS II Locus of

Causality subscale were used to create the dependent variable in this study. An additional 9 items were also administered to assess personal control, external control, and stability subscales of the CDSII (three items for each subscale).

***Social Identification Measures.*** Bond and Hewstone's (1988) 10-item Measure of Social Identification (MSI) was administered to assess the level of social identification between the participant and other undergraduate students at their public university. Theoretically, people who identify strongly with a reference group will attend to differences of non-members, especially when distinguishing features or information are presented about non-members (Bond & Hewstone, 1988). An 8-item inventory by Brown, Condor, Mathews, Wade and Williams (1986) known as the Group Identification Scale (GIS) was also used to measure participants' identification with their teammate in the experimental session. This measure was included to ensure that the team identity manipulation was effective. The Group Attitude Measure (GAS; Evans, Jarvis, & Dawson 1986) was also used to measure participant attitudes about their teammate after the performance feedback was delivered.

**Procedure**

Participants were presented with a cover story about the research objectives. A confederate was used to play the role of participant's teammate.[1] This was done to

[1] Throughout the course of the study, four research assistants served as confederates in the study. Two were male and two were female. There were also two researchers who ran each of the study sessions, one male, and one female. Participants were randomly sorted into condition using a random number table to counterbalance the four conditions of the study. Participants arrived and were assigned to one of four conditions using this procedure. Analyses were conducted to assess the extent to which the confederate, sex of the confederate, researcher, and sex of the researcher influenced study variables. Results from this analysis indicated that there were no main effects of sex of confederate or sex of researcher. Further, we found no evidence of group differences as a result of confederate used in the study or researcher

ensure that every team failed to achieve the task goal across all conditions. It was necessary to provide false performance feedback to participants to ensure a violation of expectation that would lead to team failure (McDonald, 1995). This approach holds team performance outcomes constant, ensuring that attributions will be most affected by collaboration configuration and team identity, and not variability in performance outcomes. The cover story also contained informational cues about the confederate, which allowed for the manipulation of team identity.

Across all conditions, the participant and confederate completed a demographic questionnaire and an instrument called the "Problem Solving Inventory." Participants were randomly assigned to one of the four experimental conditions before the experimental session began. Participants completed this problem solving style inventory and received information about their problem solving profile and the profile of their teammate. The problem solving style inventory was used to deliver part of the shared team identity manipulation. The experimenter explained the meaning of each profile and how each person scored on this measure. In the shared identity condition, participants and confederates were told that they had similar profiles. In the weak shared identity condition, participants were told their profile score and the score of their teammate was different.

The experimenter then asked participants to complete Bond and Hewstone's (1988) Measure of Social Identification (MSI) while the problem solving questionnaire

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conducting the study. We also examined the data to determine if the sex of the participant and sex of confederate would interact, there was no evidence of an interaction between participant sex and confederate sex. We also examined the data to determine if the sex of the participant and sex of researcher would interact, there was no evidence of an interaction between participant sex and researcher sex.

was scored. The MSI is a measure designed to assess the perceived interpersonal similarity and interpersonal liking between a respondent and a social other (e.g., the confederate in the study). During this time, the experimenter prepared materials for the other component of the team identity manipulation. While the participant and confederate completed the identification measures, the confederate initiated a scripted interaction with the participant. This interaction involved the confederate asking the participant if they were a transfer student also or a student from the same university also (depending on the experimental condition). The conversation occurred in the distributed and collocated condition while the participant and confederate were in the same room.

Feedback about the problem solving style questionnaire provided scripted information about both members of the dyad, which was done to present the similarity/difference information cue to prime a strong or weak shared identity. This feedback was provided immediately after the scripted interaction between the confederate and the participant. The experimenter asked participants to remember their own profile as well as the profile of the confederate. In the high team identity condition, participant and confederate were told that they had the same profile. In the low team identity condition, participant and confederate were told they had different profiles. To reinforce this manipulation, the experimenter handed both people a colored handout explaining their profiles. In the high team identity condition, the colors of both handouts matched. In the low team identity condition, the colors of the handouts were different. This difference in colors on the handouts provided an additional visual cue to manipulate the shared identity of the participant and the confederate.

Additional informational cues were provided by the experimenter as part of the team identity manipulation. In high team identity condition, the researcher asked the confederate to confirm that they were a student from the same university as the participant. For the low team identity condition, the researcher asked the confederate to confirm that they were a transfer student from another rival public university within the state. These cues were intended to reinforce the shared team identity manipulation.

Once this portion of the session was completed, participants were given a brief explanation about the computerized experimental task. Participants completed a word-search task on a computer in collaboration with the confederate. Low-fidelity, off-the-shelf software has been shown in previous studies to work effectively in virtual team research (Cramton, 2001; Cramton et al., 2007). A word search game called "Spelling Bee" was used for the team task. In the collocated condition, the participant and confederate worked on two computer stations separated by 10 feet in the same room. In the distributed condition, the participant and confederate worked in separate rooms for the word search task.  Once participants completed the computer task, the researcher recorded each participant's score on a sheet of paper.

At the conclusion of the task, participants completed the Group Identification Measure (GIS; Brown, Condor, Mathews, Wade, & Williams, 1986). The original form of Brown's (1986) measure was modified for the dyadic team context to assess participants' level of identification with the teammate. This measure was administered and used to perform the primary manipulation check. The group attitude measure (GAS; Evans & Jarvis, 1986) was also used to measure participants' attitudes about their teammate. This measure is designed to assess interpersonal liking and social cohesion felt between a respondent and a social other (e.g., the participant). These measures were collected after the team identity manipulation was administered and the dyad had completed the team task, but before the participant was given the feedback about their team performance. For theoretical reasons, it was desirable to measure participants' attitudes and identification with the teammate before providing the negative feedback that the team had failed to reach the target performance score.

Once participants completed the group attitude and identification measures, participants were given the feedback that their team failed to meet the team performance goal of the session. During the feedback session, the experimenter followed a script and reviewed the performance of the team. Confederate performance was reviewed such that the participant had a clear idea of the source of team failure (i.e., the low confederate score). The feedback about confederate performance was standardized across all conditions such that the experimenter read from a script when describing the confederate's performance score on the task.

After the feedback session, participants were asked to complete open-ended questions the causes of team performance. This free response format is consistent with previous research on attributions in virtual teams (Cramton et al., 2007). McAuley, Duncan, and Russell's (1992) revised Causal Dimension Scale II (CDSII) were administered to participants after the preprogrammed performance feedback. Free response comments were elicited by asking participants to provide three reasons for team performance. Three comments were requested in order to be consistent with

Cramton et al. (2007) as to ensure that participants had the autonomy necessary to provide honest answers that reflected their options. The three reasons were examined separately as a way to ensure that assessments of the comments were capturing any variance given unique reasons provided. We were also interested in examining each reason separately because it could have been the case that the first reason would represent the most recent and salient cognition available to the respondent. Using this approach allowed us to examine reasons one, two, and three in order of provision by the respondents. At the end of the experimental session, participants were debriefed about the real purpose of the study. The experimenter interviewed participants to ensure that they fully understood the necessity of the deception and the need to use a confederate who was instructed to perform poorly on the team task. Participants were then thanked for their participation and dismissed.

# 3. RESULTS

Data from 115 participants were collected for this study. Three participants were excluded from the analysis for not following the procedures and directions outlined by the experimenter. Two participants were excluded from the analysis due to technical problems with computers used in this study (e.g., computer crashes). Data from the remaining 110 participants was used to test the hypotheses. The sample size per condition ranged from 26 to 28.

Table 1 presents the means, standard deviations, correlations, and scale reliabilities for all the variables analyzed in this study. A power analysis was conducted prior to data collection to determine the appropriate number of participants to attain a power level of .80 or higher for a 2 x 2 factorial design. We specified a medium effect size (Cohen's $d = .40$), thus we anticipated needing 25 participants in each condition. We realized following the data collection stage that the effect sizes were smaller than expected. Our statistical analyses reported below had observed power values that spanned a wide range from .05 to .53 (see ANOVA results in Tables 4 through 8). According to our power analysis results, for small effects (Cohen's $d = .15$), a total of 160 participants would have been needed (i.e., 40 participants per condition). Table 2 summarizes the sample sizes required for a range of effect sizes. Because of the low power level (and associated high Type II error rate) in this study, the alpha level for testing all hypotheses (*H1* – *H3*) was set at $p = .10$.

**Manipulation Check for Team Identity**

A manipulation check was included to assess the extent to which the team identity manipulation influenced participants' identification with the teammate in the dyad. A 2 (Collaboration Configuration) X 2 (Team Identity) ANOVA was conducted using mean scores from Brown et al.'s (1986) Group Identification Scale completed with reference to the team (i.e., participant and teammate).

This analysis found a significant main effect for collaboration configuration, $F$ (1, 103) = 11.35, $p$ = .001, $\eta^2$= .099. Contrary to expectations, the main effect for team identity was not significant, $F$ (1, 103) = 0.28, *n.s.* The collaboration configuration main effect, however, was qualified by a significant collaboration configuration X team identity interaction, $F$ (1, 103) = 8.89, $p$ = .004, $\eta^2$ = .079. In the collocated team conditions, team identification was *higher* for low team identity participants ($M$ = 2.80, $SD$ = 0.78) compared to high team identity participants ($M$ = 2.50, $SD$ = 0.53). However, in the distributed team conditions, the predicted difference in social identification was observed: team identification scores were lower in the low team identity condition ($M$ = 2.04, $SD$ = 0.55) compared to the high team identity condition ($M$ = 2.45, $SD$ = 0.57). Figure 3 displays the means associated with these effects. Table 3 summarizes the ANOVA table, including effect size and observed power values.

Simple effects analyses were then performed and revealed that the team identity effect in the collocated condition was significant at the .10 level, $F$ (1, 103) = 3.29, $p$ = .07, $\eta^2$ = .031. Moreover, the simple effect for team identity was significant at the conventional .05 level in the distributed condition, $F$ (1, 103) = 5.71, $p$ = .02, $\eta^2$= .053.

These analyses demonstrate that the social identity manipulation was successful in changing participants' perceptions of team identity in the distributed team conditions, but was ineffective under collocated team conditions. The partial success of the team identity manipulation (i.e., distributed conditions only) is important for interpreting its effects on causal attributions for teammate performance. This outcome and its implications will be discussed further in the Discussion section.

**Teammate Focused Locus of Causality Scores**

The project was designed to assess the extent to which the experimental manipulations of collaboration configuration and shared identity would influence attributions of teammate performance. To test the hypotheses, analysis of variance (ANOVA) was used to examine the effects of the independent variables on causal attributions for teammate performance on the experimental task.

A 2 (Collaboration Configuration) X 2 (Team Identity) ANOVA was conducted on the locus of causality scores (CDSII scale) of participants for teammate performance. The locus of causality subscale ranged from 1 to 9, with lower values indicating more situational (external) attributions and higher values representing more dispositional (internal) attributions. The main effect for collaboration configuration (*H1)* was significant, $F$ (1, 106) = 4.23, $p = .04$, $\eta^2 = .038$. Causal attributions in the collocated team condition ($M = 3.98$, $SD = 2.96$) were less situational (external) in locus of causality than in the distributed team condition ($M = 2.90$, $SD = 2.49$). The direction of the difference between these means is inconsistent with *H1*. The hypothesized main effect for team identity (*H2*) was not significant, $F$ (1, 106) = 0.74, $p = .39$, $\eta^2 = .007$, nor was the predicted interaction between collaboration configuration and team identity (*H3)*, $F$ (1, 106) = 0.06, $p = .80$, $\eta^2 = .001$. In the high team identity conditions, the mean locus of causality scores were as follows: collocated condition ($M = 4.27$, $SD = 3.31$); distributed condition ($M = 3.06$, $SD = 2.63$). In the low team identity conditions, the mean locus of causality scores were as follows: collocated condition ($M = 3.69$, $SD = 2.59$); distributed condition ($M = 2.74$, $SD = 2.38$). Figure 4 displays the means associated with these results. Table 4 summarizes the ANOVA table and reports effect size and observed power values for this analysis.

**Free Response Comment Locus of Causality Scores**

Because the locus of causality attributions generated by participants for the free response comments were from the same person, we tested the effects of the experimental manipulations on participants' locus of causality scores for their own attributions for team performance using a repeated measures ANOVA. Thus, a 2 (Collaboration Configuration) X 2 (Team Identity) X 3 (Reason) mixed model ANOVA with repeated measures on the last factor was conducted. In terms of the between-subject factors, the ANOVA found no significant effects for collaboration configuration, $F$ (1, 105) = 0.62, $p = .44$, $\eta^2 = .006$, team identity, $F$ (1, 105) = 1.23, $p = .27$, $\eta^2 = .012$, or the hypothesized interaction, $F$ (1, 105) = 1.09, $p = .30$, $\eta^2 = .010$. In terms of the within-subjects factor, the ANOVA revealed that the main effect for reason was not significant, $F$ (2, 210) = 2.19, $p = .11$, $\eta^2 = .02$. This within-subjects factor also did not interact significantly with the between-subjects factors of collaboration configuration, $F$ (2, 210) = 0.52, $p = .60$, $\eta^2$

= .005, team identity, $F$ (2, 210) = 0.81, $p$ = .45, $\eta^2$ = .008, including the nonsignificant three-way interaction, $F$ (2, 210) = 0.97, $p$ = .38, $\eta^2$ = .009.

To further explore these repeated measures ANOVA results, we also performed separate analyses for each reason generated by participants. First, a 2 (Collaboration Configuration) X 2 (Team Identity) ANOVA conducted on participants' locus of causality scores for Reason A found that the main effect of collaboration configuration (*H1*) was not significant, $F$ (1, 106) = 1.76, $p$ = .19, $\eta^2$ = .016. The team identity main effect (*H2*) was also not significant, $F$ (1, 106) = 0.05, $p$ = .82, $\eta^2$ = .00, nor was the interaction effect (*H3*), $F$ (1, 106) = 0.04, $p$ = .84, $\eta^2$ = .00. For Reason A, in the high team identity conditions, the mean locus of causality scores were as follows: collocated condition ($M$ = 4.68, $SD$ = 2.41); distributed condition ($M$ = 3.94, $SD$ = 2.47). In the low team identity conditions, the mean locus of causality scores were as follows: collocated condition ($M$ = 4.69, $SD$ = 2.87); distributed condition ($M$ = 4.15, $SD$ = 2.36). Figure 5 represents the means associated with this analysis. Table 5 presents ANOVA results and includes effect size and observed power values.

Second, a 2 (Collaboration Configuration) X 2 (Team Identity) ANOVA was conducted using participants' locus of causality scores for Reason B. The hypothesized main effect of team identity (*H2*) was not significant at the .10 level, $F$ (1, 106) = 2.58, $p$ = .11, $\eta^2$ = .024. The main effect of collaboration configuration (*H1*) was also not significant, $F$ (1, 106) = 0.02, $p$ = .90, $\eta^2$ = .00, nor was the interaction effect (*H3*), $F$ (1, 106) = 0.02, $p$ = .90, $\eta^2$ = .00. For Reason B, in the high team identity conditions, the mean locus of causality scores were as follows: collocated condition ($M$ = 5.43, $SD$ =

2.51); distributed condition (*M* = 5.56, *SD* = 2.97). In the low team identity conditions. the mean locus of causality score were as follows: collocated condition (*M* = 4.69. *SD* = 2.45); distributed condition (*M* = 4.69, *SD* = 2.54). Figure 6 presents the means associated with this analysis. Table 6 presents the ANOVA results and reports of effect size and observed power values for these effects.

Finally, a 2 (Collaboration Configuration) X 2 (Team Identity) ANOVA was conducted with participants' locus of causality scores for Reason C. As predicted, the hypothesized interaction between collaboration configuration and team identity (*H3*) was significant at the .10 level, $F$ (1, 105) = 3.19, $p$ = .077, $\eta^2$ = .029. However, the hypotheses concerning the main effects of collaboration configuration (*H1*), $F$ (1, 105) = 0.03, $p$ = .87, $\eta^2$ = .00, and team identity (*H2*) were not supported, $F$ (1, 105) = 0.28, $p$ = .60, $\eta^2$ = .003. The difference between means for the low identity (*M* = 5.12, *SD* = 2.62) and high identity (*M* = 4.53, SD = 2.54) participants in the distributed conditions was consistent with *H3*, but the direction of this mean difference (and its magnitude) between low identity (*M* = 4.36, *SD* = 2.36) and high identity participants (*M* = 5.45, *SD* = 2.38) in the collocated conditions was inconsistent with the interaction hypothesis (see Fig. 1). Figure 7 displays the means associated with the interaction effect. Table 7 presents the ANOVA results and reports effect size and observed power values for this analysis.

Simple effects analyses revealed that the team identity effect in the collocated condition was significant, $F$ (1, 105) = 2.75, $p$ = .10, $\eta^2$ = .025. However, this simple effect did not reach significance in the distributed condition, $F$ (1, 105) = 0.77, $p$ = .38,

$\eta^2$ = .007. Thus, while the interaction effect was significant overall at the .10 level, the simple effect analyses indicated that the specific form of the interaction did not provide support for *H3* because the team identity effect was predicted to be smaller in magnitude under collocated compared to distributed team conditions.

**Situational Attribution Scores**

A 2 (Collaboration Configuration) X 2 (Team Identity) ANOVA was conducted on the frequency of situational attributions (as coded by independent raters). The results showed that the main effects of collaboration configuration (*H1*), $F$ (1, 106) = 1.13, $p$ = .29, $\eta^2$ = .011, and team identity (*H2*) were not significant, $F$ (1, 106) = 0.59, $p$ = .45, $\eta^2$ = .006, nor was the hypothesized interaction (*H3*), $F$ (1, 106) = 0.34, $p$ = .56, $\eta^2$ = .003. In the high team identity conditions, the mean situational attribution scores were as follows: collocated condition (*M* = 1.50, *SD* = 1.11), distributed condition (*M* = 1.59, *SD* = 1.05). In the low team identity conditions, these means were as follows: collocated condition (*M* = 1.54. *SD* = 0.92), distributed condition (*M* = 1.85, *SD* = 0.95). Figure 8 displays the means associated with this analysis. Table 8 presents ANOVA results and the associated effect size and observed power values.

# 4. DISCUSSION AND CONCLUSION

This study was designed to investigate the effects of collaboration configuration and team identity on causal attributions for teammate failure in virtual teams. The first hypothesis (*H1*), that situational attributions would be stronger in the collocated team conditions compared to distributed team conditions, received no support. In fact, the observed main effect for collaboration configuration showed that situational attributions for teammate performance were actually stronger in the *distributed* teams compared to collocated teams. The second hypothesis (*H2*), that situational attributions would be stronger under conditions of high team identity compared to low team identity, also received no support. The marginal main effect ($p = .11$) for team identity (see Reason B results in Figure 6) indicated that the condition means were opposite in direction from *H2*: High team identity participants made *weaker* situational attributions relative to low team identity participants. The third hypothesis (*H3*), that collaboration configuration would moderate the relationship between shared team identity and situational attributions, was not supported. The significant interaction effect in the analysis of Reason C (see Figure 7) did not conform to the predicted form of the interaction in Figure 2. The only significant difference between condition means for this analysis occurred in the collocated conditions; no reliable differences emerged in the distributed conditions.

Based on prior research, we expected that the tendency to make dispositional (internal) attributions in the distributed team conditions would be associated with limited ability to observe contextual, situational information affecting partner performance. The theoretical analyses of Cramton (2001; 2002) and empirical results of Cramton et al. (2007) stress the importance of collocated collaboration for mitigating interpersonal conflict by providing team members with situational cues about their teammates' local contexts. Contrary to this view, the present results demonstrated that situational (external) attributions were stronger in distributed teams compared to collocated teams. This result also highlights the importance of the physical location where teammates work. However, the present study's findings question the premise that collocation of teammates facilitates situational attributions by allowing individuals to observe the situational context in which teammates perform their work. It appears that under the specific distributed team conditions created in the present study, participants made stronger situational attributions relative to collocated team participants.

To better understand these unexpected results, several possible explanations will be discussed. First, it must be acknowledged that the theoretical argument for *H1* may be flawed. Both the theoretical and empirical status of Cramton's (2001, 2002) attributional framework have been questioned recently by other CMC researchers (Bazarova & Walther, 2009). To our knowledge, the number of well controlled, experimental studies testing this hypothesis is limited. One possibility is that the present results for *H1* challenge the existing theoretical analysis (Cramton, 2001; 2002) of the absence of physical collocation and its effects on causal attributions in distributed teams. In fact, Bazarova and Walther (2009) reported similar results to the present study: distributed team members made *less* dispositional attributions than collocated team members. These conflicting empirical results suggest that alternative theoretical frameworks for attributional processes in virtual teams need to be developed and tested (Bazarova & Walther, 2009).

Second, the present results for *H1* may be divergent from those reported by Cramton et al (2007) because of methodological differences. Cramton et al (2007) manipulated collaboration configuration by minimizing physical contact between the participant and confederate, except during the task performance phase of the experiment. No visual contact (except a brief introduction at start of session) or conversation was permitted between participant and confederate throughout the experimental session. The participant and confederate were kept in separate rooms until the point where the collaboration configuration manipulation was implemented. Only at that point were participant and confederate placed in the same room in collocated team conditions (Cramton et al., 2007, p. 533).

In contrast, the manipulation of collaboration configuration was operationalized using a different procedure in the present study. Because of the need to manipulate team identity effectively, participant and confederate were seated in the same room at the outset of the session. All instructions and several questionnaires were completed by both individuals in the *same* room prior to their separation into private rooms after approximately twenty minutes. A brief scripted conversation was also permitted between participant and confederate in all conditions during this time to reinforce the team identity manipulation. Thus, in the present study, participants in the distributed conditions were *physically collocated* with visual access and had brief face-to-face interaction with the confederate for about one-third of the experimental session (i.e., one hour). This methodological difference may have changed the impact of the collaboration configuration manipulation in ways that make direct comparison of these findings with Cramton et al.'s (2007) results problematic. We suspect that the difference in collaboration configuration (especially in terms of the amount of collaboration and interactions of teammates) between this and Cramton et al.'s (2007) study may have been influential in Cramton et al.'s (2007) study. Moreover, the additional face-to-face contact of participants and the confederate under distributed team conditions may explain the unexpected reversal of the hypothesized collaboration configuration main effect (*H1*) found in the present study.

Finally, a third explanation for the surprising results with respect to *H1* may be connected to another methodological issue: how participants understood and used the causal attribution measures to evaluate the locus of causality for teammate performance. The CDSII (McAuley et al., 1992) was originally designed to measure participants' attributions for actions or outcomes of events with a focus on the self. Thus, perceptions about the *locus of causality* for an action or outcome are presumed to be answered by respondents with the self as the reference target for the rating (e.g., external to participant, or internal to participant). However, because these questions concerned teammate performance, use of the CDSII to assess participants' attributions may have been problematic because of misunderstandings among participants in how to apply the specific locus of causality subscale items to a reference target outside the self.

Some empirical support for this explanation may be found by examining the average locus of causality scores in this study. In absolute magnitude, these values were relatively low (e.g., collocated condition, $M = 3.98$, distributed condition, $M = 2.90$). That is, these means were on the “situational” side of the scale midpoint (5) of the 9-point CDSII. For some participants, assigning a low score on the locus of causality subscale may have been intended to mean that teammate performance was attributed to factors external to the *participant*. With this alternative understanding of the rating scale, *any* factor related to the teammate could be construed as external to the participant. Conversely, assigning a high score on the locus of causality subscale may have been intended by participants to mean that teammate performance was attributed to factors internal to the *participant,* not to the teammate. In essence, participants were being asked to rate the teammate’s performance by taking the perspective of the *teammate* in answering the CDSII questions.

Low overall mean scores on these measures in both collocated and distributed conditions suggest the possibility that participants used the scale in a manner inconsistent with the standard instructions and assumptions for this instrument. Because the CDSII was the primary dependent variable for testing hypotheses, any systematic misunderstanding of how to use this scale (even among a subset of participants) may have distorted the condition means and inflated the overall error variance in this study. Thus, the unexpected pattern of causal attributions for collaboration configuration could be related to this measurement ambiguity. This explanation is clearly amenable to empirical testing in follow-up studies using this experimental paradigm.

With respect to *H2* and *H3,* the results of this study provided no convincing empirical support for the hypothesized causal role of team identity in moderating the effects of collaboration configuration on attributions for teammate performance. How can these negative results be explained? The results from the manipulation check analyses using the GIS measure point to a partially effective manipulation of team identity as the most likely candidate. First, no overall main effect for team identity was observed on this manipulation check. The only significant effects were a main effect for collaboration configuration and a collaboration configuration x team identity interaction. Second, simple effects analyses revealed that while there was some difference in identification scores between high vs. low team identity participants in the collocated condition ($p$ = .07), the primary source of the interaction effect (see Figure 3) was reflected in the expected mean difference between high and low identity participants in the distributed team conditions ($p$ = .02). Third, the direction of the mean difference in the collocated condition was actually reversed from what was expected from the team identity manipulation. Thus, we have conclusive evidence that the team identity manipulation achieved only mixed success.

Both *H2* and *H3* were proposed based on the assumption of a successful manipulation of team identity in both collocated and distributed conditions. Thus, this study was unable to properly test *H2*, which required that a main effect for team identity be observed on the GIS manipulation check. Moreover, this study provided a test of only one-half of the interaction hypothesis (*H3*), namely, the expected effect of team identity on causal attributions for teammate performance under distributed conditions. Because the team identity manipulation was unsuccessful in the collocated conditions, we cannot interpret substantively the results for the team identity factor in these conditions because there was no objective evidence that high identity subjects experienced greater identification with the team than low identity subjects. If anything, the reverse pattern appeared to be the case.

Under distributed conditions where the predicted differences in team identity were found, we can conclude that the results for causal attributions for teammate performance in the observed interaction for Reason C (see Figure 7) were consistent with expectations. High identity participants made stronger situational attributions compared to low identity participants. However, simple effects analyses found that this difference in condition means was not statistically reliable; in fact, the only mean difference that was close to significance ($p = .10$) was in the collocated conditions. Thus, we cannot report any compelling evidence from this study for the impact of team identity as a moderator of collaborative configuration. Further experimental research that achieves a successful manipulation of team identity will be required to provide a more rigorous test of *H2* and *H3*.

**Limitations**

Like all research studies, this experiment is not without limitations. One of the major limitations of our study was the relatively small sample size. We anticipated that the independent variables would have effect sizes in the medium range. Unfortunately, this projection was incorrect. With a total sample size of 110 participants, we obtained low statistical power to test the hypotheses. At best, for testing main effect predictions (*H1, H2*), we had observed power values in the range of .50. However, to detect interaction effects (*H3*), the observed power values in Tables 4-8 were usually below

.10, except for one analysis (Reason C) that had a power value of .43. Researchers need to be aware that larger sample sizes ($N$ = 160 or greater) will likely be required to detect the small effect sizes for these independent variables.

Although we used an experimental design, the sample consisted of college students performing tasks in a laboratory setting. We acknowledge the potential for limited generalizability that may be associated with these sample and task characteristics. The use of experimental manipulations in a laboratory setting provides a direct test of the hypothesized causal relationships among the independent and dependent variables of this study. Future research will determine if these findings can be replicated using non-student samples in the various organizational settings that use teams. Because this study was cross sectional, it is also necessary to examine how these variables manifest and interact over time. The variables of interest are dynamic: teams in organizations often change and evolve over time. We recommend the investigation of team processes in field settings with existing and ad hoc collocated and distributed teams to examine the extent to which these findings can be replicated.

Organizations also use teams of varying size and complexity. Our study examined individual reactions to team failure using a dyadic task as our operational representation of a team context (Cramton et al., 2007). Bazarova and Walther (2009) have criticized this experimental paradigm as being unrepresentative of the typical work conditions of distributed teams in organizations. We recognize this limitation of the present study and concur that alternative operationalizations of distributed team work conditions would be desirable to clarify the conflicting empirical research findings in this area of research.

**Future Directions**

Despite the lack of support for the hypotheses involving team identity, we believe that future research should continue to examine the role of social identification in distributed work teams. This recommendation is based on the empirical finding that social identification in face-to-face teams leads to more positive team-level outcomes, less interpersonal conflict, and stronger team cohesion (Polzer et al., 2006). Previous conceptual analyses by Hinds and Mortensen (2005) and Cramton et al. (2007) have proposed that team members with a strong shared identity should report more positive reactions to team failure compared to members with weak shared identity. Moreover, future research could also investigate whether these desirable team processes and outcomes are mediated through the social identity framework (i.e., variables predicting social identification, which then predicts subsequent team-level emergent processes (social cohesion) and outcomes (team satisfaction).

Additional field research will also be required to determine if distributed teams in actual organizational settings display more favorable (e.g., more situational, less dispositional) attribution patterns in the same way as face-to-face work teams. Recent empirical work on various types of distributed teams in the field suggests an affirmative answer to this question (Bazarova and Walther, 2009).

**Conclusion**

From a practical standpoint, the primary results of this study are encouraging for the use of distributed work teams in organizations. Little evidence was found to confirm the negative predictions concerning the prevalence of the fundamental attribution error in distributed teams (Cramton, 2001; Cramton, 2002). Given the multiple hurdles that distributed teams must overcome to collaborate (Griffith, Sawyer, & Neale, 2003; Hinds & Bailey, 2003; Kirkman & Mathieu, 2005), the present findings for collaboration configuration suggest that providing information about other team members and the local contexts in which they work may indeed help mitigate some of the negative outcomes associated with team failure (Cramton et al., 2007). Computer software to support distributed team collaborations can be also designed to deliver such informational cues to teammates efficiently in real time. The results of this study suggest that members of distributed teams can absorb and use such situational information to reach more accurate causal attributions for teammate performance.

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# APPENDIX A

*Table 1.*
*Means, Standard Deviations, and Correlations for Study Variables.*

| *Variable* | *M* | *SD* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *1. Collaboration Configuration* | -- | -- | (--) | | | | | | | | |
| *2. Team Identity* | -- | -- | .00 | (--) | | | | | | | |
| *3. Team Identification Manipulation Check (GIS)* | 2.46 | 0.67 | -.30 | -.03 | (.80) | | | | | | |
| *4. Locus of Causality Teammate* | 3.45 | 2.78 | -.20* | -.08 | -.00 | (.95) | | | | | |
| *5. Situational Attributions* | 1.62 | 1.00 | .10 | .07 | -.07 | -.12 | (.72) | | | | |
| *6. Locus of Causality Total* | 4.78 | 1.47 | -.08 | -.11 | .06 | .08 | -.38** | (.64) | | | |
| *7. Locus of Causality Reason A* | 4.37 | 2.52 | -.13 | .02 | -.04 | .19* | -.23* | .62** | (.88) | | |
| *8. Locus of Causality Reason B* | 5.09 | 2.62 | .01 | -.15 | .01 | -.14 | -.33** | .58** | .04 | (.83) | |
| *9. Locus of Causality Reason C* | 4.87 | 2.48 | -.02 | -.06 | .03 | .10 | -.11 | .54** | .04 | -.07 | (.82) |

*Note:* $^{*}p < .05$, $^{**}p < .01$, *reliabilities appear in parentheses on the diagonal.*

*Table 2.*
*Power Analysis Results, Sample Size Needed.*

| | $d$ = .40 | $d$ = .30 | $d$ = .20 | $d$ = .15 |
|---|---|---|---|---|
| N Required per Cell | $n$ = 25 | $n$ = 30 | $n$ = 35 | $n$ = 40 |

*Note: Sample Size Needed Per Condition To Detect Effects. Effect Size Is Cohen's d.*

*Table 3.*
*ANOVA Results for Team Identification Manipulation Check.*

| *Source* | *SS* | *df* | *MS* | *F* | *p* | *η2* | *Observed Power* |
|---|---|---|---|---|---|---|---|
| *Collaboration Configuration* | 4.34 | 1 | 4.34 | 11.35 | .001 | .099 | .92 |
| *Team Identity* | 0.09 | 1 | 0.09 | 0.28 | .64 | .002 | .08 |
| *Collaboration X Team Identity* | 3.40 | 1 | 3.40 | 8.89 | .004 | .079 | .84 |
| *Error* | 39.40 | 103 | 0.383 | | | | |
| *Total* | 47.23 | 107 | | | | | |

*Note: SS values are Type III from SPSS. Observed Power analysis was based on an alpha level of .05*

*Table 4.*
*ANOVA Results for Locus of Causality Attributions.*

| *Source* | *SS* | *df* | *MS* | *F* | *p* | *η2* | *Observed Power* |
|---|---|---|---|---|---|---|---|
| *Collaboration Configuration* | 32.12 | 1 | 32.12 | 4.23 | .04 | .038 | .531 |
| *Team Identity* | 5.62 | 1 | 5.62 | 0.74 | .39 | .007 | .137 |
| *Collaboration X Team Identity* | 0.47 | 1 | 0.47 | 0.06 | .80 | .001 | .057 |
| *Error* | 804.75 | 106 | 7.59 | | | | |
| *Total* | 842.96 | 109 | | | | | |

*Note: Effect size is Partial Eta Squared.*

*Table 5.*
*ANOVA Results for Locus of Causality Attributions of Response A.*

| *Source* | *SS* | *df* | *MS* | *F* | *p* | *η2* | *Observed Power* |
|---|---|---|---|---|---|---|---|
| *Collaboration Configuration* | 11.31 | 1 | 11.31 | 1.76 | .19 | .016 | .260 |
| *Team Identity* | 0.34 | 1 | 0.34 | 0.05 | .82 | .000 | .056 |
| *Collaboration X Team Identity* | 0.27 | 1 | 0.27 | 0.04 | .84 | .000 | .055 |
| *Error* | 681.73 | 106 | 6.43 | | | | |
| *Total* | 693.64 | 109 | | | | | |

*Note: Effect size is Partial Eta Squared.*

*Table 6.*
*ANOVA Results for Locus of Causality Attributions of Response B.*

| *Source* | *SS* | *df* | *MS* | *F* | *p* | *η2* | *Observed Power* |
|---|---|---|---|---|---|---|---|
| *Collaboration Configuration* | 0.10 | 1 | 0.10 | 0.02 | .90 | .000 | .052 |
| *Team Identity* | 17.78 | 1 | 17.78 | 2.58 | .11 | .024 | .356 |
| *Collaboration X Team Identity* | 0.12 | 1 | 0.12 | 0.02 | .90 | .000 | .052 |
| *Error* | 730.97 | 106 | 6.90 | | | | |
| *Total* | 748.97 | 109 | | | | | |

*Note: Effect size is Partial Eta Squared.*

*Table 7.*
*ANOVA Results for Locus of Causality Attributions of Response C.*

| *Source* | *SS* | *df* | *MS* | *F* | *p* | *η2* | *Observed Power* |
|---|---|---|---|---|---|---|---|
| *Collaboration Configuration* | 0.18 | 1 | 0.18 | 0.03 | .87 | .000 | .053 |
| *Team Identity* | 1.68 | 1 | 1.68 | 0.28 | .60 | .003 | .082 |
| *Collaboration X Team Identity* | 19.51 | 1 | 19.51 | 3.19 | .08 | .029 | .425 |
| *Error* | 641.88 | 106 | 6.11 | | | | |
| *Total* | 663.25 | 109 | | | | | |

*Note: Effect size is Partial Eta Squared.*

*Table 8.*
*ANOVA Results for Situational Attribution Frequency Counts*

| *Source* | *SS* | *df* | *MS* | *F* | *p* | *η2* | *Observed Power* |
|---|---|---|---|---|---|---|---|
| *Collaboration Configuration* | 1.15 | 1 | 1.15 | 1.13 | .29 | .011 | .183 |
| *Team Identity* | 0.60 | 1 | 0.60 | 0.59 | .45 | .006 | .118 |
| *Collaboration X Team Identity* | 0.34 | 1 | 0.34 | 0.34 | .56 | .003 | .089 |
| *Error* | 107.89 | 106 | 1.02 | | | | |
| *Total* | 109.98 | 109 | | | | | |

*Note: Effect size is Partial Eta Squared.*

APPENDIX B

| | | Team Identity Conditions | |
|---|---|---|---|
| | | Low Team Identity | High Team Identity |
| Collaboration Configuration | Distributed Condition | Fundamental Attribution Error<br><br>Mutual Knowledge Problem | In-Group Bias<br><br>Mutual Knowledge Problem |
| | Collocated Condition | Fundamental Attribution Error<br><br>Shared Contextual Information | In-Group Bias<br><br>Shared Contextual Information |

*Figure 1.*
*Hypothesized Biases and Levels of Information as a Function of Experimental Conditions.*

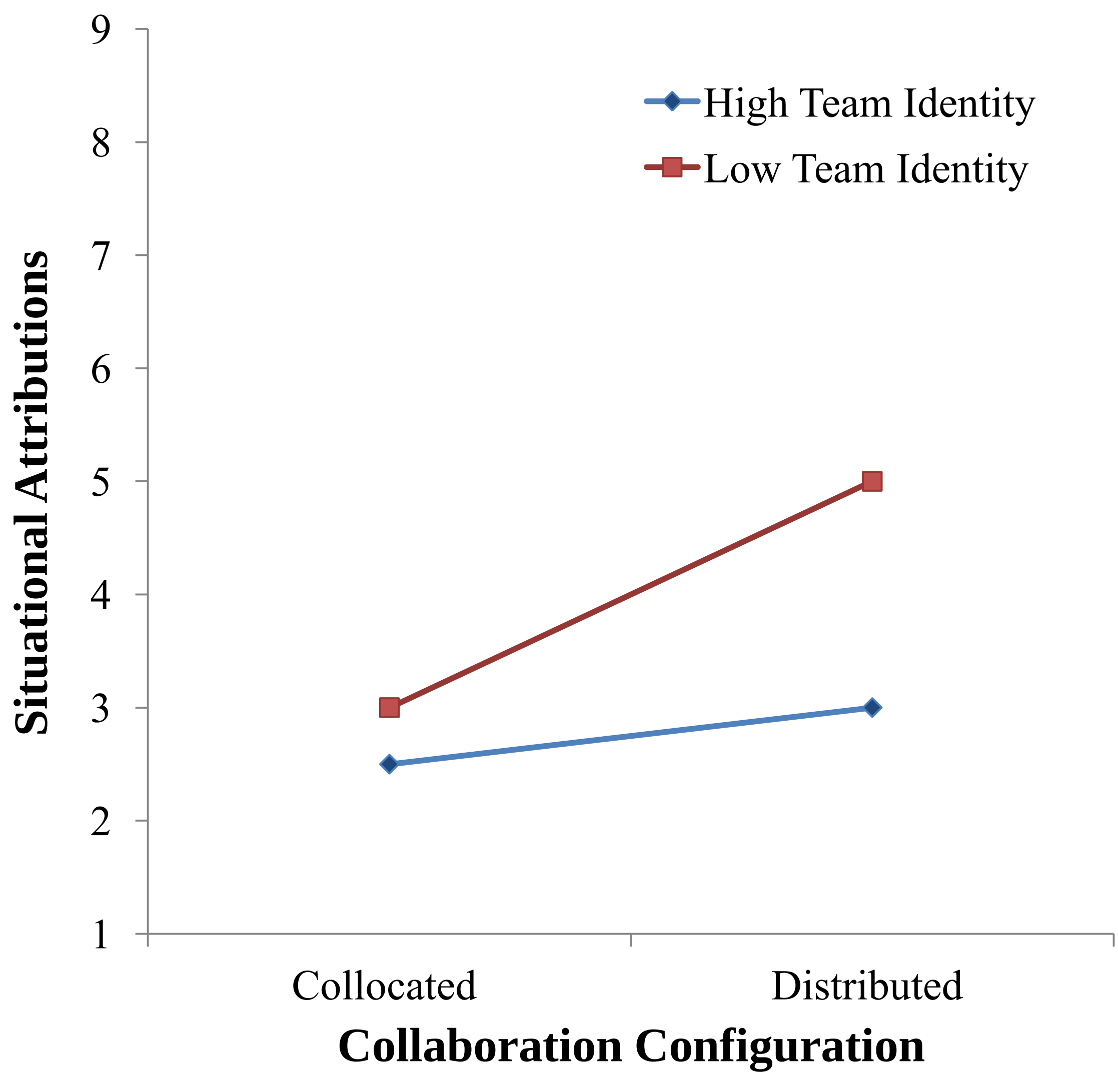


*Figure 2.*
*Hypothesized Collaboration Configuration X Team Identity Interaction (H3) for Locus of Causality Attribution (Teammate Performance).*

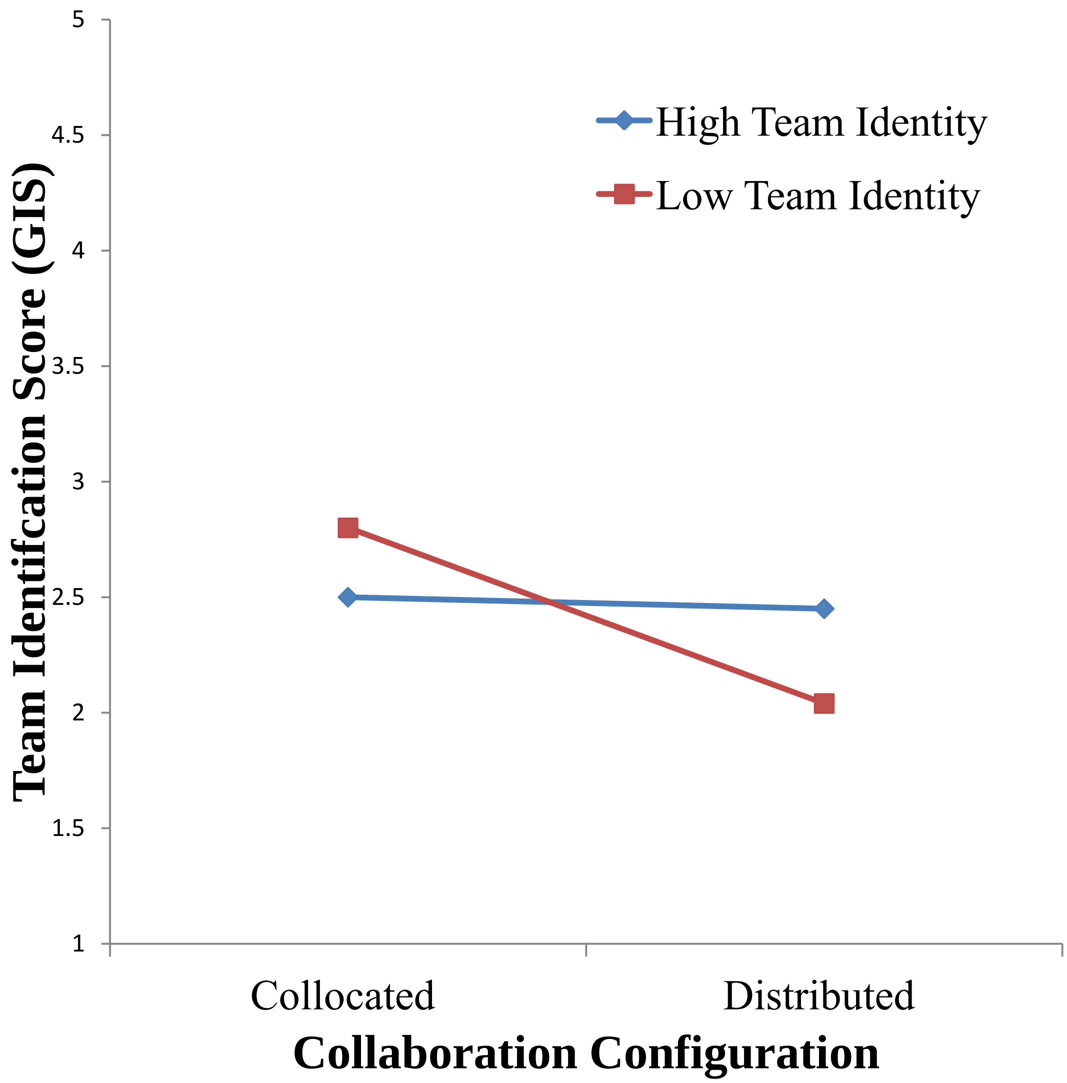


*Figure 3.*
*Team Identification Scores by Collaboration Configuration and Team Identity.*

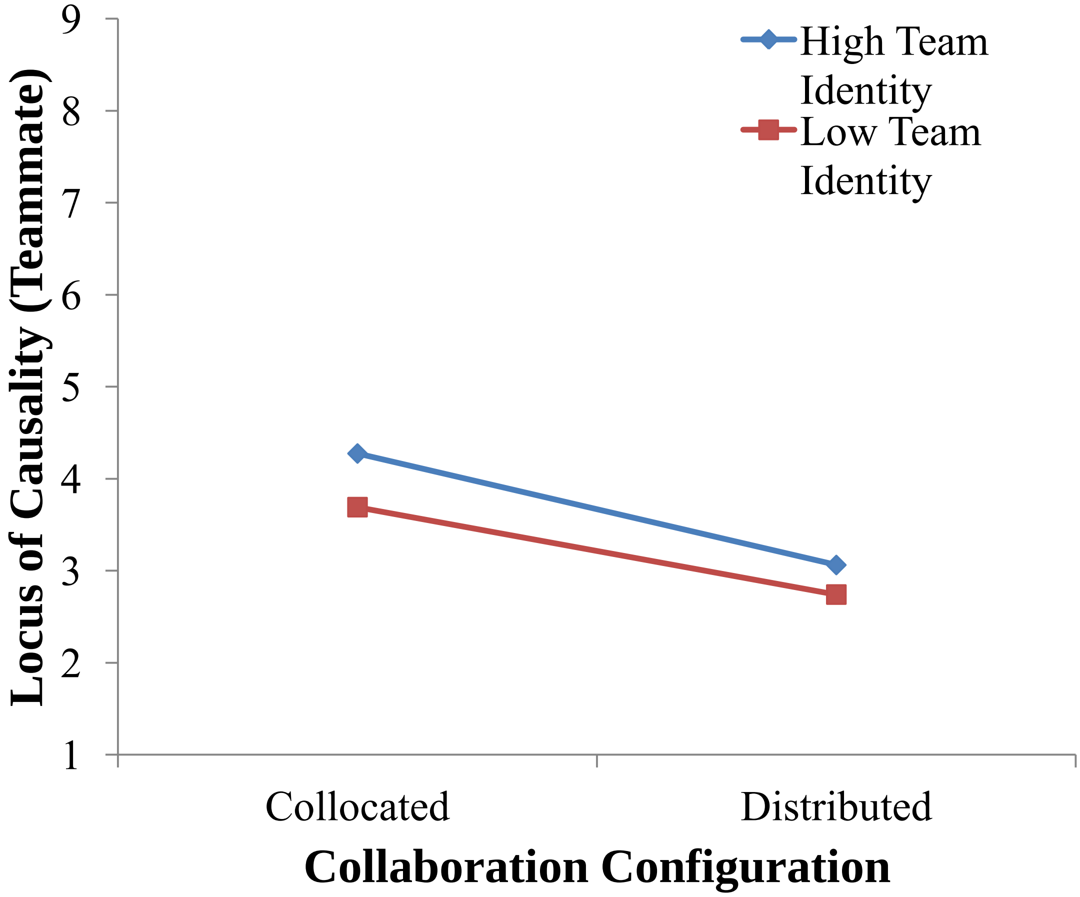


*Figure 4.*
*Means for Locus of Causality Attribution for Teammate Performance by Collaboration Configuration and Team Identity.*

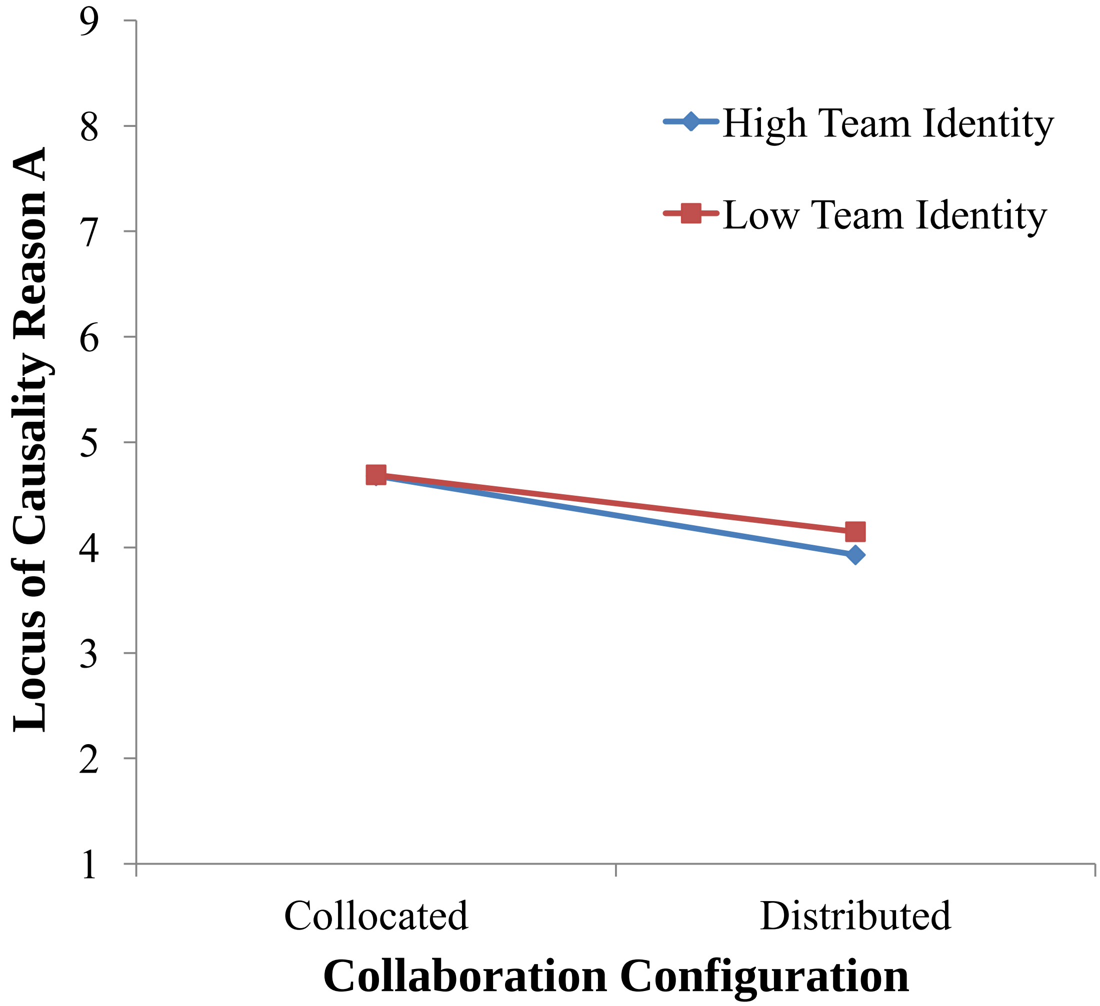


*Figure 5.*
*Means for Locus of Causality Attribution for Reason A by Collaboration Configuration and Team Identity.*

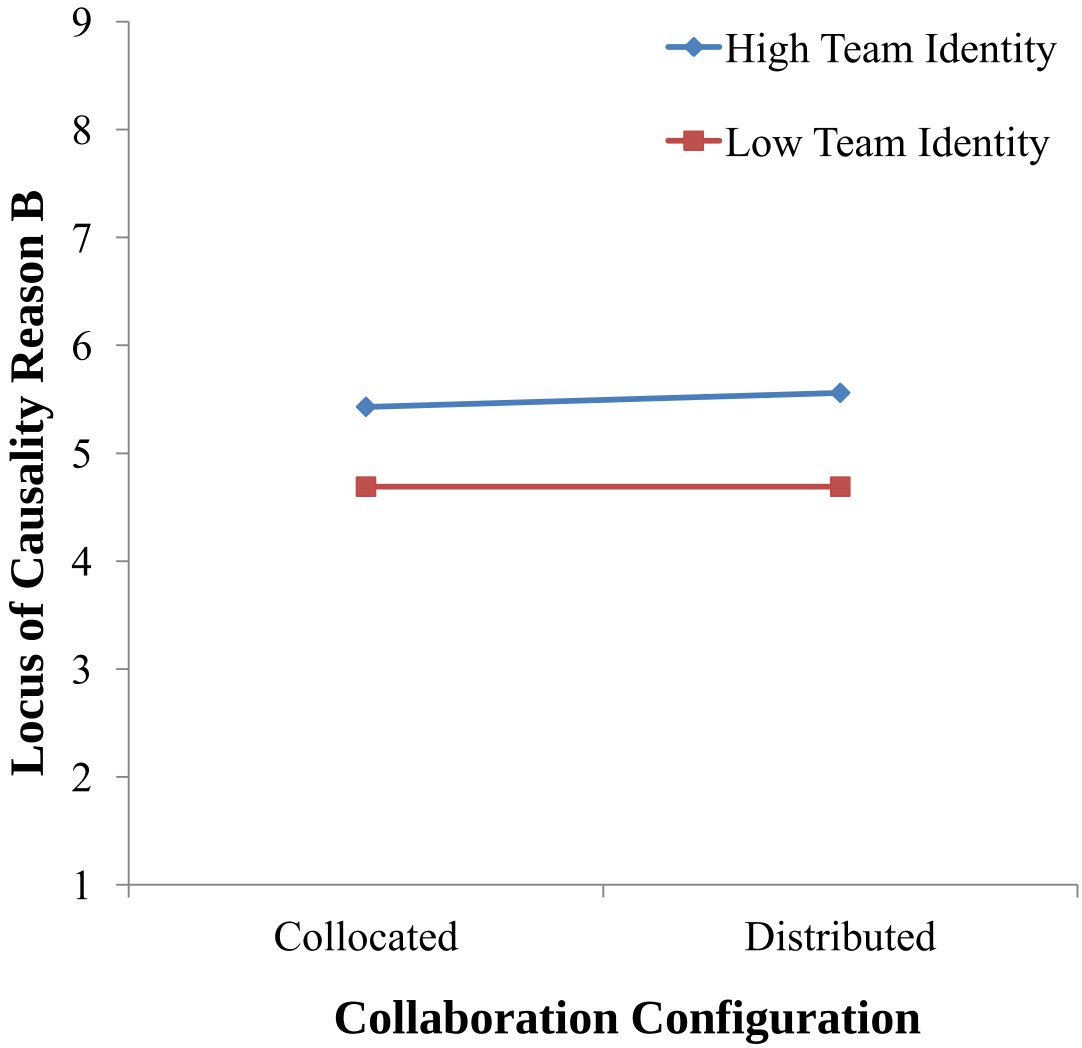


*Figure 6.*
*Means for Locus of Causality Attribution for Reason B by Collaboration Configuration and Team Identity.*

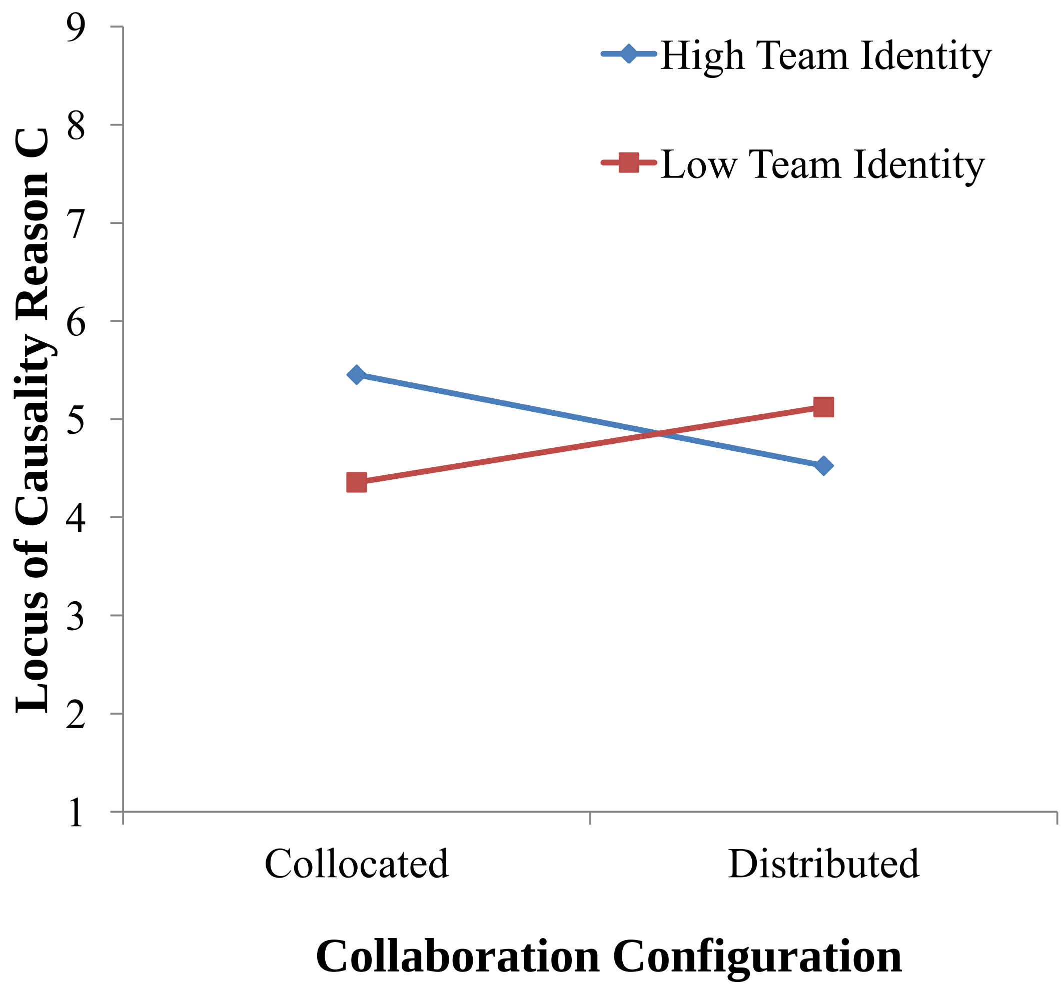


*Figure 7.*
*Means for Locus of Causality Attribution for Reason C by Collaboration Configuration and Team Identity.*

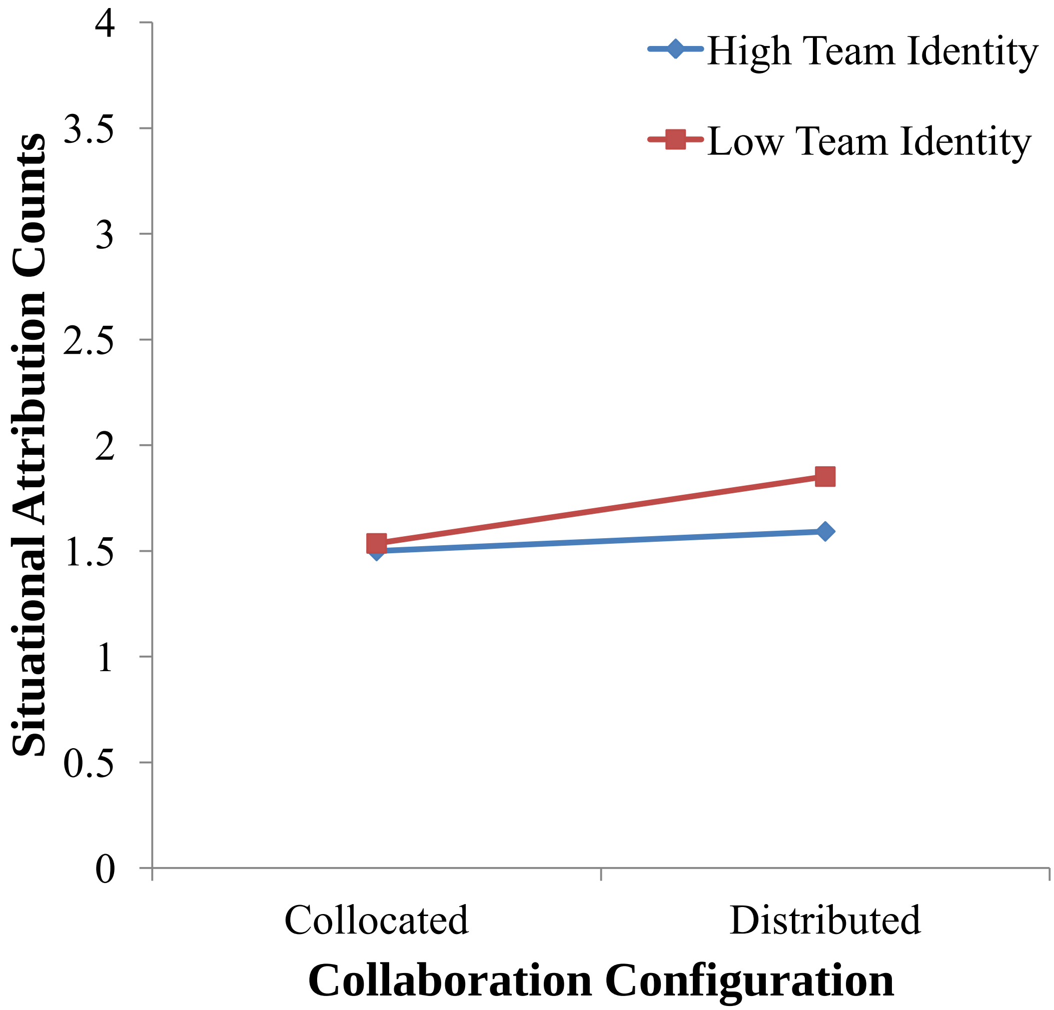


*Figure 8.*
*Means for Situational Attribution Counts by Collaboration Configuration and Team Identity.*

# VITA

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