Collective Leadership as a Mediator of the Relationship between Team Trust and Team

Performance

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Abstract

The present study investigated the relationship between collective leadership, team trust, and team performance longitudinally and with the inclusion of a performance feedback loop. Collective leadership was hypothesized to mediate the relationship between team trust and team performance; however, this hypothesis was not supported. Additional analyses support the conceptualization of collective leadership as an emergent state because collective leadership density increased significantly across two time-points. Further hypothesis testing revealed performance feedback to influence subsequent levels of team trust.

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Introduction

Team trust and collective leadership are two important components of successful teams. A team exists when two or more individuals "(a) exist to perform organizationally relevant tasks, (b) share one or more common goals, (c) interact socially, (d) exhibit task interdependence, (e) maintain and manage boundaries, and (f) [are] embedded in organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity" (Kozlowski & Bell, 2003, p. 334). Team-based leadership is becoming more popular in organizations (Pearce & Manz, 2005) due to increased competition, the lack of time needed to make all major organizational decisions, the high amount of information and expertise needed to those decisions, and the increasing complexity of senior-most leadership positions (Pearce, Manz, & Sims, 2009). This has changed some organizations' leadership structures from a traditional hierarchy where leaders are responsible for supervision, administration, command and control of subordinates (Pearce & Manz, 2005; Seers Keller, & Wilkerson, 2003) to one of lateral influence from peers and team members, as well as bottom-up influence from subordinates to individuals in higher-level positions (Pearce et al., 2009; Bligh, Pearce, & Kohles, 2006).

It is crucial that trust is developed among team members in order for a team to be successful. This occurs when team members display ability, benevolence, and integrity, which are the three antecedents of trust (Mayer, Davis, & Schoorman, 1995). Ability includes skills, competence, and perceived expertise; benevolence is caring for others and developing relationships; and integrity consists of adhering to values, fairness, and consistency (Burke, Sims, Lazzara, & Salas, 2007; Mayer et al., 1995). According to past research, trust is positively associated with performance, organizational citizenship behaviors, cooperation, quality of

communication, motivation, and response and willingness to be influenced by others (Whitener, Brodt, Korsgaard, & Werner 1998; Dirks & Ferrin, 2001). Conversely, low team trust can lead to negative outcomes such as high task conflict, high relationship conflict, and lower team performance (Langfred, 2007). These outcomes reveal the importance of developing trust within teams to maximize their effectiveness and prevent negative consequences.

The distribution of leadership within the team, referred to as collective leadership, is the extent to which team members are willing to influence others and be led by other team members based on situational and task demands (Small & Rentsch, 2010). Shared purpose, social support, and voice are antecedents of collective leadership (Carson, Tesluk, & Marrone, 2007). When leadership is shared among teams members, individuals engage in better communication and information-sharing (Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009), are more committed to the team, and work towards common goals (Bligh et al., 2006), which increase team performance.

Despite the influence that team trust and collective leadership can have on team performance, few studies have examined the relationship between these constructs (Small & Rentsch, 2010). The present study sought to integrate these constructs. Specifically, collective leadership was predicted to mediate the relationship between team trust and team performance. Using a longitudinal design with multiple time-points and a feedback loop, this study sought to empirically demonstrate that team trust emerges prior to, and contributes to, the emergence of collective leadership, which then increases team performance. A secondary purpose of this study was to demonstrate that performance feedback influences the development of subsequent team trust.

The following literature review is broken into four main sections. The first section examines team trust by defining and conceptualizing the construct, explaining how it develops and evolves over time, and enumerating the various outcomes associated with it. The second section examines collective leadership by defining the construct, describing its antecedents and how it emerges within teams, and enumerating the outcomes associated with it. These sections will present an overview of the two main constructs of the current study. The next section investigates the link between team trust and collective leadership and explains how collective leadership mediates the relationship between team trust and team performance.

Literature Review

Trust Defined

Trust is a widely studied construct in team research at both the individual and team levels of analysis. Researchers studying trust have focused on various aspects including the definition the construct (Mayer et al., 1995), how to best operationalize it (Dirks & Skarlicki, 2004), the antecedents that allow it to develop (Mayer et al. 1995; McKnight, Cummings & Chevany, 1998), and the various outcomes associated with it (Dirks & Ferrin, 2001; Dirks & Skarlicki, 2004; Burke et al., 2007). Golembiewski and McConkie (1975) stated the following to express the importance of understanding trust: "Perhaps there is no single variable which so thoroughly influences interpersonal and group behavior as does trust" (p. 131).

Mayer et al. (1995) defined trust 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" (p. 712). Other definitions of trust have focused on trust as the level of confidence one party has in another (Jones & George, 1998; Dirks & Skarlicki, 2004). The definition put forth by Mayer et al. (1995) was used in this study for four reasons. First, this definition includes the individual's willingness to be vulnerable to another individual, which Burke et al. (2007) considered an important component of trust. Second, it includes the trustor's expectation of the trustee to perform a certain behavior. Third, this definition assumes the trustee will perform the behavior independent of any oversight by the trustee. Fourth, it suggests that the trustee assesses the motivations or intentions of the trustor (Burke et al., 2007), and that the trustee believes the other party deserved their trust.

Past research has examined different types of individual and team trust (Mayer et al., 1995; Dirks & Skarlicki, 2004; Webber, 2008). Cognitive and affective are two different types of individual-level trust (McAllister, 1995). Cognitive trust consists of others' perceptions of ability and integrity (Dirks & Skarlicki, 2004) and is influenced by early trust and consistent performance (Webber, 2008). This type of trust was examined in the present study. It reflects the extent to which a person is believed to be competent, dependable, and reliable (Webber, 2008). Cognitive trust can fluctuate because it is sensitive to performance and team processes, so negative feedback or problems on tasks can lead to decreases (Webber, 2008; McAllister, 1995). In addition, monitoring behaviors and favoring certain members to complete tasks over others can decrease cognitive trust (Webber, 2008). Conversely, affective trust is based on the quality of relationships (Dirks & Skarlicki, 2004).

Trust may be examined at the team level of analysis because, "perceptions of trust reside at the individual level, but the meaning of trust as a team-level construct comes from the shared qualities of these individual-level perceptions" (De Jong & Elfring, 2010, p. 536). The authors further stated that, "[i]n addition to being similar in nature to interpersonal trust, intrateam trust is also believed to be similar in how it affects outcomes at different levels of analysis" (De Jong & Elfring, 2010, p. 536). Webber (2008) supported this by using past individual-level trust research findings to form hypotheses pertaining to team trust.

Conceptualizations of Trust

Trust has been conceptualized as a trait, a process, and an emergent state (Burke et al., 2007). The first conceptualization of trust is as a personality trait. Pervin (2003) described traits as stable and enduring, with the ability to describe consistencies in individuals' behavior. Trust as a trait is frequently measured as an individual's propensity to trust, which describes the level

of trust a person has for others prior to knowing any information about the trustee (Mayer et al., 1995). This operationalization reveals how willing an individual is to be vulnerable to others and the extent to which an individual expects others to be trustworthy (Mayer et al., 1995). A person high in this trait may be prone to blind trust, which is when a person trusts a party despite the existence of reasons not to do so (Mayer et al., 1995). The development of this trait is based on an individual's early life experiences with their significant others (Kiffin-Peterson & Cordery, 2003). Although propensity to trust is a stable disposition and serves as an individual difference variable (Mayer et al., 1995), a person's propensity to trust becomes less influential on behaviors and attitudes as different types of trust develop teams, and situational forms of trust are able to more directly influence teamwork outcomes than propensity to trust (Webber, 2008; Kiffin-Peterson & Cordery, 2003).

The second conceptualization is trust as a process (Mayer et al., 1995) that can increase or decrease outcomes, behaviors, and perceptions (Burke et al., 2007). Trust has been shown to moderate the relationship between motivational constructs and outcomes and the relationship between workplace behaviors and outcomes by influencing the behaviors that individuals exhibit. This occurs through increasing or decreasing levels of constructs associated with motivation, such as goals and needs (Dirks & Ferrin, 2001). In addition, high or low trust can affect the amount and quality of information exchanged in an employee-supervisor relationship (Burke et al., 2007).

The third conceptualization of trust is as an emergent state that describes trust as an attitude that develops quickly (Burke et al., 2007; Webber, 2008), can be broken quickly and easily (Burke et al., 2007; Jones & George, 1998), and is influenced early through cognitive cues and the reputation of group members (Webber, 2008). Trust is able to increase over time;

however, it is also heavily influenced by mistakes (Lewicki & Wiethoff, 2000), quality of

performance (Webber, 2008), and can dissolve when expectations are not reciprocated (Jones &

George, 1998). One mistake or breach in trust can either move trust-building back a couple

steps or cause the development of trust to start over at the beginning stages (Lewicki & Wiethoff,

2000), but the dissolution of trust tends to depend on the number of lapses in behavior and the

strength of the lapse (Jones & George, 1998). It also depends on the type of breach of trust.

When relationships between team members are strong, team performance and difficulties

experienced while completing tasks are less likely to influence levels of trust than when

relationships between members are weak. When trust is high, more lapses are required to

destroy trust than when trust is lower, and the strength of the perceived violation must be

extremely high in order for trust to be dissolved (Jones & George, 1998). Unlike the

conceptualization of trust as a trait based on stable characters and past experiences, trust as a

state can emerge as a result of situational demands or needs (Burke et al., 2007).

    Trust as an emergent state was the best conceptualization for the present study for three

reasons. First, early team trust between team members needed to develop quickly when the

teams initially formed (Burke et al., 2007). The student teams had a limited amount of time to

complete their class projects, which placed pressure on them to make themselves vulnerable to

each other's influence early in the timeline of the projects. Second, situational demands required

team trust to develop (Burke et al., 2007). Specifically, students were assigned projects that

were too complex and time-consuming to complete independently, so they needed to work

together and trust each other. Third, team trust could have been broken or strengthened through

their perceived quality of work and the actual grades (performance) they received (Lewicki &

Wiethoff, 2000).

How Trust Develops

The purpose of this section is to explain how trust develops because it has been defined as an emergent construct in the present study. This is important to the present study because team trust was expected to develop prior to the emergence of collective leadership. Therefore, it is necessary to understand why teams would have differing levels of trust, and differing subsequent levels of collective leadership.

Past studies have explored the antecedents of trust, how it develops, and how it can be increased (Mayer et al., 1995; McKnight et al, 1998, Elsbach, 2004). When two parties first interact, each party tends to trust the other because it is easier for a person to trust than distrust (Jones & George, 1998). Levels of trust are "surprisingly high in initial stages of a relationship" (Bligh et al., 2006, p. 302). Webber (2008) proposed and found support for a unidimensional form of trust called early trust. Specifically, the author found that team trust develops quickly and is primarily influenced by familiarity with team members. Familiarity includes past experiences with other team members and knowledge regarding their reputations, which provides individuals with early knowledge about other members that allows for categorization (Webber, 2008). Langfred (2007) assumed that team members care about their team's performance, which would influence members to trust one another quickly. Langfred (2007) measured trust at two time-points, and found the mean at time 1 to be higher than the mean at time 2, which supported Webber's (2008) notion of early trust and Jones and George's (1998) assertion that trust is high at early stages.

Mayer et al.'s (1995) antecedents of ability, benevolence, and integrity influence the development of trust as teams interact more frequently. These antecedents are independent of one another and are able to influence the extent to which a person is perceived as trustworthy.

Ability is described as the expertise, domain-specific skills, and competencies possessed by an individual (Mayer et al., 1995: Burke et al., 2007) and includes setting a compelling direction and providing structure direction for the group (Burke et al., 2007). Benevolence is the characteristics of caring for others and being concerned about relationships with others (Burke et al., 2007) and includes behaviors demonstrating concern for others (Elsbach, 2004), attachment, and perceived intentions and motives (Mayer et al., 1995). Integrity pertains to whether a person follows principles such as fairness and values, and includes perceptions of credibility, consistency, and accountability (Mayer et al., 1995: Burke et al., 2007).

Time is important to team trust because it allows team members to interact more often and become more familiar with each other (Webber, 2008), thus placing more emphasis on relationships among team members and increasing potential outcomes associated with team trust (De Jong & Elfring, 2010). The effect of time on team functioning and the incorporation of time lags in team research is frequently ignored by researchers (Mathieu, Maynard, Rupp, & Gibson, 2008). However, time influences outcomes either developmentally, where teams are influenced by a variety of variables and are able to mature across time, or episodically, where task demands force teams to utilize different processes at any given time (Mathieu et al., 2008). The episodic model is cyclical in nature and is dependent upon feedback loops, thus the demands tend to occur in cycles (Mathieu & Rapp, 2009). The episodic model was incorporated in the present study because participants received feedback regarding their team's performance on a project. The presence of feedback caused the situational and task demands to occur in cycles.

The purpose of the preceding sections was to provide a definition of trust (Mayer at al., 1995) and to justify studying trust at the team level of analysis as team trust (De Jong & Elfring, 2010). The different conceptualizations of team trust were explained, with emergent being the

conceptualization chosen for the present study due to situational and task demands placed on the teams in this study (Burke et al., 2007). Finally, the development of trust was examined, focusing on the antecedents of trust (Mayer et al, 1995), the impact of performance and competence (Webber, 2008), and other ways that trust can be strengthened or weakened (Jones & George, 1998; Lewicki & Wiethoff, 2000; Burke et al, 2007; Webber, 2008).

Collective Leadership

New leadership strategies and theories have adapted to the current workplace demands by acknowledging that the influence of leadership can occur in many different forms, and thus researchers began studying leadership holistically (Hiller et al., 2006). One concept to emerge was collective leadership, defined as "the interaction of team members to lead the team by sharing in leadership responsibilities" (Hiller et al., 2006, p. 388). Leadership no longer needs to be the responsibility of one person because "multiple individuals are often capable of satisfying team needs" (Morgeson, DeRue, & Karam, 2010, p. 8). Similar constructs include team leadership, defined as "the collective influence of members in a team on each other" (Sivasubramaniam, Murry, Avolio, & Jung, 2002, p. 68) and relational leadership, which develops "from the rich connections and interdependencies of organizations and their members" (Uhl-Bien, 2006, p. 665).

Collective, distributed, and shared leadership are all terms that are used interchangeably (Hiller et al, 2006). It conceptualizes leadership beyond the traditional perspective of an influence process from a leader to a follower by including top-down hierarchical influence, lateral influence from peers and team members, and bottom-up influence from subordinates to individuals in higher-level positions (Pearce et al., 2009; Bligh et al., 2006). Cox et al. (2003) defined collective leadership as "a collaborative, emergent process of group interaction in which

members engage in peer leadership while working together" (p. 53), while Pearce et al. (2009) described it as a dynamic, social, influence process among individuals where the purpose is to lead each other to achieve collective goals. It also reflects one form of informal leadership in which there is "no direct responsibility for a team's leadership and performance" (Morgeson et al., 2010, p. 8), rather than formal leadership in which the organization has assigned the leadership role to an individual. Each conceptualization of collective leadership reflects every individual's ability and opportunity to influence the group (Small & Rentsch, 2010), while reflecting a team's ability to work collaboratively to achieve common goals (Bligh et al., 2006).

Collective leadership is conceptualized as an emergent process (Small & Rentsch, 2010; Cox et al., 2003; Friedrich et al., 2009) because leaders can develop gradually or quickly depending upon the demands of a task or needs of the group (Bligh et al., 2006). Collective leadership can emerge as a function of an individual's knowledge, skills, and abilities (Small & Rentsch, 2010) or situational demands that cause individuals to temporarily engage in leadership behaviors to influence others (Cox et al, 2003; Bligh et al., 2006). Friedrich et al. (2009) stated, "[a]s different problems emerge, different skills and expertise will be more appropriate" (p. 935). Thus, collective leadership emerges serially as a function of team members' specific knowledge, skills, and abilities matching a particular task or situation (Seers et al, 2010). Therefore, this form of leadership is characterized by the serial emergence of leaders who may emerge quickly but then disappear as soon as the task is completed (Bligh et al., 2006).

Antecedents of Collective Leadership

A number of studies have examined the antecedents of collective leadership (Bligh et al., 2006; Pearce, Mans & Sims, 2006; Carson et al., 2007). Carson et al. (2007) examined the internal team environment, which consisted of collective purpose, social support, and voice.

Similarly, Avolio et al. (1996) found that teams must share a common purpose, believe in a collective vision, be more committed to achieving group goals than personal goals, increase their levels of trust and interdependence in other group members, and increase their motivation to achieve beyond their expectations.   Failure to develop these characteristics would prevent an organization from shifting from a single-leader structure to a team-based leadership structure (Avolio et al., 1996).

Avolio et al. (1996) proposed that teams must be fully developed in order to maximize the benefits of collective leadership. The authors found that the transformation from a group of individuals with unspecified goals, basic knowledge development, and compliance to a team of leaders who are able to collectively think abstractly, commit to each other, and exert transformational leadership resulted in higher team effectiveness. The findings of Carson et al. (2007) and Avolio et al. (1996) supported the notion that collective leadership requires team members to commit to and share a common vision and goals, offer social support to each other, be motivated achieve group goals, and develop trust in the team. Consistent with these results, Friedrich et al. (2009), found a positive relationship between collective leadership, team commitment, and team cohesion, where higher levels of collective leadership were associated with higher levels of team commitment and cohesion. These factors were associated with an increase in team performance (Friedrich et al., 2009).

Bligh et al. (2006) investigated team-level antecedents of collective leadership, in a study combining individual and team-level antecedents. Specific team-level variables included cognitive-based team trust, team potency, and team commitment, which were theorized to be significantly and positively related to collective leadership levels when complex tasks required multiple team members to engage, contribute to innovations, or lend their particular knowledge

or abilities. In summary, past research has found team trust, social support, shared purpose, voice, team potency, and team commitment to be influential to the emergence of collective leadership (Carson et al., 2007; Avolio et al., 1996; Bligh et al., 2006).

Outcomes Associated with Collective Leadership

Collective leadership has been associated with a variety of outcomes (Pearce, Manz, & Sims, 2008; Leithwood & Mascall, 2008; Mehra et al., 2006). First, collective leadership has been associated with higher levels of team performance.   Specifically, high levels of collective leadership led to better team performance among student grades as measured by teams (Hiller et al., 2006), and higher sales among sales teams (Mehra et al., 2006). Next, past studies found that collective leadership can influence attitudes and cognitions. Collective leadership led to greater perceptions of team potency and team effectiveness in student teams (Hiller et al., 2006), higher levels of satisfaction among sales teams (Mehra et al., 2006), and increased levels of motivation, personal goal-setting, personal agency, capacity to accomplish job duties, and perceptions of work settings among teachers. Finally, collective leadership has also been shown to influence behaviors. Specifically, Pearce et al. (2008) found that collective leadership resulted in fewer anti-citizenship behaviors and acted as a checks and balance system that moderated the relationship between CEO responsibility disposition and executive corruption. All of these studies demonstrated that collective leadership directly improves team performance, attitudes, cognitions, and behaviors. Furthermore, these studies reveal that the effects of collective leadership exist at the individual and team levels.

In summary, collective leadership is an emergent process (Small & Rentsch, 2010; Cox et al., 2003; Friedrich et al., 2009) that reflects every team member's opportunity to lead other members (Small & Rentsch, 2010). Antecedents of collective leadership include internal team

environment consisting of social support, shared purpose, and voice (Carson et al., 2007) as well as shared goals (Avolio et al. 1996). Finally, collective leadership has been found to influence team performance, (Hiller et al, 2006; Mehra et al., 2006), attitudes and cognitions (Hiller et al, 2006; Mehra et al., 2006), and specific behaviors (Pearce et al., 2008).

Connecting Team Trust and Collective Leadership

Both team trust and collective leadership were operationalized as emergent states in the present study. Like other emergent states, they "are products of team experiences and become new inputs to subsequent processes and outcomes" (Tasa, Taggar, & Seijts, 2007, p. 18). Trust develops when team members interact or share experiences (Webber, 2008; Langfred, 2007). Salas et al. (2005) proposed trust as a coordinating mechanism that allows what they call 'the Big 5' in teamwork to emerge because trust is able to facilitate participation and contribution from team members, which has the ability to improve the quality of outcomes such as performance. They also stated that trust is necessary in order to follow others because it requires individuals to make themselves vulnerable to others' influence. Taken together, team trust has the ability to influence the variables that influence collective leadership, which suggests that team trust is able to influence a team's level of collective leadership.

Team trust influences the variables that relate to collective leadership in a number of ways. Team trust leads to increased shared purpose, social support, and voice by creating better relationships among team members. Friedrich et al. (2009) stated, "trust among team members is important to maintaining working relationships between team members" (p. 949). Trust leads to increased participation, contribution, and quality of performance (Salas et al., 2005) because it "can have the effect of generating good team interaction" (Shen & Chen, 2007, p. 644). High trust is associated with team members having high perceptions of their team members'

competence. However, when trust is low, perceptions of others' competence decrease (Salas et al., 2005). According to Mayer et al., (1995), competence is related to trust because "competence and ability are clearly similar" (p. 722) and have even been used interchangeably in research. (Mayer et al., 1995). Past research has also included competence as a basis of trust. Because collective leadership is emergence based on each team member's relevant expertise, knowledge, skills, and abilities, trust must exist between members. When trust exists, team members are more willing to participate and possess higher levels of competence (Salas et al., 2005), thus increasing their willingness to lead when it is possible.

When trust is low, however, team members waste much of their time and energy checking and monitoring each other (Salas, et al., 2005). Research examining trust and conflict has found that relationship conflict damages trust by reducing the degree to which individuals indentify with their team, which would negatively affect shared purpose (Langfred, 2007). In addition, relationship conflict influences cohesiveness among members, which negatively affects perceived support and voice (Langfred, 2007).

Not only does team trust influence the antecedents of collective leadership, but team trust also affects an individual's degree of influence. Interdependence among team members requires risk (Salas et al., 2005), which is consistent with Mayer et al.'s (1995) definition of trust. Burke et al. (2007) found that trust influences people's willingness to follow, which supported Dirks and Ferrin (2001), where supported high trust influenced people to respond to the influence of others in a positive manner and inspired them to make themselves more open to the influence of others. Collective leadership also requires risk in that individuals must be vulnerable to other team members. The higher the level of trust an individual has in their team, the more willing they are to be vulnerable to the leadership of others team members when situations require others

to lead (Pearce, 2009; Small, 2007). Therefore, collective leadership requires trust to be present before collective leadership can emerge. Salas et al. (2005) further stated that trust is necessary in order to accept the leadership behaviors of others. This means that some level of trust is present prior to the emergence of collective leadership. Therefore, team trust emerges faster than collective leadership and serves as an antecedent, and collective leadership depends upon the existence of trust in order for members to perceive others as leaders and to allow themselves to be influenced by them.

In summary, team trust was conceptualized in this study as an emergent process that emerges prior to collective leadership. Collective leadership was proposed to mediate the relationship between team trust and team performance. This is because team trust must develop very quickly after a team forms (McKnight et al., 1998) and team trust contributes to the development of other antecedents of trust, such as shared purpose, social support, and voice (Carson et al., 2007). The existence of team trust facilitates the antecedents of collective leadership (Carson et al., 2007) and one's ability to influence others (Burke et al., 2007; Pearce, 2009; Small & Rentsch, 2010).

Hypotheses

Three hypotheses were tested in the present study. Hypothesis 1 examined collective leadership as a mediator between team trust and team performance, Hypothesis 2 examined the relationship between collective leadership at two different time-points, and Hypothesis 3 examined the effect of performance feedback on subsequent levels of team trust.

The primary purpose of the present study and the literature review was to explain how collective leadership theoretically mediates the relationship between team trust and team performance. Hypothesis 1 predicted that collective leadership at time B would mediate the

relationship between team trust at time A and team performance on project 2 (Figure 1). There are four steps to identify a variable as a mediator (Baron & Kenny, 1986); each step was given its own hypothesis.

> *H1a: Team trust at time A will be positively related to team performance on project 2.*
>
> *H1b: Collective leadership at time B will be positively related to team performance at Time B.*
>
> *H1c: Team trust at time A will be positively related to collective leadership at time B.*
>
> *H1d: Collective leadership at time B will mediate the relationship between team trust at time A and team performance on project 2.*

Although the first measures of team trust and collective leadership were collected at the same time, levels of collective leadership between teams were expected to be different at times A and B because team trust was expected to develop prior to the emergence of collective leadership and influence the extent to which leadership in teams was distributed.

> *Hypothesis 2: Collective leadership at time B will be higher than collective leadership at time A.*

As previously stated, team performance can increase or decrease team trust. One such way is through performance feedback. Past research has found a positive relationship between team performance and team trust (Webber, 2008), such that positive feedback can increase levels of team trust, while negative feedback can lead to lower levels.

> *Hypothesis 3: Performance feedback on project 1 will have a positive correlation with team trust at time B, such that teams with higher performance feedback will have higher subsequent levels of team trust while team who received lower performance feedback will have lower subsequent levels of team trust.*

Methods

Participants

Participants were 167 undergraduate students enrolled in upper-level Industrial/Organizational Psychology courses. The three sections of the course used in this study were taught by two instructors who were blind to the coding scheme of the teams and were unable to access their students' survey responses. All students were required to complete two projects in teams for course credit. Instructors offered students one extra credit point in their course for completing each of the three measures.

A total of 36 teams participated in this study, with the majority of the teams consisting of four to six students, two teams of three students, and one team of seven students. Students self-selected into their teams. Three items assessed participants' perceptions regarding the extent to which the projects required them to work in teams ($\alpha = .91$, $ICC(1) = .16$). Because this ICC(1) did not reach the .2 cutoff, it was not included in the analyses. The items were rated on a five-point Likert scale (*1 = strongly disagree; 5 = strongly agree*). An example item included "The job analysis project required my team to work together."

Participants were 67.1% female and 31.7% male. The majority race/ethnicity of the participants was white (76.6%), followed by Asian (12%), African American (4.8%), other (3%), and Hispanic/Latino (2.4%). Participants identified their academic major(s), with the majority being psychology (88.4%), sociology (9.1%), biology (6.6%) human development (6.1%), and human nutrition foods and exercise (5.5%). All other majors were below 5%. Overall, 30.5% of participants reported a GPA of 3.5 or higher, 43.1% reported a GPA between 3.0 and 3.49, and 21% reported a GPA between 2.50 and 2.99. Two participants (1.2%) did not complete the demographics questionnaire.

159 participants completed the measures at time A (95.2%), 161 completed the measures at time B (96.4%), and 165 (98.8%) completed the measures at time C. Overall, 485 out of the possible 501 total measurements were completed (96.8%). 28 out of 36 teams had complete data. No teams had the majority of its members missing data at a single time-point. However, two teams each had two members who missed the first time-point measures. Both of these teams consisted of five members. No teams had multiple members missing at the second or third time-points. One team had one member missing data at each time-point, but the same member was not missing across all three time-points. Missing data was accounted for by inserting the average of the team participants who were present at the measurement occasion.

Procedure

Table 1 presents a timeline of this study. The instructors included two team projects in their syllabi prior to the start of the semester. One instructor made each project worth 10% of the students' overall course grade, while the other instructor made each project worth 11%. The guidelines for project 1 are in Appendix A and the guidelines for project 2 are in Appendix B. The students self-selected into teams during the first week of the semester. The instructors provided the names of each team member to the researcher, who assigned a coded number to each participant.

The instructors allotted 30 minutes of class time each week for the teams to work on project 1, which was due within the first month of the semester. The instructors provided performance feedback on project 1 to the teams one week after the project was due. After the students submitted project 1, the instructors described the requirements of project 2. The instructors allotted 30 minutes of class time each week for the teams to work on project 2, which was due three to four weeks after project 1.

Participants read and signed the IRB-approved informed consent and completed the time A questionnaire on the day project 1 was due. The questionnaire included measures collective leadership, team trust, internal team environment, frequency of interactions, team conflict, liking, and expected grades on project 1.

Participants completed the time B questionnaires shortly after they received their grade on project 1. This questionnaire included the measures of collective leadership, team trust, and internal team environment.

Participants completed the time C questionnaire on the day the second project was due. This questionnaire was identical to the time A questionnaire with the addition of a supplemental questionnaire that included individuals' demographic information, subjective perceptions of the projects, and familiarity with team members prior to the course.

Measures

The measures used to assess the constructs in the procedures are discussed below.

Confounding variables. (Appendix C). Participants completed a questionnaire measuring potential confounding variables such as liking of team members, perceived conflict, expected grade on projects 1 and 2, frequency of interactions outside of class, and familiarity/prior history with team members. It was necessary to measure these confounds when studying relations among constructs because the "relationship may not be causal at all but rather due to a third variable" (Shadish, Cook, & Campbell, 2002, p.7).

Participants completed a measure of participants' liking of team members adapted from Tsui and Barry's (1986) interpersonal affect scale ($\alpha = .68, .68, ICC(1) = .24, .27$). Participants rated two items on a five-point Likert scale (*1 = to a very little extent; 5 = to a very great extent*). An example item included "To what extent do you like your team members?"

Participants rated two-items assessing perceived conflict (α = .78, .67, *ICC(1)* = .36, .08) on a five-point Likert scale (*1 = none; 5 = a very great deal).* An example item included "How much are personality clashes evident in your team?" Because the *ICC(1)* conflict at time C did not reach the .20 cutoff, it was not included in the analyses.

Frequency of interactions outside of class was assessed using a three-item measure that asked participants how many times they met outside of class to work on each project, how many hours they met for, and how many times they met to socialize outside of class (α = .39, .48). Due to its low internal reliability, this variable was not examined further.

Participants provided their expected grades on project 1 (*M* = 95.81, *SD* = 3.64, *ICC(1)* = .29) and project 2 (*M* = 96.04, S*D* = 2.58, , *ICC(1)* = .14). The *ICC(1)* for expected grade on project 2 did not meet the .20 cutoff, so it was not included in the analysis

Familiarity/prior history with team members (α = .94, *ICC(1)* = .61) was assessed using a four-item measure adapted from Webber (2008). Participants rated the items on a five-point Likert scale (*1 = I am not familiar; 5 = I am very familiar*). An example item included "To what extent did you know your team members personally prior to this class?"

Internal team environment (Appendix D). Internal team environment, an antecedent of collective leadership, was assessed using the scale developed by Carson et al. (2007). The ten-item measures assessed social support, shared purpose, and voice. Four items assessed voice, three assessed social support, and three assessed shared purpose. Nine of the original ten items were included in the scale. One item assessing shared purpose item was excluded because it asked about the creation of a team action plan, which the participants were not asked to do. Participants rated the items on a scale from one to five (*1 = strongly disagree*; *5 = strongly agree).* A sample item for voice included "Everyone on this team has a chance to participate and

provide input" (Carson et al., 2007). Carson et al. (2007) recommended aggregating the three scales to the team level and computing the mean in order to have a single internal team environment composite score (α = .86, .88, and .88, *ICC(1)* = .21, .22, .20).

Demographics (Appendix E). Participants completed a demographics questionnaire regarding their gender, race/ethnicity, GPA, and academic major(s).

Team trust (Appendix F). Team trust was measured using a five-item scale of intragroup trust developed by Simons and Peterson (2000). Participants rated the items on a seven-point Likert scale that assessed perceptions of team members' ability, benevolence, and integrity, which is consistent with Mayer et al.'s (1995) definition of trust. The items required participants to assess trust at the group level. This measure focused on aspects pertaining to cognitive trust, such as competence, rather than affective trust. An example item included "We are all certain that we can fully trust each other." A team's level of team trust was determined by summing team members' individual responses, then calculating the mean for each team.

Coefficient *alphas* were computed at the individual level to determine the reliability of team trust. These *alphas* demonstrated high reliability across all three time-points (α = .86, .90, and .89, respectively). *ICC(1)*s were computed at the team level to determine the proportion of variance in ratings due to team membership. Inspection of *ICC(1)*s revealed item-three of the team trust measure to be problematic. Therefore, it was removed from the analyses. *Alphas* were recomputed for the four-item measure of team trust (α = .85, .88, and .84) and *ICC(1)* values for .25, .23, and .18 were found across the three time-points.. The four-item measure of team trust was used in the remainder of the analyses (*M* = 24.31, *SD* = 2.19 for time A; *M* = 23.99, *SD* = 2.36 for time B; *M* = 24.05, *SD* = 2.14 for time C). Team trust at time C did not reach the .20 cutoff and was not included in the analyses.

Collective leadership (Appendix G). Collective leadership within the teams was assessed by measuring leadership density, described as "a measure of the total amount of leadership displayed by team members as perceived by others on a team" (Carson et al., 2007, p. 1225). Density represents the degree and quantity of leadership within teams (Mayo el al., 2003; Small & Rentsch, 2010) and represents "the number of ties in the network in proportion to the total number of possible ties" (Small & Rentsch, 2010, p. 204). Higher collective leadership density means team members ascribed "high levels of leadership to other members" (Small, 2007, p. 19). Consistent with Carson et al. (2007), participants answered, "To what degree does your team rely on this individual for leadership?" for every team member on a five-point scale (*1 = not at all*, *5 = to a very great extent*).

To calculate leadership density within a team, all ratings in a team were summed together, and then divided by the total number of ratings for each team. This measure followed the conceptualization of collective "leadership as a team property reflecting the distribution of leadership among multiple team members" (Carson et al., 2007, p. 1225). Figure 3 presents an example of how a team's collective leadership density was calculated. Consistent with Small (2007), self-ratings were excluded from the analyses ($M = 3.70$, $SD = .40$ for time A; $M = 3.87$, $SD = 0.369$ for time B; $M = 3.76$, $SD = 0.40$ for time C).

Performance feedback. Grades on project 1 served as the criteria for performance feedback. Instructors graded the project on a 100-point scale and provided additional comments at their discretion. Team grades ranged from 80-100 ($M = 93.17$, $SD = 6.09$).

Team performance. Project grades served as the criteria for team performance. Same as project 1, project 2 was graded on a 100-point scale ($M = 93.78$, $SD = 5.30$). Log transformations (Log10) were conducted due to the high negative skew of the team performance

variable. The relationships between team performance and the other primary variables of interest were not different following the transformations; therefore, the original project 2 grades were used as the measure of team performance in the analyses.

Results

Descriptive Statistics and Correlations. Means, standard deviations, and coefficient *alphas* are presented in Table 2 and correlations and *ICC(1)s* are presented in Table 3 for team-level variables that demonstrated high coefficient alphas greater than .80 and *ICC(1)s* greater than .20. Reaching the .20 cutoff suggests that members of a specific team are more similar to each other in their responses to variables of interest than members of other teams (Cohen et al., 2003). Failure to reach the .20 cutoff for team trust suggests that members of the same team are not more similar in their perceptions of team trust than they are to members of other teams. Because team trust at time C, one of the primary variables of interest in this study, did not reach the .20 cutoff, all time C focal variables (collective leadership and internal team environment) as well as confounding variables that were measured at earlier time-points (liking, conflict, frequency of interaction, and expected grade) were removed from the analyses.

To determine which, if any, of these variables are potential confounds, the correlation between each potential confound and each of the primary variables of interest – team trust, collective leadership density, performance feedback, and team performance – were examined. Potential confounds that were significantly correlated with at least one primary variable of interest were included in further analyses. Among potential confounding variables, team conflict had a small mean and standard deviation ($M = 2.78$, $SD = .16$). The maximum possible score was 10, so these low statistics revealed low levels of conflict across teams. Significant negative correlations were found between conflict and team trust at times A and B, and non-significant correlations were found between conflict and collective leadership at the two time-points. Due to the significant correlation between conflict and team trust at time B, it was included in the analysis of Hypothesis 3 to determine whether the relationship between performance feedback

and subsequent team trust was explained by conflict. Based on past research examining the effects of conflict (Langfred, 2007), it makes sense that low conflict was found with high team trust at both times, high liking (M = 7.45, 7.49) and high performance on the projects.

Although liking was relatively high across teams (M =7.45, SD = 1.09) on a scale with a maximum of 10, it was not significantly correlated with the team trust or collective leadership density measures. Familiarity/history with team members was not significantly correlated with the primary variables of interest. In fact, familiarity had a small negative correlation with team trust at time A, which differs from the relationship between familiarity and early trust that was found by Webber (2008). Because liking and familiarity were not significantly correlated with the team trust or collective leadership density variables, it was not necessary to further examine them as potential confounding variables.

The team mean for self-reported GPA was reverse-scored because the demographics questionnaire listed the GPA categories from highest to lowest, where a GPA of 4.0 was coded as 1, and a GPA of .99 and below was coded as eight. The team GPA mean (M = 2.97, SD = .51) indicated that the average GPA across teams was between 3.00 and 3.49. Therefore, the participants in this study were strong academically.

Among the primary variables of interest, the means for team trust across at the two time-points were approximately 24 out of a maximum score of 28 (four items were rated on a seven-point scale). While these means were high, the ratios of mean scores to the maximum score were similar to that found in Simons and Peterson (2000). Team members displayed relatively high trust in other team members, as indicated by the high means, but also in the average response per team trust item (4.8 out of seven), which is relatively high on a scale from one to seven.

Significant correlations were found for both measures of team trust, and between team trust and performance feedback. Significant negative correlations were found between team trust and conflict. The team trust measures were not significantly correlated with the measures of liking, familiarity, or team performance. Team trust at times A and B were significantly correlated with collective leadership at time B but not time A.

As expected, the measures of collective leadership density were significantly correlated across both time-points and were also significantly correlated with internal team environment. The author was surprised to see that collective leadership was not significantly correlated with performance feedback, team performance, conflict, or liking.

The mean grade for project 1 (performance feedback) and project 2 (team performance) were each over 93%, which means the teams averaged an A on both projects. There was little variance in either project grade, and one standard deviation above the mean resulted in a grade of 99%, while one standard deviation below resulted in a grade over 87%. This means that 68% of students received between a B+ and an A on the project, not including teams that earned grades of 100%. It is likely that the high negative skew of these grades limited the extent to which performance influenced subsequent levels of collective leadership.

Performance feedback was significantly correlated with the two measures of team trust, team size, and perceived project 1 grade, while team performance was not significantly correlated with any variable. Surprisingly, performance feedback on project 1 was not significantly correlated with team performance on project 2. Team size was significantly correlated with performance feedback, but not team performance. In addition, team GPA had small negative correlations with performance feedback and team performance.

Tests of Hypotheses. *Hypothesis 1*: Hypothesis 1 predicted that collective leadership at time B would mediate the relationship between team trust at time A and team performance on project 2. This was tested using Baron and Kenny's (1986) four steps to detecting mediation. The mediation results are reported in Table 4.

First, project 2 grade was regressed onto team trust at time A. This tested Hypothesis 1a, which stated that team trust at time A would be positively related to team performance on project 2. The results revealed a non-significant, negative relationship between team trust and project 2 grade, $b = -.47$ $t(34) = -1.15$, $p < .05$. Thus, Hypothesis 1a was not supported.

Second, project 2 grade was regressed onto collective leadership at time B. This tested Hypothesis 1b, which stated that collective leadership at time B would be positively related to team performance on project 2. The results revealed a positive, but non-significant relationship, $b = .47$ $t(34) = -.033$ $p < .05$. Thus, Hypothesis 1b was not supported.

Third, collective leadership at time B was regressed onto team trust at time A. This tested Hypothesis 1c, which stated that team trust at time A would be positively related to collective leadership at time B. The results revealed a significant positive relationship for the measure of density, $b = .08$ $t(33) = 3.20$, $p < .05$. Thus, Hypothesis 1c was supported.

The hypothesized mediated model required Hypotheses 1a, 1b, and 1c to be significant. Because hypotheses 1a and 1b were non-significant, Hypotheses 1d was not conducted.

Hypothesis 2: Hypothesis 2 predicted that collective leadership at time B would be significantly different from collective leadership at time A. A dependent [paired] samples t-test was conducted to test this hypothesis (Ho: $\mu_{CL1} = \mu_{CL2;}$ H$_1$: $\mu_{CL1} \neq \mu_{CL2}$). The results revealed a statistically significant relationship for collective leadership density, where the average collective leadership density at time B ($M = 3.87$, $SD = 0.37$) was significantly different from collective

leadership density at time A (M = 3.70, SD = .40); $t(35)$ = -4.00; p =. 00. Thus, Hypothesis 2 was

supported. These results revealed that collective leadership across teams increased significantly

across the first two time-points.

Hypothesis 3: Hypothesis 3 predicted that performance feedback would have a positive

relationship with team trust at time B. Table 5 reports the results of the regression analyses.

Conflict was included in the regression analysis because it was significantly correlated with the

criterion, team trust at time B. Consistent with Cohen et al.'s (2003) recommendation regarding

confounding variables, conflict was entered in the analysis prior to performance feedback.

Therefore, the variables were entered in two steps, with conflict entered in the first step and

performance feedback entered in the second step. Performance feedback significantly predicted

team trust at time B, b = .12 $t(33)$ = 2.47, p < .05. Thus, Hypothesis 3 was supported, which

indicates that performance feedback can influence subsequent levels of team trust, such that

higher performance feedback leads to higher subsequent levels of team trust.

Additional Analyses. Because the means of team trust at time A and B were not

identical, an additional dependent [paired] samples t-test was conducted to determine whether

the mean differences was significant. The results revealed that team trust at time A (M = 24.31,

SD = 2.19) was not significantly different from team trust at time B (M = 23.99, SD = 2.36),

$t(35)$ = 1.67; p = .10. Therefore, the mean level of team trust across teams did not significantly

differ across the two time-points.

Discussion

Summary of Findings

The purpose of this study was two-fold. First, the author investigated collective leadership as a mediator of the relationship between team trust and team performance. Two of the first three steps in Baron and Kenny's (1986) steps to detect mediation were non-significant. Specifically, neither team trust at time A nor collective leadership at time B significantly predicted team performance on project 2. The only significant relationship found in the mediation analysis was team trust at time A significantly predicted collective leadership at time B.

The second purpose of the present study was to examine the effect of team performance on team trust.   Results of the regression analysis revealed performance feedback on project 1 significantly predicted subsequent levels of team trust at time B, over and above the effect of conflict. These results are modest, however, because team trust was not significantly different at times A and B. Conflict had similar, significant negative correlations with team trust at both time A and time B ($r = -.65$ and $-.68$, respectively), suggesting that teams did not significantly change their levels of trust across the two time-points.

The present study also investigated the development of collective leadership over time. Tests of Hypothesis 2 revealed collective leadership density at time B to be significantly different from time A. Density at time B increased from time A, indicating that collective leadership within the student teams was a process that developed over time and increased as teams interacted more.

Implications and Integration with Literature

There were three main findings from the present study regarding team trust that are most relevant to the literature. These include the high levels of team trust early in the team life cycle, the high correlations between team trust and collective leadership density and the internal team environment antecedents of collective leadership, and the negative relationship between team trust and conflict.

First, the results of this study supported past research on the development of trust early in relationships and the consistency of high team trust across time (Webber, 2008; Jones & George, 1998; Bligh et al., 2006, McKnight et al., 1998; Levin, Whitener, & Cross, 2006). The high mean for team trust at time A supported Bligh et al.'s (2006) theoretical notion that trust tends to be high early in a relationship. Team trust at time A was measured early in the semester when the teams had interacted for the shortest amount of time compared to the other measurement occasion. This study also supported Webber (2008), which found team trust to be consistently high across time. The present study found that team trust to be consistently high at both time-points, and the time A and time B means were not significantly different from each other. While this provides support for Webber (2008), that study measured affective and cognitive trust at the second team trust time-point.

In addition, ability is an antecedent of trust (Mayer et al., 1995), but the high initial level of team trust must be explained by other processes such as categorization (McKnight et al., 1998; Webber, 2008) because the participants had very little time to view each other's abilities (Webber, 2008). High initial levels may be explained by Jones and George's (1998) notion that it is easier to trust than to distrust at early stages of a relationship (Jones & George, 1998) and by demographic similarity among team members (Levin et al., 2009). Demographic similarity was

high in the present study regarding where participants live and attend school, their academic

majors, and their GPA.

Based on the results of Webber (2008), familiarity was expected be highly correlated

with team trust at time A. In addition, participants in the present study self-selected into teams,

which further increased the expectation of high familiarity among team members. However, the

present study did not find a significant correlation between familiarity team trust at time A. An

important difference between the two studies is in when familiarity was measured. Webber

(2008) measured familiarity at the first time point, whereas the present study measured

familiarity late in the life cycle of the team.

Significant correlations were found between team trust and internal team environment.

Team trust should positively influence shared purpose by increasing commitment and motivation

to achieve team goals. Benevolence is an antecedent to trust (Mayer et al., 1995) and team trust

increases one's vulnerability to others (Salas et al., 2005). Therefore, team trust should facilitate

encouraging behaviors among team members and help team members feel valued (Carson et al.,

2007), which should have influenced perceptions of social support.   Team trust is able to

facilitate healthy interactions (Shen & Chen, 2007), which should include good communication

skills and participative decision-making strategies (Carson et al., 2007), thereby influencing

perceptions of voice. Taken together, team trust should be positively correlated with the

composite internal team environment, which the results of the present study supported.

Second, significant correlations were found between team trust and collective leadership

density. This supports Small and Rentsch's (2010) results, where team trust at the first time-

point was significantly correlated with collective leadership at the second time-point. However,

the present study operationalized collective leadership as density, while Small and Rentsch

(2010) operationalized it as centrality. Nevertheless, both studies support the notion that team trust influences the emergence and extent of collective leadership within teams.

Third, this study found a negative relationship between team trust and conflict. These results were consistent with Langfred (2007), where higher relationship conflict, in general, was hypothesized to be associated with less trust. The results of the present study made theoretical sense because conflict fosters distrust by influencing an individual's willingness to take risks, leading individuals to question team members' competence, abilities, and strategies, fostering negative emotions, and causing less understanding and cooperation among team members (Langfred, 2007).

Hypothesis 3 stated that a positive relationship would exist between performance feedback and subsequent level of team trust at time B. Consistent with past research (Webber, 2008; Peters & Karren, 2009), this hypothesis was supported. Webber (2008) argued high initial levels of trust, specifically cognitive trust, can decrease quickly if problems completing the task occur. Performance and mistakes are able to influence trust (Lewicki & Wiethoff, 2000) by causing team members' to question others' competence and abilities, causing task and relationship conflicts to arise (Langfred, 2007), and or causing trust to dissolve completely due to extremely poor performance (Jones & George, 1998). Conversely, high or reliable team performance increases team trust by increasing perceptions of team members' competence and ability (Webber, 2008). In the present study, high performance feedback may have increased team trust through increasing individuals' perceptions of competence and ability in their team members. The effect is modest, however, due to the high overall levels of trust at time A and the high overall team performance on project 2. Further, research suggests high team performance may be able to lower levels of conflict among team members, or limit the degree of relationship

conflict, which has been demonstrated to be more detrimental to trust than task conflict (Langfred, 2007). In the context of the present study, teams who performed well may have had higher levels of trust, greater confidence in each other, and better group interactions, and were therefore less susceptible to perceptions of conflict.

To summarize the findings regarding team trust, the investigation of team trust in the present study supported past research which found initial levels of trust to be high (Bligh et al., 2006) due to demographic similarity (Levin et al., 2009) and individuals' tendencies to trust rather than distrust (McKnight et al., 1998). In addition, team trust was significantly correlated with collective leadership density and internal team environment, suggesting that team trust is able to influence team members' perceptions of voice, social support, shared purpose, and willingness to be led by others, which all contributed to higher collective leadership density. Finally, team trust was negatively correlated with conflict, which suggests that conflict can negatively influence individuals' willingness to be influenced by others and can decrease perceptions of ability, benevolence, and integrity (Mayer et al., 1995).

There were three main findings from the present study regarding collective leadership that are most relevant to the literature. The results of the present study reveal support as well as inconsistency with past research in three main areas. First, the design of this study allowed for collective leadership to be studied across time and supported its conceptualization as an emergent state; second, collective leadership was significantly correlated with internal team environment; and third, collective leadership did not lead to higher team performance.

First, the present study was one of the first longitudinal studies of collective leadership (Small & Rentsch, 2010). The results of the pair-samples *t*-tests revealed the means of collective leadership density across teams to be significantly different at both time-points. The increase

from time A to time B suggests that certain team processes must exist in order for collective

leadership to emerge and develop, such as team trust (Bligh et al., 2006) and the three

dimensions of internal team environment (Carson et al., 2007). These results support Rapp and

Mathieu (2007), who argued that teams need time and opportunities to interact and apply their

teamwork knowledge, skill, and abilities. Studying teams longitudinally allows researchers to

better understand team processes and dynamics. Although the teams in the present study were

short-term teams rather than ongoing teams (De Jong & Elfring, 2010), the use of multiple time

points allowed the examination of how collective leadership changed over the course of the team

life cycle while completing the projects.

Using multiple time points, the present study demonstrated collective leadership as an

emergent state. Specifically, collective leadership emerged early in the teams' life cycle and

increased over time. This is a positive step for collective leadership research because it allows

the construct to be examined for a longer duration that includes a wider variety of factors than a

single measurement. This methodology supports Mathieu and Rapp (2009), who stated, "early

team activities are important for the successful execution of later work" (p. 91). By studying

this emergent construct over time, the various factors and the magnitude of each factor that

influence collective leadership can be examined to better understand collective leadership and its

relationship to team variables such as performance.

Second, consistent with Carson et al. (2007), both measures of internal team environment

were significantly correlated with both measures of collective leadership density. Because

Carson et al. (2007) found internal team environment to be an antecedent of collective

leadership, the high correlations among the constructs were expected. In Carson et al.'s (2007)

model, shared purpose referred to team members working towards, understanding, and sharing

common goals. Social support referred to emotional and psychological support through making other team members feel appreciated. Voice referred to perceptions of fairness, responsibilities for making decisions, and quality communication. The results of Carson et al. (2007) and the present study suggest that these three dimensions are often found among teams whose leadership is distributed across its members rather than centralized in one or two individuals. Through improving the dimensions of internal team environment, teams can foster individuals' willingness to lead when they feel they have the relevant knowledge, skills, or abilities to help complete a task or meet situational demands (Burke et al., 2007).

In the present study, collective leadership did not significantly correlate with performance feedback on project 1 or team performance on project 2. This differs from Small and Rentsch (2010), which also used a sample of student teams, where a significant correlation was found between collective leadership and subjective team performance. The present study's hypothesis that collective leadership would mediate the relationship between team trust and team performance was not supported. Although the collective leadership means were relatively high at all three time-points, one explanation for the lack of relationship with team performance was that more leaders do not simply make teams perform better (Mehra et al., 2006). In addition, diverse expertise is not directly related to higher team performance, and other factors influence team performance such as information exchange, affect climate, and perceptions of justice (Friedrich et al., 2009).

Another explanation is that collective leadership may not have influenced team performance because the team members had similar knowledge and expertise (Pearce et al., 2009; Friedrich et al., 2009). The majority of the sample was comprised of psychology majors, which indicated their expertise pertained to the field of psychology. In addition, the projects

focused on aspects of Industrial and Organizational Psychology. The projects did not require a wide range of expertise, nor was the sample heterogeneous enough to provide teams with diverse academic majors or areas of expertise. As a result, the projects and sample may have limited team members' opportunities to possess or convey their unique knowledges, skills, and abilities. Related to similar expertise, high levels of collective leadership density may not have been necessary for the teams to perform well. This explanation is supported by the lack of variance in the project grades. Because one standard deviation below the mean was still a B+ grade, the teams performed well despite their distribution of leadership. The high performance feedback may have made the students more compliant with each other and less willing to take the lead.

Practical Implications

The results of this study have important applications in the workplace. One important contribution is that it provides organizations with more information regarding how to develop successful work teams. When forming teams to solve complex problems, organizations should strive to increase the frequency of interactions among team members. This allows team members to become more familiar with one another (Webber, 2008) and provides opportunities for team members to demonstrate their ability, benevolence, and integrity (Mayer et al., 1995) to one another. This should foster team members' willingness to be influenced by other team members through increasing perceptions of social support, voice, and shared purpose (Carson et al., 2007), which will lead to higher collective leadership.

This study demonstrates the value of forming long-lasting, or ongoing teams. Forming ongoing teams may be of better value to organizations they can develop better relationships and have better team interaction effects through higher frequency of interactions, more instances of performance feedback (De Jong & Elfring, 2010), and more information sharing (Friedrich et al.,

2009) than short-term teams. This study demonstrated that level of collective leadership density increase over time as well. Taken together, one advantage of ongoing teams is that they may be able to develop higher levels of collective leadership than short-term teams.

This study provides limited support for the notion that performance feedback can influence subsequent levels of team trust. A practical implication of this is that supervisors should be aware of the influence their feedback has on teams. This is because negative performance feedback can negatively impact trust and increase relationship conflict (Langfred, 2007). Therefore, supervisors should be strive to offer constructive criticism rather than harsh reviews when assessing team performance and providing feedback if they want teams to improve their performance and team processes.

Limitations

The present study had a number of limitations.   The first limitation was the lack of standardization in the design of the study.   Because the researcher relied on multiple instructors for data collection, it was not possible to standardize all aspects of the study. In particular, team size fluctuated more than expected. The design of the study accounted for teams of four or five; however, some participants dropped the course, which narrowed some teams to three. In addition, team size was not strictly enforced at the beginning of the semesters in all sections of the course, which resulted in multiple teams of six and one team of seven.

In addition to team size, the duration in between the two measurement occasions was not standardized across the three sections of the course. Although the instructors made every attempt to allow equal time in each class for participants to complete the projects, the amount of time in between projects was not exact. For example, one instructor made the projects due on weeks four and seven while the other made them due on weeks five and nine. The instructors

had different course schedules and time restraints and the courses differed in the frequency and duration of class each week (i.e., Monday-Wednesday-Friday classes as opposed to Tuesday-Thursday classes). The two time-points were closer together than would have been ideal. This was due to the instructors' course schedules and the content of the projects relating more to the first half of the semester than the second. This made it unfeasible to stretch the timeline of the projects across the duration of the semester.

Related to the lack of standardization, the second major limitation was that the study relied on a natural manipulation. The projects were graded fairly by the instructors, who were blind to the survey responses of the participants. The unbiased grading was meant to serve as a manipulation that would increase or decrease subsequent levels of team trust and collective leadership. While performance feedback on project 1 did influence team trust at time B, it did not serve to increase subsequent measures of collective leadership. The influence of performance feedback could have been more effective if the grades had been manipulated to have more varying scores. However, it would be unethical to manipulate the scores because they are the students' actual grades.

A third limitation was the lack of variance in the measures of the primary variables of interest. Project grades in particular had high means and small variances, such that the mean average across teams for each project was over 93%, and one standard deviation above the mean was over 99% and one standard deviation below the mean was over 87%. This means 68% of teams on each project received a B+ grade or higher. The measures of team trust also had high means and small variances. Specifically, the team means at each time point were approximately 24 out of a possible 28, with standard deviations around two. Therefore, 68% of teams ranged between 22 and 26 on team trust, and 95% ranged from 20 to the maximum of 28. Because the

team trust measure consisted of four items rated on a seven-point Likert scale, this meant that teams with a score of 20 still reported a response of five on average, which is relatively high.

A fourth limitation to this study pertained to the measures used. The primary limitation was that collective leadership density was measured within teams, but centrality was not. Small and Rentsch (2010) defined centrality as "the extent to which connections are concentrated around one individual" (p. 204). This differed from past studies where centrality and density where both measured (Small & Rentsch, 2010). Centrality was not measured due to a mistake by the researcher, who failed to individualize each team's collective leadership measures so it could be determined whom each participant was rating. The questionnaire asked participants to rate each team member, but only listed the team members as "Team Member 1, Team Member 2, Team Member 3." Instead, the researcher should have inserted the names of team members in each group, such as "John Smith, Jane Smith, John Doe." It would be impossible to determine which team members were being rated by a particular participant, thus centrality was not determined. This would have allowed the researcher to determine whether leadership within teams was distributed equally across members or dominated by one or two members.

A secondary limitation to the measures was that perceptions of conflict and liking were not included in the time B questionnaire. These measures would have indicated the extent to which performance feedback influenced subsequent levels of liking and conflict among team members, which ultimately would have provided further information regarding team dynamics and processes. These measures were not included in the time B questionnaire for two reasons. First, they were not the primary constructs of interest in this study. Second, the teams had very little time to interact in between time A and time B because time A was administered when the

projects were completed and time B was administered shortly after students received project 1 grades, which was approximately one week apart.

A fifth major limitation pertained to the sample of participants in the present study. First, the sample consisted of undergraduate teams as opposed to workplace teams. The use of an undergraduate sample "limits the generalizability of the research to real teams in real organizations" (Webber, 2008, p. 764). As described in the literature review, collective leadership emerged as a strategy for organizations to meet current workplace demands (Hiller et al., 2006); therefore, the ideal sample for this study would be employees working in teams for a company. Second, the student teams were primarily psychology majors. According to Pearce et al. (2009) and Friedrich et al. (2009), team members emerge as leaders when task and situational demands require certain skills or expertise. It is likely that undergraduate psychology majors had more similar expertise than a more academically heterogeneous sample. In the context of undergraduate students, this could have happen in classes where a wider variety of majors are represented and where projects are multidisciplinary in nature. Third, the student teams were not ongoing teams (De Jong & Elfring, 2010), meaning the students were not working together for an indefinite amount of time. Rather, the amount of time students had to work together on the two projects was less than two months. Had the students worked together over a longer period of times such as years, it is likely that information regarding collective leadership, team trust, team performance, and the effects of performance feedback would have been richer and magnified.

Another limitation of this study is that $ICC(1)$ for team members' perceptions of the projects did not reach the .20 cutoff. This variable examined the extent to which the projects required teamwork to complete. As previously stated, a high $ICC(1)$ indicates that team members' responses to variables are more similar to each other than members of other teams

(Cohen et al., 2003). The low *ICC(1)* means that individual-level variables did not aggregate to the team-level of analysis. The lack of agreement in team members' perceptions of the projects suggests that team members may not have felt it was necessary to fully engage in teamwork behaviors and processes such as trust, task conflict, and leadership. A more complex task or smaller team sizes would likely increase perceptions of required teamwork.

A final limitation pertained to the data collection process. Data collection took place during class time, so students who missed class on the day of data collection did not complete the measure. The researcher asked missing participants to fill out the measures on the next day of class, which meant that not all team members completed the measures at the same time. A related problem was that students who missed consecutive classes across weeks did not complete the measures at the corresponding time, resulting in some missing data.   The instructors did not have strict attendance policies in their classes, which compounded the problem because students were not forced to attend class and received no direct penalty to their grade for skipping consecutive classes. Furthermore, some students dropped the course during the data collection process. As previously mentioned, although there was some missing data, no participants missed all three time-points, nor were there any teams that had the majority of its members missing data at a single time-point.

Directions for Future Research

The present study provides four main areas for future research. The first is to conduct standardized experiments measuring team trust, collective leadership, and team performance. Past research has used tasks such as the Tinseltown task as a project for teams to complete. Future research should focus on multidisciplinary teams in lab settings. In the context of undergraduate samples, this should include students from different majors. Tasks similar to the

Tinseltown task could be tailored to skills and expertise of the expected sample. This would allow projects to be complex enough for multiple skillsets and expertise to be needed, as well as provide the proper participants to complete such projects.

A second area of future research could examine the relationship between affective trust and collective leadership. The present study used a measure of team trust that emphasized aspects of cognitive trust such as competence. Affective trust is influenced by relationship quality among team members (Dirks & Skarlicki, 2004) and could potentially lead to different leadership distributions in teams. Because higher affective trust within teams indicates better relationship among team members, individuals would be more willing to lead and be influenced by others, thus increasing collective leadership.

The examination of the relationship between team trust, collective leadership, and team performance longitudinally across three time-points, spanning approximately two months of an academic semester, was a strength of this study. Future research should examine the relationships among these constructs for even longer periods of times. De Jong and Elfring (2010) discussed the difference between ongoing and short-term teams. Ongoing teams benefit from having a longer team and task duration, which lead to better relationships and better team interaction effects through higher frequency of interactions more instances of performance feedback (De Jong & Elfring, 2010), and changing levels of leadership distribution, liking, and conflict.

Collective leadership as a research area still lacks an adequate measure of the construct (Gockel & Werth, 2010). Different collective leadership studies have used different measurement approaches (Gockel & Werth, 2010). Small and Rentsch (2010) used the social network framework to analyze leadership density and centrality (Small & Rentsch, 2010),

Carson et al. (2007) cited studies that aggregated results from the Team Multifactor Leadership Questionnaire or ratings of behavioral scales to the team level to measure collective leadership, and Gockel and Werth (2010) recently adapted the actor-partner interdependence model (APIM) to collective leadership. Future research should seek to understand collective leadership within teams by asking a wider range of questions. This could include questions about the emergence of multiple leaders within a team, such as "How many people in your team do you view as a leader?" Conversely, one could ask, "How many people in your team do you view as a follower?" in order to distinguish between leaders and followers. The measure used in the current study could be tailored to ask specific questions regarding team tasks, such as "To what extent did your team rely on 'Team Member 1' for leadership regarding tasks such as planning how the work will get done, presenting the finished product, writing the finished product, leading the meetings, support and encouragement?" Questions could focus on influence, such as "To what extent did 'Team Member 1' influence the group?" In summary, there are a number of different ways to examine collective leadership, and future research should explore different measures in order to better understand it.

Conclusion

In conclusion, the purpose of this study was to investigate collective leadership as a mediator of the relationship between team trust and team performance. Using a sample of undergraduate students working in teams on two different projects, this study failed to empirically support the hypothesized mediation. However, this study supported past research that found that team performance can positively influence subsequent levels of team trust. In addition, this study found a significant relationship between team trust and collective leadership and found that collective leadership density was able to increase over time.

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Appendix A

Project #1 – Job Analysis

- Form a team of YOUR CHOICE consisting of between 4 and 5 persons.

- Talk to your teammates about the jobs that they CURRENTLY hold. Select the ONE JOB that you will work with for THIS project AND the next project).

- Complete the ACTION PLANNING WORKSHEET. <u>A copy of this worksheet will be turned in with your project.</u>

- The entire team should conduct a structured interview (use the "Job Analysis Structured Interview" guide) of the teammate that holds the job you are going to analyze. Information from the interview should be recorded on the guide. <u>One copy (if handwritten, please be legible) will be turned in with your project.</u>

- After the "Job Analysis Structured Interview" guide has been completely filled in, conduct the "Post-Interview Assessment" (p. 12 of packet). Information from the assessment should be recorded. <u>One copy (if handwritten, please be legible) will be turned in with your project.</u>

- **AFTER YOU HAVE COMPLETED BOTH OF THE ABOVE**, go to the online O*NET site (http://online.onetcenter.org/) and print out a "Summary Report" for the job you are analyzing. <u>A copy of this summary report will be turned in with your project.</u>

- Use the information from the Structured Interview, Post-Interview Assessment, and O*NET to write a <u>Job Description to be turned in with your project.</u>
    o The Job Description should be written as an "executive summary". That is, write a summary that could be easily read by a busy CEO.
    o Use complete sentences
    o Length should be ONE(1) page DOUBLE SPACED
    o Be certain that your Job Description contains all elements below:
        - Who: Job Title
        - When: Date of Interview
        - Why: Class project
        - What: Summary of most important tasks AND summary of most important knowledges and skills

- Your paper is due at the beginning of class. Please make sure you turn in all five of the required components.

Appendix B

Project #2 – Employee Testing and Selection

- The purpose of Project #2 is to recommend testing and selection procedures for the job you analyzed in Project #1. Specifically, you will make your recommendations based on the Job Duties (task statements in section 5) and KSA's (in section 6) you wrote for that job.

- Your paper will consist of THREE sections: **MUST BE TYPED AND DOUBLE SPACED!**
    1. Predictors
        - Describe the KIND of predictors that will be used in the selection process
        - If published test, give publisher and web site (if applicable)
        - DEFEND the above (relate the test to the Job Duties and KSA's) and attach a copy of sections 5 and 6 from job analysis project. Literally, tell me what tasks or KSA's are measured by this predictor
        - Write ONE SAMPLE ITEM for each predictor you will use
    2. Interview
        - Outline the procedure by which applicants will be chosen for an interview
        - Indicate who in the organization will conduct the interviews. Why was this person chosen?
        - Explain what kind of interview you will use. Why did you choose this?
        - Write two questions that could be used in a interview for this job
        - Defend why an interview is an appropriate predictor for this job (again list specific tasks and KSA's)
    3. Selection Process
        - How will you combine the information from the various predictors? For example, will you use multiple cutoffs, multiple hurdles, or multiple regression?
        - What order will you administer the predictors and why?

Your paper is due at the beginning of class. Both the job analysis project and the selection project will be presented in class.

Appendix C

Confounding Variables

Conflict
Thinking about your team as a whole, please rate the items on the following scale:
1 = None; 2 = A little; 3 = Somewhat evident; 4 = clearly evident; 5 = A very great deal
1. How much are personality clashes evident in your team?
2. How much tension is there among members in your team?

Frequency of Interaction
1. How many times did you meet outside of class to work on this project? *(Fill in blank)*_____
2. How many total hours did you spend working together outside of class? *(Circle the answer that bet applies, rounding to the nearest half-hour)*
3. How many times did you meet outside of class to socialize? *(Fill in blank)*_____

Liking
1 = To a very little extent; 2 = To a small extent;
3 = Somewhat; 4 = To a large extent; 5 = To a very great extent
1. To what extent do you like your team members?
2. To what extent would you like to spend time with your team members outside of class?

Prior History and Familiarity with Team Members - Adapted from Webber (2008)
1. How many of the team members did you know personally prior to this class?
2. How many team members did you know anything about (i.e. reputation) prior to this class?

1 = I am not familiar; 5 = I am very familiar
3. To what extent did you know the academic reputation for your team members prior to this class?
4. To what extent did you know your team members personally prior to this class?

Expected Grade
What grade do you expect to receive on the project? (*Answer 0-100*). _____

Appendix D

Internal Team Environment (Carson et al., 2007)
1 = Strongly disagree; 2 = Slightly disagree;
3 = Neither agree nor disagree; 4 = Somewhat agree; 5 = Strongly agree

<u>Shared Purpose</u>
The members of my team . . .
1. Spent time discussing our team's purpose, goals, and expectations for the project.
2. Discuss our team's main tasks and objectives to ensure that we have a fair understanding.
3. Devise action plans and time schedules that allow for meeting our team's goals.

<u>Social Support</u>
The members of my team . . .
4. Talk enthusiastically about our team's progress.
5. Recognize each other's accomplishments and hard work.
6. Give encouragement to team members who seem frustrated.

<u>Voice</u>
7. People in this team are encouraged to speak up to test assumptions about issues under discussion.
8. As a member of this team, I have a real say in how this team carries out its work.
9. Everyone on this team has a chance to participate and provide input.
10. My team supports everyone actively participating in decision-making

Note. Item 3 was removed.

Appendix E

Demographics

1. What is your gender?
   ☐ Female
   ☐ Male

2. What is your race/ethnicity?
   ☐ American Indian or Alaska Na4ive
   ☐ Asian
   ☐ Black or African American
   ☐ Hispanic/Latino
   ☐ Native Hawaiian or other Pacific Islander
   ☐ White
   ☐ other: _____

3. What is your current overall GPA?
   ☐ 4.0 or higher
   ☐ 3.50 – 3.99
   ☐ 3.00 – 3.49
   ☐ 2.50 – 2.99
   ☐ 2.00 – 2.49
   ☐ 1.50-1.99
   ☐ 1.00 – 1.49
   ☐ 0.99 or below

4. What is your major(s)?

Appendix F

Measure of Team [Intragroup] Trust (Simons & Peterson, 2000)

Never = 1, Once in a While = 2, Sometimes =3, Fairly = 4,
Many Times = 5, Often = 6, Constantly Always = 7

1. We absolutely respect each other's competence.
2. Every team member present shows absolute integrity.
3. We expect the complete truth from each other.
4. We are all certain that we can fully trust each other.
5. We count on each other to fully live up to our word.

Appendix G

Measure of Collective Leadership Density (Carson et al., 2007)

Rate the following question from 1 to 5 for every team member:
   1 = Not at all, 2 = Slightly, 3 = Average, 4 = Above average, 5 = To a very great extent

   "To what degree does your team rely on this individual for leadership?"
         Team Member 1:   1 2 3 4 5
         Team Member 2:   1 2 3 4 5
         Team Member 3:   1 2 3 4 5
         Team Member 4:   1 2 3 4 5

Table 1

Timeline of the Present Study with Variables Measured at Each Time-Point

Early Semester	Week 4 or 5	1 week after Students Submit Project 1	Shortly after Students Receive Performance Feedback		Students Submit Project 2	1 Week after Students Submit Project 2
Students self select into teams Students work on Project 1	Team trust-A Collective Leadership-A Confounding Variables Internal Team Environment	Performance Feedback (Grade 1)	Team trust-B Collective Leadership-B Internal Team Environment	Students work on Project 2	Team trust-C Collective Leadership-C Confounding Variables Demographics Prior History/Familiarity Perception of the projects	Team Performance (Grade 2)

Confounding variables = Liking, conflict, frequency of interactions, and expected grade

Table 2

Psychometric Properties for Major Team-Level Study Variables

Variable	M	SD	α	Maximum	Skew
Team size	4.64	0.93	---	7	.58
Team trust-A	24.31	2.19	.85	28	-.89
Team trust-B	23.99	2.36	.88	28	-.75
Collective leadership-A	3.70	0.40	---	5	.35
Collective leadership-B	3.87	0.37	---	5	.48
Internal team environment-A	36.84	3.48	.86	45	-.12
Internal team environment-B	37.29	3.55	.88	45	-.11
Liking	7.45	1.09	.68	10	-.26
Conflict	2.78	0.98	.78	10	2.34
Familiarity/history	6.33	3.54	.94	20	1.05
Performance feedback	93.17	6.09	---	100	-.74
Team performance	93.78	5.30	---	100	-1.33
Self-reported GPA	2.97	0.51	---	8	-.14

Note. N=36

Table 3

Correlations among Study Variables with ICC(1)s on Main Diagonal

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Team size	---												
2 Trust-A	.00	.25											
3 Trust-B	.05	.88**	.23										
4 CL-A	-.24	.25	.22	---									
5 CL-B	-.27	.48**	.37*	.78**	---								
6 ITE-A	-.29	.59**	.55**	.54**	.56**	.21							
7 ITE-B	-.12	.69**	.67**	.50**	.63**	.86**	.22						
8 Liking	-.12	.18	.22	.09	.17	.35*	.39*	.24					
9 Conflict	.02	-.65**	-.68**	-.17	-.32	-.48**	-.51**	-.26	.36				
10 Familiarity	.17	-.12	.08	.05	-.07	-.10	.00	.33	.09	.61			
11 Feedback	.34*	.35*	.40*	.07	.12	-.03	.17	-.17	-.16	.13	.48**	---	
12 Performance	.17	-.19	-.12	.09	.03	-.10	-.12	.05	.19	.27	.12	.32	---
13 GPA	.07	-.29	-.31	-.13	-.08	-.05	-.10	-.09	.05	-.13	-.24	-.07	-.15

Note. N = 36. Bolded correlations represent autocorrelations among variables across different time points.
*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).
Trust-A = Team trust at time A; Trust-B = Team trust at time B
CL-A = Collective leadership density at time A; CL-B = Collective leadership density at time B
ITE-A = Internal team environment at time A; ITE-B = Internal team environment at time B
Liking = Liking at time A
Conflict = Perceived conflict at time A;
Familiarity = Prior history/familiarity with team members
Feedback = Performance feedback on project 1
Performance = Team performance on project 2
GPA = Self-reported GPA

Table 4

Summary of Regression Analyses to Detect Mediation

| | Dependent Variable | | | | | | | | |
| | Project 2 grade | | | Project 2 grade | | | Collective leadership-B | | |
Predictor	*B*	R^2	F	*B*	R^2	F	*B*	R^2	F
Team trust-A	-0.48	.05	1.74						
Collective leadership-B				0.47	.00	.04			
Team Trust-A							.07**	.23	10.28*

Note. N = 36, CI = confidence interval.
*p < .05, **p < .01.

Table 5

*Summary of Regression Analyses for Study Variables Predicting Team Trust at Time B*

Variable	Model 1 B	Model 2	
		B	95% CI
Constant	28.54**	17.62**	[8.45, 26.78]
Conflict	-1.64**	-1.52**	[-2.11, -0.94]
Performance Feedback		.11*	[0.02, 0.21]
R^2	.46	.54	
F	28.92	19.67**	
ΔR^2		.08	
ΔF		6.09	

Note. $N = 36$. CI = confidence interval.
*p < .05, **p < .01.

Figure 1

Proposed Model of Collective Leadership Mediating the Relationship between Team Trust and Team Performance

Time A   **Time B**   **Later in Semester**
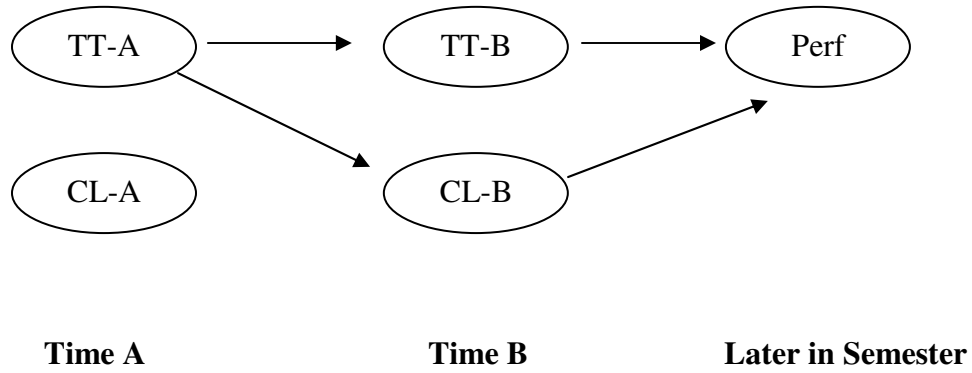
Note. Measurement occasions are bolded.
TT-A = Team trust at time A
TT-B = Team trust at time B
Perf = Team performance on project 2
CL-A = Collective leadership at time A
CL-B = Collective leadership at time B

Figure 2

Example of Collective Leadership Calculation

"To what degree does your team rely on this individual for leadership?"

Participant	Rating of Team Member1	Rating of Team Member2	Rating of Team Member 3
101	4	4	4
102	4	5	3
103	4	3	3
104	5	5	5

Calculation:

Sum of all team member ratings = (4+4+4) + (4+5+3) + (4+3+3) + (5+5+5) = 49

Total number of responses = 12

Collective Leadership Density = Sum of all responses/Total number of responses

Collective Leadership Density = 49/12 = 4.08