



Contents lists available at ScienceDirect

The Leadership Quarterly

journal homepage: [www.elsevier.com/locate/leaqua](http://www.elsevier.com/locate/leaqua)

## Collective leadership behaviors: Evaluating the leader, team network, and problem situation characteristics that influence their use

Tamara L. Friedrich<sup>a,\*</sup>, Jennifer A. Griffith<sup>b</sup>, Michael D. Mumford<sup>c</sup>

<sup>a</sup> University of Warwick, UK

<sup>b</sup> Alfred University, United States

<sup>c</sup> University of Oklahoma, United States

### ARTICLE INFO

#### Article history:

Received 1 February 2015

Received in revised form 1 September 2015

Accepted 13 November 2015

Available online xxx

Editor: Kristin Cullen-Lester

#### Keywords:

Collective leadership

Individual differences

Network

Communication

Leader–Team Exchange

### ABSTRACT

The focus on non-hierarchical, collectivistic, leadership has been steadily increasing with several different theories emerging (Yammarino, Salas, Serban, Shirreffs, & Shuffler, 2012). While most take the view that collectivistic approaches to leadership (e.g., shared and distributed leadership) are emergent properties of the team, a recent, integrative framework by Friedrich, Vessey, Schuelke, Ruark and Mumford (2009) proposed that collective leadership, defined as the selective utilization of expertise within the network, does not eliminate the role of the focal leader. In the present study, three dimensions of collective leadership behaviors from the Friedrich et al. (2009) framework — Communication, Network Development, and Leader–Team Exchange were tested with regard to how individual differences of leaders (intelligence, experience, and personality), the team's network (size, interconnectedness, and embeddedness), the given problem domain (strategic change or innovation), and problem focus (task or relationship focused) influenced the use of each collective leadership dimension.

© 2016 Published by Elsevier Inc.

## Introduction

### Overview

Leadership scholars have been hailing a paradigm shift from vertical, hierarchical leadership towards more horizontal, collective processes for the past 10–15 years (Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009; Gronn, 2002; Pearce & Conger, 2003), with particular fervor picking up in the last few (D'Innocenzo, Mathieu, & Kukenberger, 2014; Nicolaidis et al., 2014; Wang, Waldman & Zhang, 2014; Yammarino, Salas, Serban, Shirreffs, & Shuffler, 2012). The focus on this form of leadership, however, is not entirely new. It has been studied since the early parts of the 20th century (Fitzsimons, James, & Denyer, 2011) and was a key part, in some form, of many of the major leadership theories such as the Vroom and Yetton (1973) model that included involving subordinates in the decision-making process.

There are many different forms of collectivistic approaches to leadership, such as shared leadership (Pearce & Conger, 2003), distributed leadership (Gronn, 2002), collective leadership (Friedrich et al., 2009), emergent leadership (Kickul & Neuman, 2000) and team leadership (Day, Gronn, & Salas, 2004). A complementary trend is an increased focus on a role approach to leadership, and the potential distribution of those roles amongst different individuals (Morgeson, DeRue, & Karam, 2010). As a result of the

\* Corresponding author at: Warwick Business School, Coventry, CV4 7AL, UK. Tel.: +44 024 7652 8104.

E-mail address: [tamara.friedrich@wbs.ac.uk](mailto:tamara.friedrich@wbs.ac.uk) (T.L. Friedrich).

rapid development of these theories, often in parallel with one another, there have been some growing pains in this domain, as there is frequent overlap in definitions and use of the same words interchangeably (e.g., shared and distributed leadership). This has led to several attempts to clearly define the different perspectives (e.g., Yammarino et al., 2012) and find ways to distinguish their underlying mechanisms, such as examining differences in the content, process, formality, locus or mechanism of the collectivistic leadership (D'Innocenzo et al., 2014; Hernandez, Eberly, Avolio, & Johnson, 2011; Morgeson et al., 2010; Wang et al., 2014). For clarity, we will utilize Yammarino et al.'s (2012) definition of collectivistic leadership as a general term to refer to forms of leadership that involve multiple individuals within a team or organization taking on a formal or informal leadership role over time. Collective leadership, on the other hand, refers to the specific theory (Friedrich et al., 2009) that will be partially tested in the present study.

A particular point of contention in this area of leadership research is the role of the focal, or formal, leader. While shared and distributed leadership research typically focuses on the collectivistic process as an emergent state or evaluates the overall level of distribution of different roles and leadership behaviors amongst members of the team, other theories such as Friedrich et al.'s (2009) collective leadership framework, maintain the importance of the focal leader in either explicitly sharing aspects of the leadership role with others, or in creating the conditions in which individuals may emerge as an informal leader. Locke speaks to this in both his critique of shared leadership theory (2003) as well as in his theoretical and practitioner letter exchange with Pearce and Conger (Pearce, Conger, & Locke, 2007) in which he asserts that it is risky to ignore the focal or formal leader altogether as that is how most teams and organizations are still structured. In addition, in a recent review of the ways that leadership research is conceptualized, Hernandez et al. (2011), asserted that we should not ignore the focal leader or disregard what we have learned about focal leaders as we progress in our study of shared and collective leadership. They call for an increased understanding of what characteristics make leaders better equipped to engage in collectivistic leadership and taking the "leader locus" perspective can help us "explain when and how shared leadership can emerge successfully" (pg. 1177).

There is evidence, in fact, that both forms of leadership, hierarchical and collectivistic, are necessary in some form and contribute, together, to team effectiveness. For instance, a study by Mehra, Smith, Dixon, and Robertson (2006) found that it was not simply the distribution of the leadership role that was beneficial to team performance. They found that it was the coordinated efforts between focal leaders and emergent leaders that was the best for team effectiveness. In addition, research on the relationship between vertical and shared leadership typically finds that shared leadership contributes to team performance beyond vertical leadership, but that vertical leadership remains a significant contributor to team success (Ensley, Hmieleski, & Pearce, 2006; Pearce & Sims, 2002). In light of this, Friedrich et al.'s (2009) framework takes an integrative approach (Mumford, Friedrich, Vessey, & Ruark, 2012) that incorporates processes from several collectivistic theories, such as shared leadership, distributed leadership, complexity theory, emergent leadership, and team leadership, along with theories related to focal leadership, such as trait- and skills-based leadership theories. In this, the collective leadership framework integrates both vertical and collectivistic approaches to leadership and presents the focal leader as the orchestrator that either explicitly shares the leadership role, or creates the environment in which individuals may emerge into informal leadership roles.

While there is some early indication to the validity of the relationships presented in the framework (Friedrich et al., 2014), more empirical work is necessary, particularly regarding how the proposed relationships may vary across different contexts. Thus, in the present effort we seek to test three elements of the Friedrich et al. (2009) framework that focus on collective leadership behaviors in which focal leaders may engage – Communication, Developing the Network, and Leader–Team Exchange, as well as how these different forms of collective leadership may exhibit different antecedents, including the leader's personal characteristics, as well as characteristics of the team network and problem situation. We do this using measures developed for use of the framework in the United States Army (Yammarino et al., 2014). We turn now to a general overview of the framework and description of the specific aspects being studied in the present effort.

### *Overview of the collective leadership framework*

In the development of the collective leadership framework, Friedrich et al. (2009) provided an integrative review of the collectivistic leadership literature, including the individual, team, network, and organizational factors that may influence the emergence of collective leadership. They define collective leadership as a dynamic process in which a defined leader, or set of leaders, selectively utilizes the skills and expertise within a network as the need arises. An important difference in this framework, from other collectivistic theories, was that the focal leader plays a key role. As can be seen in Fig. 1, they contribute to the emergence of collective leadership through their specific knowledge, skills and expertise that facilitates the collective leadership process, their development and use of the network around them, and their actions to share the leadership role, either explicitly with individuals or in a generalized way, with the whole team (Mumford et al., 2012). The framework was not intended as a single, testable model (Friedrich et al., 2009), but rather as a birds-eye-view of the multilevel factors, such as the individual leader's skills, team's cohesion, or organizational culture, that may influence the emergence of collective leadership. A summary of the original 2009 model is presented below, with the dimensions we focus on in this study highlighted in grey.

As shown in the model, the central aspects of the framework most closely tied to the emergence of collective leadership include the leader's characteristics, the performance parameters and climate, the leader and team's network, communication and Leader–Team Exchange (Friedrich et al., 2009). The authors assert that *the leader's characteristics*, such as intelligence, experience and personality, will determine how capable they are in building the network and communication conditions that facilitate the emergence of collective leadership and whether they can recognize the opportunity and advantages of exchanging elements of the leadership role with team members. In addition, the *development and use of the network* is critical for exchange of

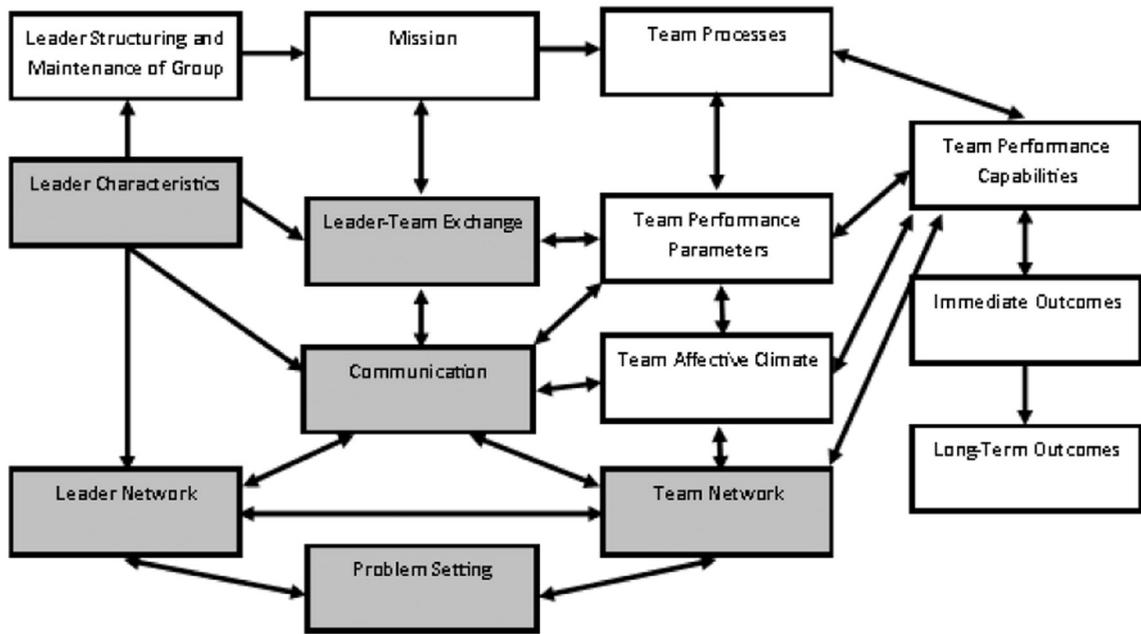


Fig. 1. Collective leadership framework.  
(Adapted from Friedrich et al., 2009).

information and understanding the relationships between actors, and knowledge embedded in the network can facilitate the distribution of the leadership role. Similarly, *communication* is the means by which the leadership role is shared and plays a key role in creating the conditions of trust that facilitate the emergence of leaders and the ability of the focal leader to pass the role to others. Finally, *Leader–Team Exchange* includes the explicit distribution of the leadership role to others, both to specific individuals (e.g., delegation) or in a more generalized way (e.g., empowerment).

In an initial test of key relationships proposed in the framework, Friedrich et al. (2014) evaluated the collective leadership behaviors of General George C. Marshall using a historiometric method. They evaluated if his knowledge, skills, and abilities, the development of his and his team's network, and effective communication within the team would be predictive of General Marshall's use of collectivistic actions such as empowerment, delegation, giving subordinates a voice in decisions, and building exchange relationships. This study provided initial support for the proposed relationships. They found that Marshall's characteristics, and, in particular, his intelligence and expertise, were found to be positively related to his use of collective leadership behaviors, and there was support for the hypothesis that his development of the network as well as effective communication was positively related to his use of collective leadership. Of practical importance, the study also demonstrated that there was a positive relationship between Marshall's use of collective leadership and desirable team outcomes.

While these findings suggest that a leader's personal characteristics may be related to the use of collective leadership, an important finding emerging from this study was that not all forms of collective actions are created equal, and may have different antecedents as well as outcomes for the team. We chose to focus on the three key forms of collective leadership behaviors examined in the Marshall study – Communication, Network Development, and Leader–Team Exchange, to further test these behaviors using a different methodology and focus on the individual leader's decision to use the behaviors based on contextual factors. It is important to note that in the Marshall Study, the Leader–Team Exchange behaviors we are examining in this study were referred to as “Collectivistic Actions” which was a change from the label in the initial 2009 framework. We will return to the original label of “Leader–Team Exchange” behaviors to better distinguish these behaviors from the full set of three dimensions which are three different forms of collective leadership behaviors.

### Collective leadership behaviors

#### Communication

Communication is essential to collective leadership. In fact, Friedrich et al. (2009, 2014) describe it as a “prerequisite” for understanding the problem that the team is facing, defining shared goals, understanding where the relevant expertise lies in the network, and sharing the leadership role. The behaviors included within this dimension are actions that create the conditions in which collective leadership is more likely to emerge, such as establishing clear communication expectations that facilitate the involvement of followers, which may include promoting feedback exchange, information sharing, or establishing communication norms. It also includes behaviors that promote the communication of ideas that facilitate a collective decision making process,

such as voice or consultation. In this second aspect of the dimension, communication, itself, can also be a more subtle way of distributing the leadership role compared with the more active distribution observed in Leader–Team Exchange.

Friedrich et al. (2009, 2014) note, however, that there is very little research on communication in the context of collective leadership. What little research is available, however, supports the assertion that communication is essential to collective leadership. For instance, Kramer (2006) and Kramer and Crespy (2011) have conducted ethnographic studies on shared leadership and collaborative leadership in theater groups and found that communication facilitated the emergence and coordination of shared leadership (Kramer, 2006), and specific behaviors such as establishing collaboration norms, encouraging followers to voice ideas, and providing feedback, were key to the emergence of collaborative leadership (Kramer & Crespy, 2011). Similarly, in their study of General Marshall's collective leadership, Friedrich et al. (2014) found that communication behaviors, such as feedback exchange, and establishing communication norms, facilitated the use of collectivistic actions.

#### *Network development*

If communication is the life blood of collective leadership, the network within the team is the artery through which it flows. Both the team's network as well as the leader's individual network play an important role in the emergence of collective leadership. A well-developed network is essential for collective leadership to emerge given that it facilitates awareness of expertise and distribution of the role. A study along these lines by Klein, Ziegert, Knight, and Xiao (2006) demonstrated that network awareness, or leaders and team members being familiar with the connections and available expertise in their networks, was related to the collective enactment of the leadership role and, ultimately, team performance. In addition, a study by Kramer and Crespy (2011) found that the focal leader purposefully developing relationships within the team facilitated collaborative leadership. Some scholars go so far as to say that the network of relationships can be viewed as collective leadership itself (Carter & DeChurch, 2012; Contractor, DeChurch, Carson, Carter, & Keegan, 2012).

The Friedrich et al. (2014) study on the collective leadership of George Marshall included aspects of the “leader network” and “team network” dimensions of the original framework (Friedrich et al., 2009) and identified an overall “developed network” dimension which involves the leader and team's network being well connected, and members interacting and building relationships. The expectation, then, is that a well-developed network will facilitate collective leadership in both direct and indirect ways. A well-developed network can directly result in increased awareness of the available expertise and skills in the team which can facilitate sharing of the leadership role. In addition, the relationships can foster a climate of trust and familiarity which not only fosters communication, but also support for those the leadership role is passed to, which indirectly facilitates collective leadership. In support of this, Friedrich et al. (2014) found that a developed network was positively related to collective leadership actions.

#### *Leader–Team Exchange*

The dimension of Leader–Team Exchange encompasses the majority of behaviors often associated with collectivistic forms of leadership, such as shared and distributed leadership (Friedrich et al., 2009) and includes actions in which the leader engages in an explicit distribution of the role, such as through delegation (Leana, 1986), or utilizing others in the team due to their specific expertise (Friedrich et al., 2009), but can also be a more general involvement of others in the decision-making process, such as through empowerment (Konczak, Stelly, & Trusty, 2000). Although they were referred to as “collectivistic actions” in their study of George Marshall, Friedrich et al. (2014) studied the relationship between several Leader–Team Exchange behaviors and team outcomes and found that they were positively related to team performance outcomes such as decision acceptance, collective efficacy, and cohesion.

Beyond this initial study of the Leader–Team Exchange dimension of the collective leadership model, other research on collectivistic forms of leadership demonstrate the different ways in which leaders may share the leadership role and the ultimate impact that this may have on performance. For instance, an explicit distribution of the role through delegation, or having multiple individuals share leadership responsibilities can have a positive effect on problem solving (Carmeli & Schaubroeck, 2006; Pearce & Sims, 2002). The leadership role can also be shared with followers in a more generalized way through empowerment (Mathieu, Gilson, & Ruddy, 2006).

These three sets of actions – Communication, Network Development, and Leader–Team Exchange, are seen as three key steps that focal leaders can take in the collective leadership process and each is related to important team outcomes. In each area of study, however, there is little understanding of both the individual differences as well as the contextual factors that may influence whether and how focal leaders will choose to utilize Communication, Network Development and Leader–Team Exchange behaviors. In the present effort, we seek to expand upon our understanding of the collective leadership process by both further testing relationships proposed in the studies conducted by Friedrich et al. (2009, 2014) as well as fill a gap in the literature that would help us understand the contexts in which leaders are likely to utilize different collective leadership behaviors.

#### *Individual differences and collective leadership*

While there is significant research that has evaluated how characteristics of individual followers as well as characteristics of teams relate to the use of collective behaviors, there is far less research on what individual differences within *the leader* may lead to them acting collectively or not, and in particular the different leader characteristics that may be tied to the different forms of collective leadership behaviors. In a recent review of the literature, Hernandez et al. (2011) call for an increased focus on the profiles of traits that may facilitate collectivistic leadership, not just for members of the team, but for the individual focal leader. Some studies, such as the ones by Friedrich et al. (2014), Klein et al. (2006), and Peterson, Smith, Martorana, and

Owens (2003) provide some insight into how leader characteristics such as intelligence, expertise, and personality may relate to collective leadership. Based on the proposed relationships in the original collective leadership framework (Friedrich et al., 2009), the recent empirical findings related to collective leadership (Friedrich et al., 2014) and other relevant empirical evidence outlined below, we believe that individual characteristics such as cognitive ability, prior experience, and personality will be related to the use of collective leadership behaviors, and in some cases differently related to the three forms of collective leadership behaviors.

#### *Cognitive ability*

In their overview of the unique contribution of the collective leadership framework, Mumford et al. (2012) made it clear that, unlike other collectivistic forms of leadership, cognition is central to collective leadership. Intelligence has been one of the individual characteristics most consistently correlated with leadership, broadly speaking, (Sternberg, 2003; Zaccaro, Gilbert, Thor, & Mumford, 1991), although there is some indication that the strength of this relationship may depend on the situation and other characteristics of the leader (Judge, Colbert, & Ilies, 2004). Network scholars consistently discuss the importance of cognition in understanding one's social network, including the connections, nature of relationships, clustering and how connections can be used (Chua, Ingram, & Morris, 2008; Kilduff, Crossland, Tsai, & Krackhardt, 2008). Having an accurate understanding of the network can lead to greater perceived power (Krackhardt, 1990), however, there is quite a lot of information stored within social networks that must be recalled in order to have an accurate understanding of it (Krackhardt, 1987). Given the positive relationship between intelligence and both recall and information processing (Bors & Forrin, 1995; Lohman, 2000), it is believed that intelligence will facilitate both the interpretation and analysis of the social network and will thus be positively related to the leader's actions to develop it.

**Hypothesis 1a.** Intelligence will be positively related to the leader's Network Development behaviors.

In their review of the underlying mechanisms of different leadership theories, Hernandez et al. (2011) suggest that cognition may be particularly critical to collectivistic leadership processes as it requires the "understanding of the knowledge, skills, abilities, and behaviors needed to complete the task at hand and a shared judgment of which team members possess whatever is most conducive to taking over the leadership role" (p. 1178). While they applied this to the need for a shared team mental model, it also indicates the importance of cognition to a focal leader needing to make the judgment on where to allocate the leadership role in the Leader–Team Exchange process. Similarly, Friedrich et al.'s (2014) study on General Marshall's use of collective leadership indicated that intelligence was a significant predictor of Leader–Team Exchange behaviors, which included empowerment and delegation.

**Hypothesis 1b.** Intelligence will be positively related to the leader's use of Leader–Team Exchange behaviors.

#### *Organizational and leadership experience*

There is evidence to suggest that a leader's experience, both within organizations and specific leadership experience, is related to their ultimate performance (Fiedler, 1995; Hedlund et al., 2003; Vincent, Decker, & Mumford, 2002). However, the findings are equivocal (Avery, Tonidandel, Griffith, & Quinones, 2003), and the relationship between expertise and collective leadership is less clear. In the collective leadership framework, Friedrich et al. (2009) suggest that expertise will give leaders a better understanding of when they can utilize the expertise of others effectively, and initial evidence from the study on General Marshall's use of collective leadership indicates that expertise is a strong predictor of Leader–Team Exchange behaviors (Friedrich et al., 2014). Further evidence regarding the importance of experience to collectivistic leadership, broadly, is reflected in a study by Klein et al. (2006) on the dynamic distribution of leadership roles within trauma teams. The authors found that leaders that were more confident in their own abilities and expertise were more likely to pass off the leadership role, and they suggested that this was because they felt confident that they could resolve any mistakes that might arise due to their delegation. Thus, it is expected that leaders with more experience will have both the experiential knowledge to know when the leadership role can and should be passed to others, as well as the confidence needed to allow others to take charge.

An important caveat, however, is that the leader's experience and confidence in distributing the role to others may depend on their understanding of the problem within a specific context. If they do not have the relevant expertise required, but have the confidence and past experience to know they are not qualified to make the decision, they are likely to pass on the role. However, if their experience is task-relevant and they have high self-efficacy as a result (Chan & Drasgow, 2001), this may lead to less information seeking and involvement of others. In a study along these lines, Gilly, Graham, Wolfenbarger, and Yale (1998) found that individuals who perceived their expertise as high were less likely to engage in word-of-mouth information seeking. Thus, we expect that leadership experience will be negatively related to leaders seeking the input of others through communication behaviors.

**Hypothesis 2a.** Prior organizational and leadership experience will be positively related to the leader's Leader–Team Exchange behaviors.

**Hypothesis 2b.** Prior leadership experience will be negatively related to the leader's Communication behaviors.

#### *Personality*

In addition to intelligence and expertise, there is reason to expect that personality traits will be related to the use of collective leadership, and, perhaps, differentially related to each type of collective leadership behavior. There is consistent evidence that

personality is related to leader emergence and effectiveness (Judge, Bono, Ilies, & Gerhardt, 2002), and also related to what form of leadership is used, such as transformational or transactional leadership (Bono & Judge, 2004). While there has yet to be research on collective leadership and personality, specifically, evidence can be drawn from the broader leadership literature that examines similar underlying processes.

One of the consistent findings in personality and leadership research is that low neuroticism (or high emotional stability) is related to effective leadership (Judge et al., 2002). Colbert, Judge, Choi, and Wang (2012) propose this is due to hostility, unpredictability, and rumination that may prevent those that are high on neuroticism from being seen as a leader or accomplishing their desired goals. Given that passing the leadership role to others requires a high level of trust in the followers and confidence in oneself as a leader, it would be expected that emotional stability would have a positive relationship with Leader–Team Exchange.

The relationship between agreeableness and leadership emergence and outcomes has typically been inconsistent (Colbert et al., 2012), and the effects weak (Judge et al., 2002). However, the impact of agreeableness may be dependent on the type of leadership measured. As Colbert et al. (2012) indicate, agreeableness may be related to pro-social behaviors or forms of leadership, and a study by Cogliser, Gardner, Gavin, and Broberg (2012) indicates this is the case, as they found that it was positively related to social-oriented emergent leadership, but not task-oriented emergent leadership. In addition, Brown, Treviño, and Harrison (2005) indicate that agreeable individuals are concerned about justice and fairness. Peterson et al. (2003) also found that agreeableness was negatively related to centralization, likely because more agreeable leaders were willing to share leadership responsibilities with others. Hernandez et al. (2011) echo this in suggesting that agreeableness may be associated with allowing others to take the lead. Thus, we would anticipate it being positively related to Communication and Leader–Team Exchange behaviors which promote involvement of others.

Conscientiousness is the best predictor of the Big 5 personality traits for leadership outcomes (Judge et al., 2002). With regard to conscientiousness and collective leadership, there is evidence to suggest that leaders who are more conscientious are more likely to decentralize their control (Peterson et al., 2003). This may be a result of conscientious leaders having a greater awareness of the network dynamics at play, as well as who in the team has the relevant expertise to pass the leadership role to. In addition, conscientious individuals tend to be strategic and goal-oriented (Colbert et al., 2012). Along these lines, a study by Cogliser et al. (2012) found that conscientiousness was positively related to task-oriented emergent leadership. This strategic orientation may lead them to focus on developing the network for the positive advantages it may provide, and for effectively capitalizing on the capabilities of those in their team in order to achieve the goal by using Leader–Team Exchange behaviors.

While extraversion has been consistently shown to be a predictor of leadership emergence and ratings of effectiveness (Judge et al., 2002), the two indicators of extraversion – sociability and dominance (Colbert et al., 2012) may have differing effects on collective leadership behaviors. Specifically, dominance would be expected to be negatively related to collective leadership behaviors, particularly communication and Leader–Team Exchange which involve encouraging the participation of others. Sociability on the other hand, may be positively related to communication and network development. It is beyond the scope of the present effort to examine the individual indicators of the broad personality dimensions, thus we expect that the overall dimension of extraversion will not have a significant effect on Communication, but will have a positive effect on Network Development.

Finally, openness to experience has also shown a positive relationship to leadership emergence and effectiveness (Judge et al., 2002), and generally indicates that the individual is tolerant of ambiguity and complexity (Colbert et al., 2012). While there is little evidence for how openness to experience may influence the different choices of leadership behaviors, we anticipate that leaders who are intolerant of ambiguity and not open to different perspectives would be less likely to distribute the leadership role to others or to access alternative ideas through Communication. Thus, openness to experience is expected to have a positive relationship to Leader–Team Exchange behaviors and Communication.

**Hypothesis 3a.** The leader's level of agreeableness and openness to experience will be positively related to their use of Communication behaviors.

**Hypothesis 3b.** The leader's level of conscientiousness and extraversion will be positively related to their use of Network Development behaviors.

**Hypothesis 3c.** The leader's level of emotional stability, agreeableness, conscientiousness, and openness to experience will be positively related to the use of Leader–Team Exchange behaviors.

#### *Context effects on the use of collective leadership behaviors*

##### *Network characteristics*

Collective leadership, at its core, is a function of using the network effectively, so it stands to reason that characteristics of a leader's network will differentially influence how the network is used. There is a clear indication that the structure and content of an individual's network shapes their actions (Kilduff, Tsai, & Hanke, 2006), thus we may expect that characteristics of the network may play a role in which leadership behaviors a leader chooses to engage. However, while there are quite a few studies using social networks to understand how leadership is shared and distributed (e.g., Mehra et al., 2006), or how a person's position in a network is related to their leadership emergence or effectiveness (e.g. Balkundi & Harrison, 2006; Hoppe & Reinelt, 2010; Sparrowe & Liden, 2005) few, if any, have looked at the process of a focal leader interpreting the network to determine if sharing

leadership is the appropriate strategy. Given that the development and use of networks is a key part of the collective leadership framework (Friedrich et al., 2009), we sought to examine how aspects of the network that the leader was working in might shape their use of collective leadership behaviors.

There is quite a lot of debate on how network characteristics affect leader and team performance (Balkundi & Harrison, 2006), so we chose to evaluate three key structural characteristics of networks that have been identified in the literature (Balkundi & Harrison, 2006; Hoppe & Reinelt, 2010) – team size, density of connections, and embeddedness of connections, to determine how they might shape a leader's collective actions. A recent meta-analysis of shared leadership research (Nicolaidis et al., 2014) evaluated whether the size of the team would interact with shared leadership on team performance. Several other studies have included team size as a control variable without hypothesizing specific effects (Ensley et al., 2006; Hiller, Day, & Vance, 2006; Pearce & Sims, 2002). Most of these studies did not find significant effects for team size, but this may be because all forms of shared leadership were included as one. Given the cognitive effort required to attend to the specific individuals in large networks (Kilduff et al., 2008), we anticipate that larger teams will pose more challenge to leaders engaging in Leader–Team Exchange, which requires an awareness and use of the network.

Network size has not been examined with regard to a leader's efforts to develop it or promote communication behaviors. Communication behaviors, however, require a closer connection between the leader and followers and within the team network, for instance in order to exchange feedback, or engage in consultation. Thus, we expect that Communication will be used more in smaller teams than larger teams.

A study by Chua et al. (2008) demonstrated that embeddedness within networks increases affect-based trust. Trust is critical to sharing the leadership role, and higher levels of embeddedness and interconnection within a team may signal to the leader that the team as a whole can be trusted and thus lead to increased use of Leader–Team Exchange. Similarly, Kilduff et al. (2008), in a review of network perceptions research, explain that individuals, in an effort to reduce cognitive demand, will often use schemas to apply patterns and overall characteristics to a network. Instead of monitoring specific connections, they take a gestalt view of the entire network and the relationship patterns within it. Thus, a more interconnected or embedded network may take on the property of being characterized by cohesion and trust, while a more disconnected or less embedded network may appear “deficient” of relationships. Thus, if a leader perceives the team to be less connected or have fewer embedded relationships, they may utilize Communication or Network Development behaviors to encourage the members to connect and share information in order to build a trusting environment. While the research in this area is limited, we make the following hypotheses.

**Hypothesis 4a.** Communication behaviors will be used more in teams that are less connected, less embedded, and smaller.

**Hypothesis 4b.** Network development behaviors will be used more in teams that are less connected, less embedded, and larger.

**Hypothesis 4c.** Leader–Team Exchange behaviors will be used in teams that are more connected, more embedded, and smaller.

#### *Problem domain*

In addition to characteristics of the leader and the leader's network, it is anticipated that characteristics of the problem situation will also shape which form of collective leadership is utilized, and the collectivistic leadership domain is in need of research that examines the impact that the situation has on its use (Dust & Ziegert, 2012; Friedrich et al., 2014; Pearce & Sims, 2002; Yammarino et al., 2012). The influence of the situation has been long recognized within leadership research broadly, most notably within the situational and contingency theories of leadership. The problem situation has received less consideration, however, in the modern shift to non-hierarchical leadership. In their recent meta-analysis on shared leadership, D'Innocenzo et al. (2014) suggested that the type of task a team faces may influence whether collectivistic leadership is appropriate, but there is little research on whether it does. In their meta-analysis, Nicolaidis et al. (2014) did evaluate task characteristics, specifically whether it was focused on a decision-making action or a project, and found no significant effect for team task. These studies, however, did not evaluate the different types of collective leadership and focused on limited types of tasks. In the present study, we wanted to evaluate two problem domains, innovation and organizational change, which have been the focus of existing collectivistic research, to better determine if leaders used the different collective leadership behaviors differently across the domains.

Existing research has shown that collectivistic forms of leadership are beneficial in the strategic change management domains. Pearce and Sims (2002) demonstrated that shared leadership contributed to the effectiveness of change management teams, beyond the positive effect that vertical leadership had. In addition, a study by Denis, Lamothe, and Langley (2001) indicated that leaders acting collectively are beneficial during strategic change decisions. While the mechanisms of how the collectivistic approaches influenced outcomes were not clearly tested, the research on individual responses to change may provide some insight. For instance, the opportunity to voice one's opinions during times of change reduces perceptions of injustice and increases support for the decision (Brotheridge, 2003). Thus, while communication, particularly feedback, has been noted as being particularly important to innovation (Mainemelis, Kark, & Eptropaki, 2015), it is expected that a leader will rely more heavily on the Communication forms of collective leadership behavior in a strategic change scenario in order to convey trust and justice within the team. There has yet to be any research on network development during strategic change, broadly, but efforts to mitigate the negative effects of disrupting existing formal and informal networks during change as well as to build new networks following the change, would seem to naturally require the leader to attend to the network's development. Thus, we expect Network Development to be utilized more in the strategic change scenario.

**Hypothesis 5a.** Communication behaviors will be used in the strategic change scenario more than the innovation scenario.

**Hypothesis 5b.** Network Development behaviors will be used in the strategic change scenario more than the innovation scenario.

Creativity and Innovation has been touted as a domain that stands to benefit from the use of collective leadership as it allows for the utilization of individuals' unique expertise (Mainemelis et al., 2015), and there is early evidence that shared leadership or distribution of the leadership roles is beneficial within teams (Hauschildt & Kirchmann, 2001; Hoch, 2013; Howell & Boies, 2004). The benefits observed around utilizing collectivistic approaches in an innovative setting appear to stem from leaders drawing in ideas and talent from others in the team and pooling unique strengths (Mainemelis et al., 2015), thus it is expected that Leader–Team Exchange will be used more in the innovation scenario.

**Hypothesis 5c.** Leader–Team Exchange behaviors will be used in the innovation scenario more than the strategic change scenario.

#### *Problem focus*

While there is no available research on how the use of collective leadership may differ based on whether a problem is task or relationship oriented, this was of interest as these have been identified as distinct forms of leadership situations (Burke et al., 2006). In examining the available research, it was clear that the majority of studies that examine collectivistic forms of leadership do so by examining them during a specific challenge, project, or task or in how the collectivistic leadership relates to overall work performance (Carson, Tesluk, & Marrone, 2007; D'Innocenzo et al., 2014). We were unable to find research in which the problem the leader or team faced was a relationship-oriented problem and feel that this is an important area to study given that leaders in organizations must guide followers through both types of problems. While they are exploratory hypotheses, we anticipate that Leader–Team Exchange behaviors will be used more in task-focused than relationship focused problems as the resolution of a relationship focused problem may not lend itself as easily to the delegation of parts or all of the leadership role. Communication and Network Development behaviors are more interpersonal in nature, both explicitly (e.g., encouraging followers to connect with one another), and implicitly (e.g., encouraging followers to voice opinions to build trust). Thus, it is expected that these two forms of behaviors will be used more in relationship-oriented problems.

**Hypothesis 6a.** Communication behaviors will be used more for the relationship-focused problem than the task-focused problem.

**Hypothesis 6b.** Network Development behaviors will be used more for the relationship-focused problem than the task-focused problem.

**Hypothesis 6c.** Leader–Team Exchange behaviors will be used more for the task-focused problem than the relationship-focused problem.

## **Method**

### *Sample*

The sample used to test these hypotheses included 158 undergraduate students, 96 women and 62 men, attending a large Southwestern university in the United States. Recent evidence indicates that student samples frequently provides convergent findings with those done in the field, particularly those focused on Industrial and Organizational research questions (Mitchell, 2012). Given that the focus of the study was on the underlying individual decision-making and we wanted to isolate aspects of the context, we felt that an experimental setting with a student sample was appropriate to test our research questions. The students in the sample were recruited through psychology courses offering extra credit or requiring research participation hours. Prior to agreeing to participate, students reviewed a brief description of the study posted on a website and then decided that they were willing to join the study. The average age of participants was 20 years old. The average ACT score was 25, nearly 4 points above the national average of students graduating high school in 2009. Five participants were ultimately dropped from the sample due to the manipulation check or for incomplete written responses. The final sample included 153 participants.

### *General procedure*

Study participants were recruited to participate in what was described as a leader problem-solving study. During the first hour of the three-hour study, participants completed a series of individual differences measures that included psychometric measurements of intelligence, personality, as well as biographical data such as age, gender, prior experience in organizations, and leadership experience.

During the second and third hours of the study, participants were permitted to work at their own pace through two separate leadership simulations – one focused on a strategic organizational change scenario and one focused on an innovation scenario. Within each of these broad problem scenarios, they had to respond to two specific issues – one task-focused problem and one person-focused problem. For each of the four problem responses they had to indicate not only what actions they would take in leading their team, but also the reasons that they chose those actions.

The paper and pencil tasks were low-fidelity simulations of two different scenarios in which they were to assume the role of a leader within an organization. In the first task, they were to assume the role of vice president of the sales and marketing team, and in the second task they were asked to assume the role of the director of a research and design team. Both tasks followed the same procedure once the company and the problem were described. After reading through background information on the company, their role, and the problem, they were then given a series of short biographical sketches of their team members. They were asked to read through the sketches and then instructed to draw the social network connections between team members as indicated in their biographical sketches. They were then asked to respond to the two different problems for each leadership scenario – the task-focused problem, and the person-focused problem.

To test the between-subject effects of network characteristics, the manipulation was introduced via the biographical sketches that each participant was given. They were either given a large or small number of team members, a team in which members had either dense or few connections, and a team that had either more or less embedded relationships. With three main manipulations at two levels each, there were a total of eight possible conditions, or networks, they could have been given. The individual differences measures and network manipulations were intended to evaluate the between-subjects effects on use of the collective leadership behaviors. The two scenarios (strategic change versus innovation) and two problem types (task versus person focused) were intended to test the within-subject effects of problem characteristics. We now turn to a detailed description of the individual differences measures, experimental task, manipulations, independent variables, and analysis plan.

### *Individual differences measures*

The first individual difference set of measures administered to participants was given to evaluate cognitive ability, as well as experience in organizations and in leadership roles. The test used to evaluate cognitive ability was the Wonderlic Personnel Test which has demonstrated split-half reliabilities above .80 (McKelvie, 1989) and evidenced adequate validity (Frisch & Jessop, 1989; Hawkins, Faraone, Pepple, Seidman, & Tsuang, 1990). In addition to cognitive ability, participants were asked to self-report the number of different organizations they have been a member of, as well as the highest level of leadership that they have held.

In addition to cognitive ability, organizational and leadership experience, participants were asked to complete a measure of personality. Goldberg's (1992) unipolar personality assessment provided a global evaluation of the Big-5 personality scales – emotional stability (neuroticism), extroversion, openness, agreeableness, and conscientiousness. For this measure, participants were given 100 self-descriptive words (e.g., active, out-going, reserved) and were asked to rate on a 9-point scale the degree to which these words accurately described them relative to their peers. The results for the five scales provided internal consistencies above .80 and studies by Becker, Billings, and Eveleth (1997); Reyson (2005), and Saucier (2002) have demonstrated the construct validity of the measure.

### *Experimental task*

The experimental activity that participants engaged in included two separate leadership simulation tasks. Both were the same in their general design and the format of the problems that they were asked to solve for each of the two tasks, but they differed on the general domain that they were working in; one was a strategic change task focused on organizational restructuring and one was an innovation task focused on new product development. The two different tasks were administered to determine if there are within-person differences in the use of collective leadership tactics across different domains.

For the first leadership task, an adapted version of a task previously used by Friedrich and Mumford (2009), participants were asked to assume the role of the new Vice President of Sales and Marketing at Sweet Thing Cookie Company. To personally engage them in the situation and their role, they were provided information on the history of the company and how they came to be Vice President of Marketing and Sales. They were then provided information on the general situation that the company was facing. They were told that within the first month of assuming the VP role, the organization decided to expand and acquired a smaller company focused on healthier snacks – Snack Right. They are informed that they will eventually be leading a joint marketing and sales team from both organizations and are then provided short biographical sketches of their current team with which they will be asked to solve two different problems. Examples of these biographical sketches can be seen in Fig. 2.

After being asked to read through the biographical sketches of their team members they were asked to draw the social network of the team. They were permitted to reference the biographical sketches and company background information throughout the activity. They had been told in the prior instructions to pay particular attention to which employees work with one another and the information on who each person is associated with is explicitly outlined in the “primary contacts” section of their biographical sketches. As can be seen in Fig. 3, they were provided instructions and an example of how to draw the social network and were also given an unconnected set of circles representing their team members for them to draw in the appropriate connections. The instructions to pay close attention to the relationship information, and having them draw the network, was done intentionally to ensure that every participant processed the network information. The network drawing was also included as a manipulation check and participants that did not complete it were removed from the analyses (this was the case for 4 participants).

After drawing their team's network they were then asked to respond to two different problems, one task-focused and one people-focused. In the first, task-focused problem they are told that they need to develop a plan for combining the two sales and marketing teams from the parent and acquired company. In describing their plan they are asked to discuss how they will integrate and organize the team for a new sales and marketing strategy, and how they will present the reorganization plan to

## SWEET THING SALES AND MARKETING TEAM

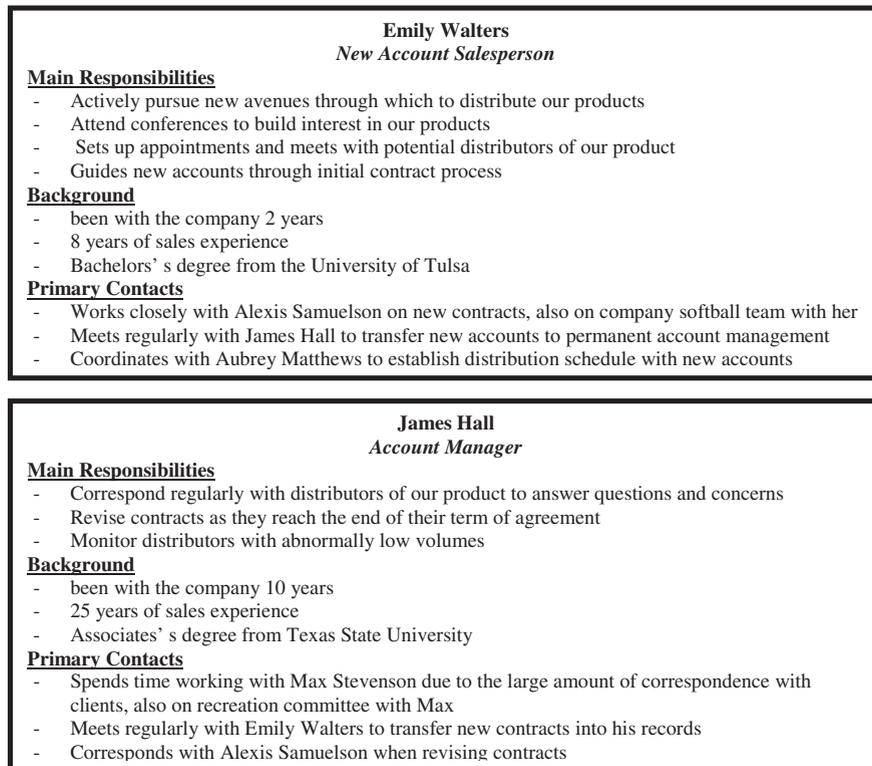


Fig. 2. Examples of team member biographical sketches.

their members. In an attempt to elicit discussion of their leadership strategies they are specifically asked to discuss their use of motivational, influence, and organizational strategies they would use in accomplishing the given task. They are first given two pages to describe their plan for solving the problem, and then they are given another two pages with a follow-up prompt to discuss their reasoning for taking the approach that they did. This second follow up question was intended to get additional decision-making information regarding their leadership strategy beyond just the description of their strategy.

For the second, people-focused problem that they were given for this scenario, they are told that after working together for several weeks, there is still a divide between members from the two organizations and that the Snack Right team members still feel like outsiders. The participant is then asked to develop a plan for resolving the problem based on what they know of their original team and, again, asked to describe what motivational, influence, and organizational strategies they would use in solving the problem. Once again, they are asked to describe their plan and also their reasoning for using the strategy that they did.

Once participants completed the first leadership task, they were asked to move on to the second task which was an innovation-focused task. In this task they were asked to assume the role of director of Research and Development for Play Stages Toy Company, a company focused on educational toys that were designed for the different developmental stages of children. As with the other task, they were given a description of the organization and of their role and how they came to be the director. They were then told of the current situation that the organization was facing which was a decrease in sales due to a backlash against educational, or “edu-tainment,” toys, which were being accused of damaging children’s sense of “play.” Thus, the company was looking to adapt to this problem and develop toys that were both educational but also emphasized fun and socializing with other children.

The flow of this task was the same as the first — they were provided the general situation, a description of their team with biographical sketches, asked to draw their network, and then given two problems. The first, task-focused problem asked them to develop a new research and development strategy to accomplish the organization’s new mission. The second, people-focused problem informs them that they are to develop a task-force of members from all over the organization to help with an innovation, but that their R&D team believes they should be solely responsible for carrying out innovations and may not be receptive to the ideas of others in the organization. These four different problems allowed us to evaluate within-subject effects for problem domain (strategic change versus innovation) and problem focus (task versus person focused). In the next section we will review our main between-subjects manipulation — the characteristics of the team network.

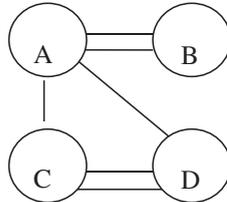
### TEAM MEMBER CONNECTIONS

**In the space provided below please draw the network of connections, or relationships, of your current team members. An example is provided for how a network is drawn.**

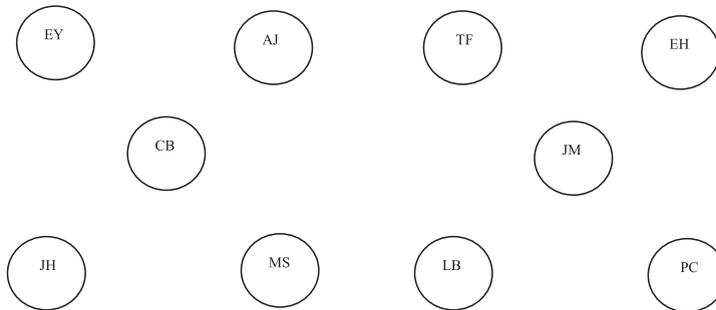
**Example Work Team:**

- Employee A works closely with Employee B, Employee C, and Employee D**
- Employee C works closely with Employee A and Employee D**
- Employee D works closely with Employee A**
- Employee C and D have two connections – they work closely together and are on a social committee together**
- Employee A and B have two connections – they work closely together and are also friends**

**Example Network:**



**FILL IN YOUR NETWORK: \*The letters in the circles are your team members' initials**



**Fig. 3.** Instructions for drawing their team network.

*Between-subjects manipulations*

To evaluate whether characteristics of a team's social network impact a leader's collective leadership tactics, the between-subjects independent variables of this study are three different characteristics of networks, each at two levels, which may influence leadership strategies. The first two characteristics selected were based on research conducted by Balkundi and Kilduff (2006) that discusses connections within a network and the embeddedness of individuals in a network as distinguishing features between networks. For the present study, actor connections are operationalized by explicit relationships between two team members and embeddedness is operationalized by the depth of connections between two actors as indicated by the number of levels that they are related to one another. In addition to these two variables, it was of interest whether the size of a team's network also played a role. The manipulation of these variables occurred in the biographical sketches of their team that each participant was given. Example diagrams of these manipulations are provided in Fig. 4. We now turn to a detailed description of how each of these variables was manipulated.

*Network size.* The first of the three network variables manipulated was the size of the network that the participant was given. Participants were either given a small network of five team members or a larger network of ten team members. It was determined that teams of five and ten were different enough in size to elicit behavioral differences while not introducing other effects, as may be the case if the team size was so large they could not keep the relationships between members in mind as they worked through the problem. Burt, Kilduff, and Tasselli (2013) refer to three sizes of networks that vary in distinguishable complexity – small (three nodes), larger (five nodes), and still larger (ten nodes). We selected networks of five and ten so that there would be enough actors to implement the second and third manipulations.

*Density of connections.* The second network variable being manipulated was the degree of connection density within the network. Individuals were given networks that were either low in density, where each team member was only connected to two other team members, or high in density, where team members were connected to three different team members. These connections were indicated in the "Primary Contacts" section of their biographical sketch. While the addition of one contact may not seem

## Diagrams of the eight network conditions

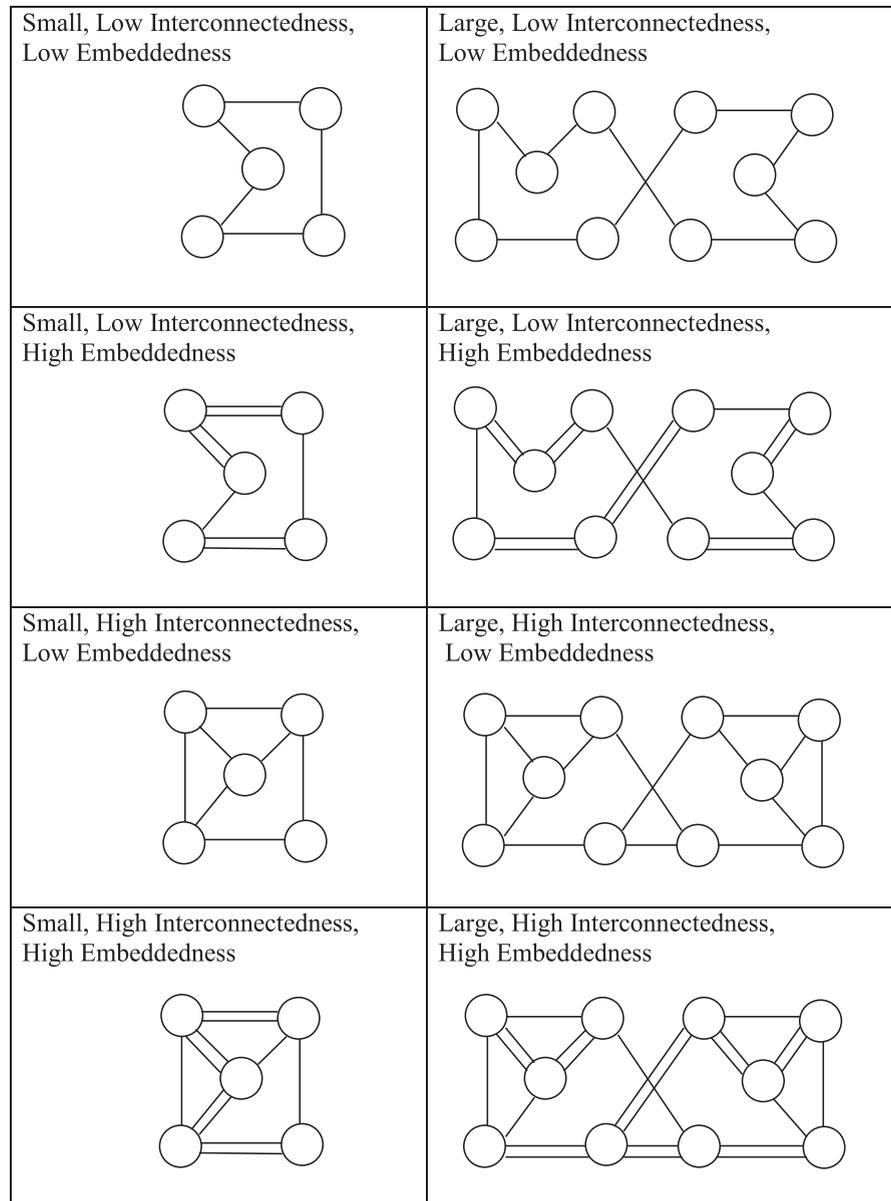


Fig. 4. Diagrams of the eight network conditions.

substantial, as indicated in the diagrams in Fig. 4, the aggregate difference between all members being connected by one additional connection is significant.

*Embeddedness.* The third, and final, network variable being manipulated is the level of embeddedness of members within the network. As described by Kilduff and Tsai (2006), connections between individuals usually exist at a number of levels and work relationships often overlap with personal relationships. Thus, the embeddedness of actors, and the network as a whole, is represented in the layers of connections between individuals. For the low embeddedness condition, the biosketches only described connections related to work, while in the high embeddedness condition, half of the existing connections between actors had a second connection that was not work related. Examples of secondary connections include being on committees together, playing on sports teams together, being friends from college, amongst others. These three manipulations, at two levels each, were crossed such that participants were assigned to eight possible conditions. Diagrams of each of these conditions are presented in Fig. 4.

## Dependent variables

### Collective leadership behaviors

Using the dimensions identified in the Friedrich et al. (2009) framework and Yammarino et al. (2014) measures, an initial list of collective leadership behaviors was identified for each of the dimensions. Following the findings of the Friedrich et al. (2014) study the list was shortened to key behaviors found to be related to team performance. Finally, the research design and task was considered in order to narrow the behaviors that would be appropriate and evident in the study. The ultimate list of behaviors can be found in Table 1. Please note, the definitions and item structure reflect the result of the Factor Analysis discussed in the next section, not the a priori structure, which included “Voice” within Leader–Team Exchange.

Participants' responses to the four problems were content coded by trained raters for indicators of each of the 12 behaviors, ultimately providing scores for the degree to which participants used each behavior in responding to each problem. Ratings were made by three judges using a set of benchmark ratings scales. The benchmark scales were based on general definitions summarized from the Friedrich et al.'s (2009) collective leadership theory, the Yammarino et al. (2014) measure of collective leadership, as well as the Friedrich et al. (2014) study regarding General Marshall's collective leadership.

Based on the definitions and example markers of each behavior, three judges from a pool of eight, all doctoral students in industrial and organizational psychology or business, were asked to rate, on a 5-point Likert scale, the degree to which the participant used each behavior in their response to the problem (1 = did not use the behavior at all, 3 = behavior was used but only part of their overall strategy, 5 = behavior was the dominant part of their strategy). For any given participant, three of the eight judges rated the responses. The eight judges, who were unfamiliar with the study hypotheses, were trained to rate the participant responses during a 20 h training program where they were familiarized with the questions being asked of the participants and the rating scales. Subsequently, judges practiced applying the scales to an initial sample of responses. Their initial reliabilities were evaluated and they then met to discuss discrepancies and review any scales with low agreement. The ultimate inter-rater reliability coefficient, ICC(2) exceeded .70 for both Communication and Network Development, and .60 for Leader–Team Exchange. While the inter-rater reliability for Leader–Team Exchange was a little low, this may be a result of the Leader–Team Exchange behaviors being observed less frequently than the Communication and Network Development behaviors, as can be seen in their means displayed in Table 4.

Following existing research on the collective leadership framework, an exploratory factor analysis was conducted on the 12 leadership behaviors to determine if the behaviors emerged into clear factors. An initial factor analysis was conducted on the aggregate responses across both the task and relationship problems for Scenario 1, the strategic change scenario. A principal components analysis was conducted on the 12 items using orthogonal (Varimax) rotation. The Kaiser–Meyer–Olkin (KMO) value was .77 indicating a sufficient level of sampling adequacy (Kaiser, 1975), and Bartlett's test of sphericity  $X^2(66) = 1896.38, p < .00$  indicates that the correlations between the items were large enough to conduct the PCA. Using the standard eigenvalue of 1 as the cut-off for number of factors extracted, three factors emerged that explained a cumulative 68.89% of the variance. The factor loadings after rotation are provided in Table 2 and a description of the items that loaded onto each of the three factors is provided in Table 1.

As can be seen in Table 2, a clear pattern emerged between the three factors into the proposed types of collective leadership, however one behavior, “Voice” that was previously identified as a Leader–Team Exchange behavior (Friedrich et al., 2009) aligned more closely with the Communication factor. This is not entirely unexpected, as voice, similar to consultation, involve both encouraging communication as well as engaging others in decision making.

**Table 1**

Item descriptions for collective leadership dimensions.

Dimension	Items	Item description
<i>Network Development</i>	Encourages interaction	The leader mentions encouraging communication and interaction between team members
	Fosters connections	The leader mentions encouraging team members to build relationships with one another
<i>Communication</i>	Builds familiarity	The leader mentions encouraging team members to get to know one another personally and professionally with a focus on building understanding
	Feedback exchange	The leader mentions giving feedback to followers, and encouraging them to give feedback to him/her and their teammates
	Information sharing	The leader mentions encouraging individuals to share information and knowledge with him/her and with each other
	Communication norms	The leader mentions establishing expectations for how team members should communicate with him/her and/or with each other
	Voice	The leader mentions encouraging followers to express their ideas and opinions and making sure that everyone is heard
<i>Leader–Team Exchange</i>	Consultation	The leader mentions encouraging followers to suggest improvements in their plan or other functions of the team
	Delegation of responsibilities	The leader mentions delegating different tasks or responsibilities to specific people or groups
	Utilization of individual's expertise	The leader mentions using or working with someone because of their particular expertise or knowledge.
	Empowerment	The leader mentions giving team members authority over decision making or use of resources, indicating that they are self-reliant and do not need to wait for approval
	Shared leadership	The leader mentions sharing the leadership role or giving leadership power to others in the team

**Table 2**  
Factor analysis for collective leadership dimensions, Scenario 1.

Item	Rotated factor loadings		
	<i>Communication</i>	<i>Leader–Team Exchange</i>	<i>Network Development</i>
Feedback exchange	0.90		
Voice	0.84		
Communication norms	0.84		
Information sharing	0.83		
Consultation	0.79		
Delegation of responsibilities		0.88	
Utilization of individual's expertise		0.85	
Empowerment		0.70	
Shared leadership		0.60	
Encourages interaction			0.85
Fosters connections			0.85
Builds familiarity			0.83
Eigen values	3.56	2.41	2.29
% of variance	29.69	20.10	19.10
$\alpha$	0.90	0.75	0.80

Note: N = 306.

Before using the three forms of collective leadership behaviors as dependent variables, we conducted a second Factor Analysis on the aggregate responses to the task and relationship problems in Scenario 2, the innovation scenario. However, this time we constrained the model to three factors to determine if the same structure would emerge. A second principal components analysis was conducted on the 12 items using orthogonal (Varimax) rotation. The Kaiser-Meyer-Olkin (KMO) value was .79 indicating a sufficient level of sampling adequacy (Kaiser, 1975), and Bartlett's test of sphericity  $X^2(66) = 1868.41, p < .00$  indicates that the correlations between the items were large enough to conduct the PCA. The model was constrained to three factors which explained a cumulative 67.27% of the variance. The factor loadings after rotation are provided in Table 3 and it was found that the structure was the same as in the analysis of responses to Scenario 1.

### Analyses

Prior to running analyses, any participants that did not complete the manipulation check, which involved them drawing out the social network of the teams in each task, or the written problem responses, were excluded. This eliminated five participants for a resulting sample size of 153. Regression was used to evaluate the relationship of individual differences to the collective leadership behaviors. Repeated Measures Analysis of Variance was used to evaluate the between-subjects effects of varying network characteristics on use of the collective leadership behaviors, as well as the within-subjects effects of problem domain and focus. Means, standard deviations and bivariate correlations are presented in Table 4. Please note that Time 1 refers to the first (task) problem of the first (Strategic Change) scenario, Time 2 refers to the second (relationship) problem of the first (Strategic Change) scenario, Time 3 refers to the first (task) problem of the second (Innovation) scenario, and Time 4 refers to the second (relationships) problem of the second (Innovation) scenario.

**Table 3**  
Factor Analysis for Collective Leadership Dimensions, Scenario 2.

Item	Rotated Factor Loadings		
	<i>Communication</i>	<i>Leader–Team Exchange</i>	<i>Network Development</i>
Feedback Exchange	0.88		
Voice	0.84		
Information Sharing	0.84		
Communication Norms	0.82		
Consultation	0.78		
Delegation of Responsibilities		0.87	
Utilization of Individual's Expertise		0.83	
Empowerment		0.69	
Shared Leadership		0.43	
Fosters Connections			0.82
Builds Familiarity			0.81
Encourages Interaction			0.75
Eigen Values	3.64	2.26	2.18
% of variance	30.31	18.81	18.15
$\alpha$	0.90	0.70	0.77

Note: N = 306.

Please cite this article as: Friedrich, T.L., et al., Collective leadership behaviors: Evaluating the leader, team network, and problem situation characteristics that influence their u..., *The Leadership Quarterly* (2016), <http://dx.doi.org/10.1016/j.leaqua.2016.02.004>

**Table 4**  
Descriptive statistics and correlations.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Intelligence (WPT)	22.77	5.22																						
2. Extraversion	122.50	23.27	.06																					
3. Agreeableness	142.73	18.71	-.07	.37**																				
4. Conscientiousness	128.05	20.56	.04	.17*	.48**																			
5. Emotional stability	101.67	19.83	.05	.25**	.33**	.26**																		
6. Openness	134.75	18.80	.13	.34**	.45**	.40**	.13																	
7. Number of orgs involved in	2.73	2.13	-.01	.15	.10	.04	-.04	.08																
8. Highest level of leadership held	1.88	2.14	.08	.22**	.11	.07	.04	.18*	.46**															
9. Communication time 1	2.13	0.81	-.14	-.03	.20*	.05	.01	.04	.06	-.04														
10. Communication time 2	2.29	0.81	-.11	.05	.07	.08	-.12	-.05	.09	-.08	.34**													
11. Communication Time 3	2.05	0.77	-.09	.00	.06	.05	-.02	-.03	.04	-.05	.22**	.24**												
12. Communication Time 4	2.06	0.74	-.04	.08	.12	-.03	-.06	.07	.13	-.12	.22**	.26**	.27**											
13. Leader team exchange time 1	1.75	0.57	.15	-.11	-.04	-.03	.01	-.02	-.04	.11	.07	-.08	.15	.05										
14. Leader team exchange time 2	1.28	0.28	.14	-.08	.08	-.09	.12	-.00	-.03	-.07	.05	-.04	.19*	.19*	.19*									
15. Leader team exchange time 3	1.67	0.57	.22**	-.03	.04	-.03	-.01	.01	-.03	.04	-.03	-.08	.15	0.04	.52**	.25**								
16. Leader team exchange time 4	1.54	0.41	.19*	.09	.01	.02	.02	-.02	-.02	.01	.12	.07	.02	.01	.21*	.22**	.28**							
17. Network development time 1	2.55	0.85	.13	.04	.09	-.01	.02	.07	.24**	.07	.42**	.18*	.26**	.22**	.15	.13	.03	.10						
18. Network development time 2	2.87	0.82	.13	.14	.07	.08	.01	.18*	.17*	.29**	.16	.07	.03	.10	.21*	.05	.10	.07	.29**					
19. Network development time 3	1.71	0.60	.09	.01	-.02	-.03	-.08	-.01	.04	.04	.02	.02	.52**	.08	.34**	.15	.55**	.06	.14	.06				
20. Network development time 4	1.96	0.62	.12	.06	.14	.05	.08	.17*	.30**	.25**	.13	.03	.11	.28**	.00	.13	0.04	-.08	.38**	.26**	.25**			
21. Overall communication	2.13	0.52	-.14	-.02	.17*	.11	-.07	.01	.12	-.11	.68**	.70**	.64**	.64**	.07	.14	.03	.08	.41**	.13	.24**	.20*		
22. Overall leader team exchange	1.56	0.32	.26**	-.05	.02	-.04	.03	-.01	-.05	.06	.07	-.06	.18*	.08	.78**	.48**	.82**	.58**	.14	.17*	.44**	.02	.10	
23. Overall network development	2.27	0.47	.18*	.10	.11	.04	.01	.16*	.29**	.25**	.30**	.13	.33**	.26**	.26**	.17*	.24**	.07	.74*	.67**	.49**	.69**	.38**	.28**

\*\*Correlation is significant at the 0.01 level (2-tailed).  
\*Correlation is significant at the 0.05 level (2-tailed).  
N = 153.

## Results

### *Individual differences and collective leadership behaviors*

To evaluate the relationship between individual differences variables and each form of collective leadership behaviors, we conducted a stepwise regression. Due to the lack of consistent prior research on the relationship between individual differences and collective leadership, we conducted a backwards regression to evaluate which individual differences are significant predictors of the use of collective leadership behaviors. The results are presented in Table 5 and demonstrate that the number of organizations they have been involved in ( $\beta = .20, p \leq .04$ ), and agreeableness ( $\beta = .17, p \leq .05$ ) were positive predictors of Communication behaviors, while the highest level of leadership position they have held was negatively related ( $\beta = -.22, p \leq .05$ ). Both number of organizations they have been involved in ( $\beta = .29, p \leq .01$ ) and intelligence ( $\beta = .19, p \leq .05$ ) had a significant, positive relationship with Network Development behaviors, while intelligence ( $\beta = .26, p \leq .01$ ) was the only significant predictor of Leader–Team exchange behaviors.

Hypothesis 1a and Hypothesis 1b, which stated that Intelligence will be positively related to the leader's Network Development and Leader–Team Exchange behaviors were supported. Hypothesis 2a, which stated that prior organizational and leadership experience will be positively related to Leader–Team Exchange behaviors was not supported, however Hypothesis 2b, which stated that prior leadership experience would be negatively related to Communication was supported. Hypothesis 3a, which stated that agreeableness and openness to experience would be positively related to Communication was partially supported, as agreeableness was related, but openness was not. Hypotheses 3b and 3c were not supported as there was no relationship observed between personality and Network Development or Leader–Team Exchange.

### *Contextual factors and collective leadership behaviors*

Repeated measures ANCOVAs were used to analyze the effect of the three network manipulations (size of network, number of connections and embeddedness), as well as problem scenario (strategic change or innovation) and problem focus (task-focused or relationship focused) on each form of collective leadership. The results are summarized in Table 6.

### *Effects of network characteristics*

For Communication behaviors, a significant main effect was found for team embeddedness ( $F(1, 145) = 6.78, p \leq .01$ ), such that Communication was used more for less embedded teams ( $M = 2.24, SE = .06$ ) than for more embedded teams ( $M = 2.02, SE = .06$ ), partially supporting Hypothesis 4a, which stated that communication behaviors would be used more in teams that are less connected, less embedded, and smaller. There were no network effects on the use of either Network Development or Leader–Team exchange behaviors, so Hypotheses 4b and 4c were not supported.

### *Effects of scenario type and problem focus*

For the use of Communication behaviors, a significant main effect was observed for scenario ( $F(1, 145) = 6.81, p \leq .01$ ), such that it was used more in the strategic change problem ( $M = 2.21, SE = .05$ ) than the innovation problem ( $M = 2.06, SE = .05$ ), but there was no effect for problem focus. Thus, Hypothesis 5a, which states that Communication behaviors will be used in the strategic change scenario more than the innovation scenario, was supported, but Hypothesis 6a, which stated that Communication behaviors will be used more for the relationship-focused problem than the task-focused problem, was not.

**Table 5**  
Regression of individual differences on collective leadership dimensions.

	B	SE	$\beta$
<i>Communication, R = .28, R<sup>2</sup> = .08</i>			
Constant	1.41	0.32	
Number Of organizations Involved in	0.05	0.02	0.20*
Highest level of leadership held	−0.05	0.02	−0.22*
Agreeableness	0.01	0.002	0.17*
<i>Network Development, R = .34, R<sup>2</sup> = .12</i>			
Constant	1.71	0.17	
Number of organizations Involved In	0.07	0.02	0.29**
Intelligence (Wonderlic)	0.02	0.01	0.19*
<i>Leader–Team Exchange, R = .26, R<sup>2</sup> = .07</i>			
Constant	1.21	0.11	
Intelligence (Wonderlic)	0.02	0.01	0.26**

N = 153.

\* Correlation is significant at the 0.05 level.

\*\* Correlation is significant at the 0.01 level.

**Table 6**

Repeated measures ANCOVAs for within and between subjects effects of context factors on collective leadership dimensions.

	<i>M</i>	<i>SE</i>
<b>Communication</b>		
<i>Scenario</i> ( $F(1, 145) = 6.81, p \leq .01, \text{partial } \eta^2 = .05$ )		
Strategic problem scenario	2.21	0.05
Innovation problem scenario	2.06	0.05
<i>Embeddedness</i> ( $F(1, 145) = 6.78, p \leq .01, \text{partial } \eta^2 = .05$ )		
Low embeddedness	2.24	0.06
High embeddedness	2.02	0.06
<b>Network Development</b>		
<i>Scenario</i> ( $F(1, 145) = 250.74, p \leq .01, \text{partial } \eta^2 = .63$ )		
Strategic problem scenario	2.71	0.06
Innovation problem scenario	1.82	0.04
<i>Problem focus</i> ( $F(1, 145) = 31.79, p \leq .01, \text{partial } \eta^2 = .18$ )		
Task focused problem	2.13	0.05
Relationship focused problem	2.41	0.05
<b>Leader–Team Exchange</b>		
<i>Scenario</i> ( $F(1, 145) = 9.38, p \leq .01, \text{partial } \eta^2 = .06$ )		
Strategic problem scenario	1.52	0.03
Innovation problem scenario	1.61	0.03
<i>Problem Focus</i> ( $F(1, 145) = 59.96, p \leq .01, \text{partial } \eta^2 = .29$ )		
Task focused problem	1.71	0.04
Relationship focused problem	1.41	0.02
<i>Scenario</i> $\times$ <i>problem focus</i> ( $F(1, 145) = 37.76, p \leq .01, \text{partial } \eta^2 = .21$ )		
Strategic problem scenario		
Task focused problem	1.75	0.05
Relationship focused problem	1.28	0.02
Innovation problem scenario		
Task focused problem	1.67	0.05
Relationship focused problem	1.54	0.03

Note:  $N = 153$ .

With regard to the use of Network Development behaviors, there was a significant main effect for both scenario ( $F(1, 145) = 250.74, p \leq .01$ ), as well as problem focus ( $F(1, 145) = 31.79, p \leq .01$ ), such that Network Development behaviors were used more in the strategic change problem ( $M = 2.71, SE = .06$ ) than the innovation problem ( $M = 1.82, SE = .04$ ), and more in the relationship-focused problem ( $M = 2.41, SE = .05$ ) than the task-focused problem ( $M = 2.13, SE = .05$ ) supporting both [Hypothesis 5b](#), which stated that Network Development behaviors will be used more in the strategic change scenario than the innovation scenario, and [Hypothesis 6b](#), which stated it would be used more for the relationship-focused problem than the task-focused problem.

Finally, for the use of Leader–Team Exchange Behaviors, there was a main effect for both scenario ( $F(1, 145) = 9.38, p \leq .01$ ), as well as problem focus ( $F(1, 145) = 59.96, p \leq .01$ ), along with a significant interaction between the two ( $F(1, 145) = 37.76, p \leq .01$ ). Leader–Team Exchange behaviors were used more in the Innovation Scenario ( $M = 1.61, SE = .03$ ) than the strategic change scenario ( $M = 1.52, SE = .03$ ) and were used more in the task-focused problem ( $M = 1.71, SE = .04$ ) than the relationship-focused problem ( $M = 1.41, SE = .02$ ), which supports both [Hypothesis 5c](#) and [6c](#) which stated that Leader–Team Exchange behaviors will be used in the innovation scenario more than the strategic change scenario, and more for the task-focused problem than the relationship-focused problem. In addition, the interaction effect indicated that the difference in the use of the Leader–Team Exchange behavior between the task ( $M = 1.75, SE = .05$ ) and relationship focused ( $M = 1.28, SE = .02$ ) problems was greater in the strategic change scenario than the use in the task ( $M = 1.67, SE = .05$ ) and relationship focused ( $M = 1.54, SE = .03$ ) problems in the Innovation scenario.

## Discussion

### General discussion

In the present study we have sought to advance research on collectivistic forms of leadership, and specifically add to the body of work testing the relationships proposed in the [Friedrich et al. \(2009\)](#) collective leadership framework. To add to the literature in a strategic way, we focused on two areas of research that leadership scholars, and collective leadership scholars in particular, have called for more work – understanding how individual differences relate to leadership behaviors ([Antonakis, Day, & Schyns, 2012](#)), and how contextual factors may shape the use of collective leadership behaviors ([Dust & Ziegert, 2012](#); [Friedrich et al., 2014](#); [Mumford et al., 2012](#)).

The findings with regard to individual differences indicate that there may, in fact, be differences in who utilizes different forms of collective leadership behaviors. While some popular opinion might imply that collective leadership approaches are easier or require less effort from the leader due to the distribution of the leadership role, it may actually be the case that this form of

leadership is quite cognitively demanding given the observed relationship between intelligence and the use of Network Development and Leader–Team Exchange behaviors. We believe this is the case because attending to large networks is cognitively demanding (Kilduff et al., 2008), and Leader–Team Exchange requires attending to the network to assess the available knowledge, skills and abilities and having an accurate understanding of the network characteristics so that the role can be appropriately shared with the individual with the relevant expertise.

Prior experience exhibited an interesting, and possibly counterintuitive relationships with collective leadership behaviors. While the leader's prior organizational experience was positively related to their use of Network Development and Communication behaviors, their highest level of prior leadership experience was negatively related to the use of Communication behaviors. Situational expertise can provide useful case-based knowledge that leaders can utilize in problem solving (Mumford, Friedrich, Caughron, & Byrne, 2007), and may make them more attuned to their network and how they can use it to solve problems. However, experience, particularly experience directly relevant to the task, such as leadership experience, can make individuals feel more confident (Chan & Drasgow, 2001) and may make it less likely that they seek out information and feedback from others they believe do not have as much experience (Gilly et al., 1998), which are key behaviors in the Communication dimension.

One surprising finding was how little personality influenced the use of different collective leadership behaviors. The only personality characteristic found to be significant was agreeableness which was a significant predictor of Communication behaviors. It may be the case that the other two behaviors, Network Development and Leader–Team Exchange are driven more by cognition rather than personality. It is not surprising that agreeableness is predictive of Communication given that individuals that are high on agreeableness tend to focus on others and have a desire for justice (Brown et al., 2005; Colbert et al., 2012) which would lead them to promote follower voice, seek consultation, and want to provide feedback.

With regard to problem scenario and focus, it was found that Leader–Team Exchange was used more in the innovation scenario and task focused problems. There is evidence to indicate that involving others in the leadership process is more beneficial when tasks are complex and cannot be solved by a single individual (Wang et al., 2014), as is often the case with innovative tasks. Innovation tasks also benefit from utilizing diverse perspectives, so leaders may be more likely to draw on specific individuals with unique expertise rather than the team as a whole. Leader–Team Exchange may be used more in task-focused problems than relationship-focused problems due to the greater ease in defining specific elements of the problem to solve and that those tasks can be allocated to those with the relevant expertise. Elements of relationship-focused problems, on the other hand, may not be as easily distributed.

Both Communication and Network Development behaviors were used for the strategic change scenario more than the innovation scenario. Strategy and change management issues can often be very disruptive to teams, both from a structural perspective and an interpersonal perspective. By using Network Development behaviors following a strategic change, the leader may help facilitate the reorganization and facilitate information sharing within the newly established group or unit. With regard to the psychological strain that change can put on employees, providing individuals with the opportunity to voice their concerns and ideas through Communication behaviors has been shown to lead to increased follower commitment (Falbe & Yukl, 1992) and can increase perceptions of justice in the process (Brotheridge, 2003). With regard to problem type, there was no significant effect on Communication behaviors, but there was on Network Development such that these behaviors were used more in relationship-focused problems than in task-focused problems. Given the interpersonal nature of these problems, it seems rather intuitive that the leader's strategy would revolve around building interpersonal relationships.

With regard to network characteristics, embeddedness was the only factor to have an effect on the use of collective leadership behaviors, and specifically was used more in less embedded teams than more embedded. Given that embeddedness can serve as a signal that there is higher levels of trust in the team (Chua et al., 2008), perhaps a network that was less embedded was perceived by the leader as one that needed interpersonal development and trust building, which was achieved by promoting information sharing and providing voice to followers. While it is surprising that the other network factors did not have an effect on the use of the collective leadership behaviors, it may be that the network was not as salient as it would be in a real-world setting, a limitation that we note in the next section.

A final, important, contribution of this study is the observed consistency of the dimensions of collective leadership behaviors. Following the initial dimensions and behaviors proposed in the framework (Friedrich et al., 2009) and the first study testing the dimensions and items (Friedrich et al., 2014), this study added further evidence to the presence of different forms of collective leadership behaviors and expanded our understanding of how these behaviors are influenced by individual level antecedents as well as contextual factors.

### Limitations

Before turning to a discussion of the study's implications for theory and practice, it is important to first address several limitations of our study. First, we used a student sample to test our hypotheses rather than conducting a field study. While we chose this design in order to control the context that the leaders were operating in, specifically the network factors and problem that they were given to work on, in order to focus more specifically on comparing different individual's decision making in the same scenario, we realize this may reduce the external validity of our findings. While the meta-analysis conducted by D'Innocenzo et al. (2014) on studies of shared leadership did find that student samples had lower effect sizes than comparable real-world samples, both meta-analyses conducted by Nicolaidis et al. (2014) as well as Wang, Waldman, and Zhang (2014) did not find significant differences in the effects observed between studies conducted in schools versus the field. In addition, Mitchell (2012) conducted a comparison of findings in the psychology literature, obtained with student and field samples. He

found that generalizability from student studies varies across fields, but Industrial and Organizational psychology studies tend to be amongst the highest in their correlation with field effects ( $r = .89$ ,  $n = 72$ , 95% CI [.83, .93]). Although lower, leadership studies still exhibited a reasonable correlation between lab and field effects ( $r = .69$ ,  $SD = .21$ ). Given this support for the generalizability of student-sample findings, and the benefits of controlling for specific network and problem characteristics, we feel that the appropriate sample was utilized. It would be beneficial, of course, to test the findings further with a field study or a higher fidelity team study in the lab.

Second, the experiment utilized a low-fidelity simulation in which the leaders were assigned to hypothetical teams that they had just joined. While we believe this would still elicit the relevant cognitive processing of team and problem-relevant information, it is likely that the networks were not as salient as they would be in a field study and the leader's actual connections and relationships may induce different, or stronger effects on their choice of collective leadership behaviors. In addition, the findings may be unique to leaders that are relatively new to a team or have limited interactions within the team network. However, as an early, exploratory study of how leaders read relevant network information when engaging in collective leadership, we feel that a controlled experiment was necessary to more easily compare basic between-subject effects. It is expected that future research will further explore the individual characteristics and interpersonal processes that are related to a leader's collective leadership behaviors.

Third, there were a number of other individual differences and situational factors that may have been related to the use of these collective leadership behaviors. For instance, social or political skills, or creativity, which are included in the original Friedrich et al. (2009) framework, or past experience and success in using collective leadership behaviors may influence a leader's likelihood of utilizing these behaviors. The individual differences that were examined, such as personality traits, could also interact with one another in their relationship to collective leadership, but evaluating these interactions was beyond the scope of the present study. The individual differences that could have been focused on was quite a lengthy list, and in order to minimize strain on the study participants we selected several key individual differences that had been identified as relevant in other research as an initial step. Further work should continue in this area to expand our understanding of what set of individual differences may be related to a leader's propensity to engage in collective leadership. Similarly, there may be other relevant situations that different forms of collective leadership may be enacted in – such as a dangerous, complex, emergent scenario, as would be seen in the military or emergency services. The situations chosen were those we felt provided enough variation to test for differences and were also scenarios that younger, less experienced leaders could engage in. Future research should examine other, applied problem scenarios.

Finally, we did not measure any performance outcomes in the present study, so judgments cannot be made as to whether the differential use of the three forms of collective leadership behaviors were tied to leader or team performance. While there is some indication from the collective leadership literature that use of collective behaviors, broadly, is related to team performance (Friedrich et al., 2014), we do not yet know if the specific forms of collective leadership effect performance differently or are more appropriate in different situations. Given our better understanding of the process that leaders go through in using these behaviors, it is recommended that future research focuses on the relationship between these types of collective leadership and performance. Despite these limitations, we believe that our findings have several important implications for theory and practice.

#### *Implications for research*

We believe that the present study makes several important contributions to leadership research. First we have extended upon the Friedrich et al. (2009) theoretical framework, as well as the first initial empirical test of it (Friedrich et al., 2014) to further understand the process of collective leadership. In particular, we made important steps in examining three specific forms of collective leadership behaviors and the different “why's” and “how's” by which they are utilized.

The study also helps us understand the conditions that may lead to the use of collective leadership. We often study how the leader's choice to share the role influences subordinate or team performance, for instance, Zhang and Bartol's (2010) finding that empowering leadership led to more subordinate creativity, but few studies have evaluated under what conditions leaders will choose to share the role, and *how* the role will be shared. In this study we evaluated three key factors that may influence the choice of collective leadership behaviors – individual leader characteristics, network characteristics and types of problems. In this vein, we also took a “leader locus” approach to studying collective leadership, which is rare amongst leadership research in the non-hierarchical domain. Finally, the method utilized a unique approach to studying network effects by manipulating experimental networks that could be controlled for specific network characteristics.

#### *Implications for practice*

Following the trend of increased research on collectivistic behaviors, there has also been an increase in recommendations to practitioners, particularly regarding the positive aspects of shared, distributed, and collective leadership (for examples, see Goldsmith, 2010; Morrison, 2013). While there is some indication that collectivistic approaches to leadership are related to team effectiveness, these findings are not consistent (Mehra et al., 2006). Adding to that, the present effort highlights the importance of looking at different types of collective leadership behaviors and their underlying mechanisms, rather than treating them as a single form of leadership. With regard to the present effort, it may be a very different type of leader that emerges and succeeds in situations that call for promoting more subtle forms of collective leadership via communication rather than encouraging Leader–Team Exchange. In addition, a leader that typically uses certain forms of collective leadership behavior may be

best suited to certain types of situations. The task and relationship oriented findings indicate that a leader may need to shift between behaviors to appropriately handle solving a task versus relationship problem in the same domain. It may also add support to the growing research on leader dyads (Hunter, Cushenbery, Fairchild, & Boatman, 2012) in which the formal role is divided by two individuals – each who might be a better leader for different types of problems.

### Conclusion

In the present effort we sought to define and evaluate several antecedents of three forms of collective leadership behaviors, and in so doing, test elements of Friedrich et al.'s (2009) collective leadership framework. The findings indicate that there are, in fact, several ways in which leaders may promote collective leadership in their team, and that these forms of collective leadership are related to different leader characteristics and are used at different rates depending on team and task characteristics.

### References

- Antonakis, J., Day, D. V., & Schyns, B. (2012). Leadership and individual differences: At the cusp of a renaissance. *The Leadership Quarterly*, 23, 643–650. <http://dx.doi.org/10.1016/j.leafqua.2012.05.002>.
- Avery, D. R., Tonidandel, S., Griffith, K. H., & Quinones, M. A. (2003). The impact of multiple measures of leader experience on leader effectiveness: New insights for leader selection. *Journal of Business Research*, 56, 673–679. [http://dx.doi.org/10.1016/S0148-2963\(01\)00312-5](http://dx.doi.org/10.1016/S0148-2963(01)00312-5).
- Balkundi, P., & Harrison, D. A. (2006). Ties, leaders, and time in teams: Strong inference about network structure's effects on team viability and performance. *Academy of Management Journal*, 49, 49–68. <http://dx.doi.org/10.5465/AMJ.2006.20785500>.
- Balkundi, P., & Kilduff, M. (2006). The ties that lead: A social network approach to leadership. *The Leadership Quarterly*, 17, 419–439. <http://dx.doi.org/10.1016/j.leafqua.2006.01.001>.
- Becker, T. E., Billings, R. S., & Eveleth, D. M. (1997). Validity of scores on three attachment style scales: Exploratory and confirmatory evidence. *Educational and Psychological Measurement*, 57, 477–493. <http://dx.doi.org/10.1177/0013164497057003009>.
- Bono, J. E., & Judge, T. A. (2004). Personality and transformational and transactional leadership: A meta-analysis. *Journal of Applied Psychology*, 89, 901–910. <http://dx.doi.org/10.1037/0021-9010.89.5.901>.
- Bors, D. A., & Forrin, B. (1995). Age, speed of information processing, recall, and fluid intelligence. *Intelligence*, 20, 229–248. [http://dx.doi.org/10.1016/0160-2896\(95\)90009-8](http://dx.doi.org/10.1016/0160-2896(95)90009-8).
- Brotheridge, C. M. (2003). The role of fairness in mediating the effects of voice and justification on stress and other outcomes in a climate of organizational change. *International Journal of Stress Management*, 10, 253–268. <http://dx.doi.org/10.1037/1072-5245.10.3.253>.
- Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning perspective for construct development and testing. *Organizational Behavior and Human Decision Processes*, 97, 117–134. <http://dx.doi.org/10.1016/j.obhdp.2005.03.002>.
- Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E., & Halpin, S. M. (2006). What type of leadership behaviors are functional in teams? A meta-analysis. *The Leadership Quarterly*, 17, 288–307. <http://dx.doi.org/10.1016/j.leafqua.2006.02.007>.
- Burt, R. S., Kilduff, M., & Tasselli, S. (2013). Social network analysis: Foundations and frontiers on advantage. *Annual Review of Psychology*, 64, 527–547. <http://dx.doi.org/10.1146/annurev-psych-113011-143828>.
- Carmeli, A., & Schaubroeck, J. (2006). Top management team behavioral integration, decision quality, and organizational decline. *The Leadership Quarterly*, 17, 441–453. <http://dx.doi.org/10.1016/j.leafqua.2006.06.001>.
- Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal*, 50, 1217–1234. <http://dx.doi.org/10.2307/AMJ.2007.20159921>.
- Carter, D. R., & DeChurch, L. A. (2012). Networks: The way forward for collectivistic leadership research. *Industrial and Organizational Psychology*, 5, 412–415. <http://dx.doi.org/10.1111/j.1754-9434.2012.01470.x>.
- Chan, K. Y., & Drasgow, F. (2001). Toward a theory of individual differences and leadership: Understanding the motivation to lead. *Journal of Applied Psychology*, 86, 481–498. <http://dx.doi.org/10.1037/0021-9010.86.3.481>.
- Chua, R. Y. J., Ingram, P., & Morris, M. W. (2008). From the head and the heart: Locating cognition-and affect-based trust in managers' professional networks. *Academy of Management Journal*, 51, 436–452. <http://dx.doi.org/10.5465/AMJ.2008.32625956>.
- Cogliser, C. C., Gardner, W. L., Gavin, M. B., & Broberg, J. C. (2012). Big five personality factors and leader emergence in virtual teams relationships with team trustworthiness, member performance contributions, and team performance. *Group & Organization Management*, 37, 752–784. <http://dx.doi.org/10.1177/105960111246426>.
- Colbert, A. E., Judge, T. A., Choi, D., & Wang, G. (2012). Assessing the trait theory of leadership using self and observer ratings of personality: The mediating role of contributions to group success. *The Leadership Quarterly*, 23, 670–685. <http://dx.doi.org/10.1016/j.leafqua.2012.03.004>.
- Contractor, N. S., DeChurch, L. A., Carson, J., Carter, D. R., & Keegan, B. (2012). The topology of collective leadership. *The Leadership Quarterly*, 23, 994–1011. <http://dx.doi.org/10.1016/j.leafqua.2012.10.010>.
- Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *The Leadership Quarterly*, 15, 857–880. <http://dx.doi.org/10.1016/j.leafqua.2004.09.001>.
- Denis, J. L., Lamothe, L., & Langley, A. (2001). The dynamics of collective leadership and strategic change in pluralistic organizations. *Academy of Management Journal*, 44, 809–837. <http://dx.doi.org/10.2307/3069417>.
- D'Innocenzo, L., Mathieu, J. E., & Kukenberger, M. R. (2014). A meta-analysis of different forms of shared leadership–team performance relations. *Journal of Management*, 20, 1–28. <http://dx.doi.org/10.1177/0149206314525205>.
- Dust, S. B., & Ziegert, J. C. (2012). When and how are multiple leaders most effective? It's complex. *Industrial and Organizational Psychology*, 5, 421–424. <http://dx.doi.org/10.1111/j.1754-9434.2012.01473.x>.
- Ensley, M. D., Hmieleski, K. M., & Pearce, C. L. (2006). The importance of vertical and shared leadership within new venture top management teams: Implications for the performance of startups. *The Leadership Quarterly*, 17, 217–231. <http://dx.doi.org/10.1016/j.leafqua.2006.02.002>.
- Falbe, C. M., & Yukl, G. (1992). Consequences for managers of using single influence tactics and combinations of tactics. *Academy of Management Journal*, 35, 638–652. <http://dx.doi.org/10.2307/256490>.
- Fiedler, F. E. (1995). Cognitive resources and leadership performance. *Applied Psychology*, 44, 5–28. <http://dx.doi.org/10.1111/j.1464-0597.1995.tb01378>.
- Fitzsimons, D., James, K. T., & Denyer, D. (2011). Alternative approaches for studying shared and distributed leadership. *International Journal of Management Reviews*, 13, 313–328. <http://dx.doi.org/10.1111/j.1468-2370.2011.00312.x>.
- Friedrich, T. L., & Mumford, M. D. (2009). The effects of conflicting information on creative thought: A source of performance improvements or decrements? *Creativity Research Journal*, 21, 265–281. <http://dx.doi.org/10.1080/10400410902861430>.
- Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Mumford, M. D., Yammarino, F. J., & Ruark, G. A. (2014). Collectivistic leadership and George C. Marshall: A historiometric analysis of career events. *The Leadership Quarterly*, 25, 449–467. <http://dx.doi.org/10.1016/j.leafqua.2013.10.012>.
- Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Ruark, G. A., & Mumford, M. D. (2009). A framework for understanding collective leadership: The selective utilization of leader and team expertise within networks. *The Leadership Quarterly*, 20, 933–958. <http://dx.doi.org/10.1016/j.leafqua.2009.09.008>.
- Frisch, M. B., & Jessop, N. S. (1989). Improving WAIS-R estimates with the Shipley-Hartford and the Wonderlic Personnel Test: Need to control for reading ability. *Psychological Reports*, 65, 923–928. <http://dx.doi.org/10.2466/pr0.1989.65.3.923>.

- Gilly, M. C., Graham, J. L., Wolfinger, M. F., & Yale, L. J. (1998). A dyadic study of interpersonal information search. *Journal of the Academy of Marketing Science*, 26, 83–100. <http://dx.doi.org/10.1177/0092070398262001>.
- Goldberg, L. R. (1992). The development of markers for the big five factor structure. *Psychological Assessment*, 4, 26–42. <http://dx.doi.org/10.1037/1040-3590.4.1.26>.
- Goldsmith, M. (May, 2010). Sharing leadership to maximize talent. *Harvard business review* (Retrieved from <https://hbr.org/2010/05/sharing-leadership-to-maximize/>).
- Gronn, P. (2002). Distributed leadership as a unit of analysis. *The Leadership Quarterly*, 13, 423–451. [http://dx.doi.org/10.1016/S1048-9843\(02\)00120-0](http://dx.doi.org/10.1016/S1048-9843(02)00120-0).
- Hauschildt, J., & Kirchner, E. (2001). Teamwork for innovation – the 'troika' of promoters. *R&D Management*, 31, 41–49. <http://dx.doi.org/10.1111/1467-9310.00195>.
- Hawkins, K. A., Faraone, S. V., Pepple, J. R., Seidman, L. J., & Tsuang, M. T. (1990). WAIS-R validation of the Wonderlic Personnel Test as a brief intelligence measure in a psychiatric sample. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 2, 198–201. <http://dx.doi.org/10.1037/1040-3590.2.2.198>.
- Hedlund, J., Forsythe, G. B., Horvath, J. A., Williams, W. M., Snook, S., & Sternberg, R. J. (2003). Identifying and assessing tacit knowledge: Understanding the practical intelligence of military leaders. *The Leadership Quarterly*, 14, 117–140. [http://dx.doi.org/10.1016/S1048-9843\(03\)00006-7](http://dx.doi.org/10.1016/S1048-9843(03)00006-7).
- Hernandez, M., Eberly, M. B., Avolio, B. J., & Johnson, M. D. (2011). The loci and mechanisms of leadership: Exploring a more comprehensive view of leadership theory. *The Leadership Quarterly*, 22, 1165–1185. <http://dx.doi.org/10.1016/j.leafqua.2011.09.009>.
- Hiller, N. J., Day, D. V., & Vance, R. J. (2006). Collective enactment of leadership roles and team effectiveness: A field study. *The Leadership Quarterly*, 17, 387–397. <http://dx.doi.org/10.1016/j.leafqua.2006.04.004>.
- Hoch, J. E. (2013). Shared leadership and innovation: The role of vertical leadership and employee integrity. *Journal of Business and Psychology*, 28, 159–174. <http://dx.doi.org/10.1007/s10869-012-9273-6>.
- Hoppe, B., & Reinel, C. (2010). Social network analysis and the evaluation of leadership networks. *The Leadership Quarterly*, 21, 600–619. <http://dx.doi.org/10.1016/j.leafqua.2010.06.004>.
- Howell, J. M., & Boies, K. (2004). Champions of technological innovation: The influence of contextual knowledge, role orientation, idea generation, and idea promotion on champion emergence. *The Leadership Quarterly*, 15, 123–143. <http://dx.doi.org/10.1016/j.leafqua.2003.12.008>.
- Hunter, S. T., Cushenbery, L., Fairchild, J., & Boatman, J. (2012). Partnerships in leading for innovation: A dyadic model of collective leadership. *Industrial and Organizational Psychology*, 5, 424–428. <http://dx.doi.org/10.1111/j.1754-9434.2012.01474.x>.
- Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: A qualitative and quantitative review. *Journal of Applied Psychology*, 87, 765–780. <http://dx.doi.org/10.1037/0021-9010.87.4.765>.
- Judge, T. A., Colbert, A. E., & Ilies, R. (2004). Intelligence and leadership: A quantitative review and test of theoretical propositions. *Journal of Applied Psychology*, 89, 542–552. <http://dx.doi.org/10.1037/0021-9010.89.3.542>.
- Kaiser, H. F. (1975). An index of factorial simplicity. *Psychometrika*, 39, 31–36.
- Kickul, J., & Neuman, G. (2000). Emergent leadership behaviors: The function of personality and cognitive ability in determining teamwork performance and KSAs. *Journal of Business and Psychology*, 15, 27–51. <http://dx.doi.org/10.1023/A:1007714801558>.
- Kilduff, M., & Tsai, W. (2006). *Social networks and organizations*. Thousand Oaks, CA: Sage Publications, Ltd.
- Kilduff, M., Crossland, C., Tsai, W., & Krackhardt, D. (2008). Organizational network perceptions versus reality: A small world after all? *Organizational Behavior and Human Decision Processes*, 107, 15–28. <http://dx.doi.org/10.1016/j.obhdp.2007.12.003>.
- Kilduff, M., Tsai, W., & Hanke, R. (2006). A paradigm too far? A dynamic stability reconsideration of the social network research program. *Academy of Management Review*, 31, 1031–1048. <http://dx.doi.org/10.5465/AMR.2006.2252816>.
- Klein, K. J., Ziegert, J. C., Knight, A. P., & Xiao, Y. (2006). Dynamic delegation: Shared, hierarchical, and deindividualized leadership in extreme action teams. *Administrative Science Quarterly*, 51, 590–621. <http://dx.doi.org/10.2189/asqu.51.4.590>.
- Konczak, L. J., Stelly, D. J., & Trusty, M. L. (2000). Defining and measuring empowering leader behaviors: Development of an upward feedback instrument. *Educational and Psychological Measurement*, 60, 301–313. <http://dx.doi.org/10.1177/00131640021970420>.
- Krackhardt, D. (1987). Cognitive social structures. *Social Networks*, 9, 109–134. [http://dx.doi.org/10.1016/0378-8733\(87\)90009-8](http://dx.doi.org/10.1016/0378-8733(87)90009-8).
- Krackhardt, D. (1990). Assessing the political landscape: Structure, cognition, and power in organizations. *Administrative Science Quarterly*, 35, 342–369. <http://dx.doi.org/10.2307/2393394>.
- Kramer, M. W. (2006). Shared leadership in a community theater group: Filling the leadership role. *Journal of Applied Communication Research*, 34, 141–162. <http://dx.doi.org/10.1080/00909880600574039>.
- Kramer, M. W., & Crespy, D. A. (2011). Communicating collaborative leadership. *The Leadership Quarterly*, 22, 1024–1037. <http://dx.doi.org/10.1016/j.leafqua.2011.07.021>.
- Leana, C. R. (1986). Predictors and consequences of delegation. *Academy of Management Journal*, 29, 754–774. <http://dx.doi.org/10.2307/255943>.
- Locke, E. A. (2003). Leadership: Starting at the top. In C. L. Pearce, & J. A. Conger (Eds.), *Shared leadership: Reframing the how's and why's of leadership* (pp. 271–284). Sage Publications.
- Lohman, D. F. (2000). Complex information processing and intelligence. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 285–340). New York: Cambridge University Press.
- Mainemelis, C., Kark, R., & Epitropaki, O. (2015). Creative leadership: A multi-context conceptualization. *The Academy of Management Annals*, 9, 393–482. <http://dx.doi.org/10.1080/19416520.2015.1024502>.
- Mathieu, J. E., Gilson, L. L., & Ruddy, T. M. (2006). Empowerment and team effectiveness: An empirical test of an integrated model. *Journal of Applied Psychology*, 91, 97–108. <http://dx.doi.org/10.1037/0021-9010.91.1.97>.
- McKelvie, S. J. (1989). The Wonderlic Personnel Test: Reliability and validity in an academic setting. *Psychological Reports*, 65, 161–162. <http://dx.doi.org/10.2466/pr0.1989.65.1.161>.
- Mehra, A., Smith, B. R., Dixon, A. L., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team performance. *The Leadership Quarterly*, 17, 232–245. <http://dx.doi.org/10.1016/j.leafqua.2006.02.003>.
- Mitchell, G. (2012). Revisiting truth or triviality the external validity of research in the psychological laboratory. *Perspectives on Psychological Science*, 7, 109–117. <http://dx.doi.org/10.1177/1745691611432343>.
- Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, 36, 5–39. <http://dx.doi.org/10.1177/014920630934737>.
- Morrison, N. (December, 2013). Two heads are better than one: A model of shared leadership. Retrieved from <http://www.forbes.com/sites/nickmorrison/2013/12/21/two-heads-are-better-than-one-a-model-of-shared-leadership/>
- Mumford, M. D., Friedrich, T. L., Caughron, J. J., & Byrne, C. L. (2007). Leader cognition in real-world settings: How do leaders think about crises? *The Leadership Quarterly*, 18, 515–543. <http://dx.doi.org/10.1016/j.leafqua.2007.09.002>.
- Mumford, M. D., Friedrich, T. L., Vessey, W. B., & Ruark, G. A. (2012). Collective leadership: Thinking about issues vis-à-vis others. *Industrial and Organizational Psychology*, 5, 408–411. <http://dx.doi.org/10.1111/j.1754-9434.2012.01469.x>.
- Nicolaidis, V. C., LaPort, K. A., Chen, T. R., Tomassetti, A. J., Weis, E. J., Zaccaro, S. J., & Cortina, J. M. (2014). The shared leadership of teams: A meta-analysis of proximal, distal, and moderating relationships. *The Leadership Quarterly*, 25, 923–942. <http://dx.doi.org/10.1016/j.leafqua.2014.06.006>.
- Pearce, C. L., & Conger, J. A. (2003). *Shared leadership: Reframing the hows and whys of leadership*. Sage Publications.
- Pearce, C. L., & Sims, H. P., Jr. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group Dynamics: Theory, Research, and Practice*, 6, 172–197. <http://dx.doi.org/10.1037/1089-2699.6.2.172>.
- Pearce, C. L., Conger, J. A., & Locke, E. A. (2007). Shared leadership theory. *The Leadership Quarterly*, 19, 622–628. <http://dx.doi.org/10.1016/j.leafqua.2008.07.005>.
- Peterson, R. S., Smith, D. B., Martorana, P. V., & Owens, P. D. (2003). The impact of chief executive officer personality on top management team dynamics: One mechanism by which leadership affects organizational performance. *Journal of Applied Psychology*, 88, 795–808. <http://dx.doi.org/10.1037/0021-9010.88.5.795>.
- Reyson, S. (2005). Construction of a new scale: The Reysen like ability scale. *Social Behavior and Personality*, 33, 201–208. <http://dx.doi.org/10.2224/sbp.2005.33.2.201>.
- Saucier, G. (2002). Orthogonal markers for orthogonal factors: The case of the big 5. *Journal of Research in Personality*, 36, 1–31. <http://dx.doi.org/10.1006/jrpe.2001.2335>.

- Sparrowe, R. T., & Liden, R. C. (2005). Two routes to influence: Integrating leader-member exchange and social network perspectives. *Administrative Science Quarterly*, 50, 505–535. <http://dx.doi.org/10.2189/asqu.50.4.505>.
- Sternberg, R. (2003). WICS: A model of leadership in organizations. *Academy of Management Learning & Education*, 2, 386–401. <http://dx.doi.org/10.5465/AMLE.2003.11902088>.
- Vincent, A. S., Decker, B. P., & Mumford, M. D. (2002). Divergent thinking, intelligence, and expertise: A test of alternative models. *Creativity Research Journal*, 14, 163–178. [http://dx.doi.org/10.1207/S15326934CRJ1402\\_4](http://dx.doi.org/10.1207/S15326934CRJ1402_4).
- Vroom, V. H., & Yetton, P. W. (1973). *Leadership and decision-making*. University of Pittsburgh Press.
- Wang, D., Waldman, D. A., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. *Journal of Applied Psychology*, 99, 181–198. <http://dx.doi.org/10.1037/a0034531>.
- Yammarino, F. J., Salas, E., Serban, A., Shirreffs, K., & Shuffler, M. L. (2012). Collectivistic leadership approaches: Putting the “we” in leadership science and practice. *Industrial and Organizational Psychology*, 5, 382–402. <http://dx.doi.org/10.1111/j.1754-9434.2012.01467.x>.
- Yammarino, F. J., Mumford, M. D., Vessey, W. B., Friedrich, T. L., Ruark, G. A., & Brunner, J. M. (2014). *Collective leadership measurement for the U.S. Army. Study report 2014–01, contract No.91WAW-09-C-0090*. Fort Belvoir, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Zaccaro, S. J., Gilbert, J. A., Thor, K. K., & Mumford, M. D. (1991). Leadership and social intelligence: Linking social perspectiveness and behavioral flexibility to leader effectiveness. *The Leadership Quarterly*, 2, 317–342. [http://dx.doi.org/10.1016/1048-9843\(91\)90018-W](http://dx.doi.org/10.1016/1048-9843(91)90018-W).
- Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: The influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Academy of Management Journal*, 53, 107–128. <http://dx.doi.org/10.5465/AMJ.2010.48037118>.