



University of Tennessee, Knoxville
**TRACE: Tennessee Research and Creative
Exchange**

[Doctoral Dissertations](#)

[Graduate School](#)

5-2007

Shared Leadership: A Social Network Analysis

Erika Engel Small

University of Tennessee - Knoxville

Follow this and additional works at: https://trace.tennessee.edu/utk_graddiss

 Part of the [Industrial and Organizational Psychology Commons](#)

Recommended Citation

Small, Erika Engel, "Shared Leadership: A Social Network Analysis. " PhD diss., University of Tennessee, 2007.

https://trace.tennessee.edu/utk_graddiss/305

This Dissertation is brought to you for free and open access by the Graduate School at TRACE: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Doctoral Dissertations by an authorized administrator of TRACE: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

To the Graduate Council:

I am submitting herewith a dissertation written by Erika Engel Small entitled "Shared Leadership: A Social Network Analysis." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Industrial and Organizational Psychology.

Joan R. Rentsch, Major Professor

We have read this dissertation and recommend its acceptance:

Robert T. Ladd, Michael C. Rush, James Wansley

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

I am submitting herewith a dissertation written by Erika Engel Small entitled “Shared Leadership: A Social Network Analysis.” I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements of Doctor of Philosophy, with a major in Industrial and Organizational Psychology.

Joan R. Rentsch, Ph.D.

Major Professor

We have read this dissertation and recommend its acceptance:

Robert T. Ladd, Ph.D.

Michael C. Rush, Ph.D.

James Wansley, Ph.D.

Accepted for the Council:

Carolyn Hodges

Vice Provost and Dean of Graduate Studies

(Original signatures are on file with official student records.)

SHARED LEADERSHIP:
A SOCIAL NETWORK ANALYSIS

A Dissertation
Presented for the
Doctor of Philosophy Degree
The University of Tennessee, Knoxville

Erika Engel Small
May 2007

ACKNOWLEDGMENTS

I would like to extend my sincere gratitude to my dissertation chair, Dr. Joan R. Rentsch. The support and guidance that she has offered during this project are indicative of the leadership that she has provided during my years as her student. I am indebted to her not only for sharing her ideas and time with me, but also for the contagious energy with which she did so. I owe a great deal of thanks to my committee members, Dr. Tom Ladd, Dr. Mike Rush, and Dr. Jim Wansley, for their willingness to contribute their time and expertise to this project.

I am also deeply thankful for the encouragement and advice of my friends, Jacqui Bergman, Shawn Bergman, and Wes Davenport. The support that they have provided – both technical and moral – is very likely the reason that I have managed to make it to the end of this process with my sanity intact. I will forever be grateful for their friendship.

Finally, I am most appreciative of the motivating force that is my husband, Ken Small. He has been my teacher, my confidant, and my inspiration. Without his constant pushing (even when I swore I did not need it), I would have likely let my frustrations and doubts overcome me.

ABSTRACT

Current leadership theory and research has centered on the attributes, behaviors, and relationships of a single leader. However, researchers now recognize the team as an alternative source of leadership. Theories of shared leadership propose that leadership is a process that can be shared among team members, and that this behavior is beneficial to team performance. The purpose of this study was not only to examine the performance benefits of shared leadership, but also to explore factors that may facilitate its development. Moreover, a social network analysis was used to measure the distribution of leadership among team members and the degree of leadership within the team, providing a richer source of information about shared leadership than the more traditionally used aggregation measurement approach. Results indicated that intragroup trust was a key predictor of both dimensions of shared leadership, which were positively related to team effectiveness. Moreover, the interaction between the two dimensions of shared leadership was significantly related to team viability. However, contrary to expectations, the direction of this interaction suggested that the distribution of leadership within the team was more strongly positively related to team viability when the degree of leadership was low rather than high. These empirical findings are among the first on the relatively new concept of shared leadership, and they draw attention to the need for further research to more fully understand the causes and consequences of shared leadership and its measurement.

TABLE OF CONTENTS

Chapter	Page
1. OVERVIEW OF PRESENT STUDY	1
2. SHARED LEADERSHIP	5
Defining the Construct.....	5
Dimensions of Shared Leadership	7
Shared Leadership Behaviors	8
3. SHARED LEADERSHIP AND TEAM EFFECTIVENESS	10
4. TRUST AND SHARED LEADERSHIP	13
5. A SOCIAL NETWORK APPROACH TO SHARED LEADERSHIP	16
6. METHOD	22
Participants.....	22
Research Environment.....	22
Measures	24
Design and Procedure	33
Missing Responses.....	33
Data Preparation.....	35
7. RESULTS	36
Descriptive Statistics and Correlations	36
Repeated Measures Framework.....	38
Tests of Hypotheses	39
8. DISCUSSION	43
Summary of Empirical Findings.....	44
Limitations	48
Strengths and Contributions.....	53
Implications and Future Research.....	54
Concluding Remarks.....	61
LIST OF REFERENCES.....	62
APPENDICES	73
VITA.....	97

LIST OF TABLES

Table	Page
1. Summary of Procedure	77
2. Team Level Descriptive Statistics and Within Time Period Correlations	78
3. Correlations among Variables in the Repeated Measures Framework.....	80
4. Variance Partitioning for Dependent Variables.....	81
5. Results of Regression Analyses for Shared Leadership Predicting Team Effectiveness.....	82
6. Results of Hierarchical Regression Analyses for the Interaction of Shared Leadership Variables Predicting Team Effectiveness	83
7. Results of Regression Analyses for Intragroup Trust Predicting Shared Leadership.....	84
8. Results of Hierarchical Regression Analysis for the Interaction of Attitude about Shared Leadership and Intragroup Trust Predicting Shared Leadership.....	85
9. Analysis of Variance for Leadership Type	86
10. Team Effectiveness Means and Standard Deviations by Leadership Type	87
11. Results of Exploratory Hierarchical Regression Analyses of the Incremental Effect of Degree of Leadership over Distribution of Leadership	88
12. Results of Exploratory Hierarchical Regression Analyses of the Incremental Effect of Distribution of Leadership over Degree of Leadership	89

CHAPTER 1

OVERVIEW OF PRESENT STUDY

Recent trends in organizational restructuring have resulted in decreasing levels of management and increasing spans of control. These conditions have fostered more team-based organizations in which teams rather than individuals are the core unit (Avolio, Jung, Murry, & Sivasubramaniam, 1996). As organizations rely more heavily on teams, the study of team development and effectiveness is becoming increasingly important (Pearce & Sims, 2000; Pearce, Yoo, & Alavi, 2004). However, not all organizations are able to successfully implement team-based structures (Pearce & Sims, 2000; Stewart & Manz, 1995). One reason often cited for the failure of team-based initiatives is the quality of team leadership (Avolio et al., 1996; Hollenbeck, Ilgen, & Segoe, 1994; Klein, 1984; Sinclair, 1992; Stewart & Manz, 1995; Yukl, 2002). According to Avolio et al. (1996), “the most critical ingredient of team success is its leadership” (p. 175).

Much has been written about leadership over the years, with theory, research, and developmental efforts typically being centered on a single leader. Within a single leader framework, leadership is said to lie in the behaviors and/or attributes of a single person – the leader (Barry, 1991; Pearce & Conger, 2003; Pearce & Manz, 2005; Yukl, 2002). This heroic leader bias has guided research and theory on leadership, much to the exclusion of alternative leadership approaches. Recently, researchers have argued that a romantic conceptualization of a single heroic leader, who is solely responsible for the triumph or downfall of organizations, is outdated and mythical (Pearce & Manz, 2005).

This is particularly true with the increasing complexity and responsibility of team tasks. It is unlikely that a single team member will possess all the leadership

competencies or fill all of the leadership roles needed by the team (Avolio et al., 1996; Barry, 1991; Conger & Pearce, 2003). Therefore, the team can serve as an alternate source of leadership in addition to the traditional vertical or appointed team leader. Consequently, leadership theory and research has begun to delve into the questions of whether, how, and to what end team members can share in the leadership of the team. As Yukl (2002) observed, “The extent to which leadership can be shared, the conditions facilitating success of shared leadership, and the implications for design of organizations are all important and interesting questions that scholars have only recently begun to investigate” (p. 432).

The present study examines a model in which trust plays a critical role in the development of shared leadership in teams. Like leadership, trust is frequently cited as a hallmark of effective teams (Dirks, 1999) and has been consistently found to be positively related to team effectiveness, either directly or indirectly through group processes (Dirks, 1999; Porter & Lilly, 1996; Simons & Peterson, 2000). In addition, a recent meta-analysis (Dirks & Ferrin, 2002) found that trust was positively and significantly related to leadership behaviors, including transformational leadership (uncorrected $r = .72$). Although much of the current leadership theory presents trust as an outcome of leadership behavior (e.g., Jung & Avolio, 2000; Podsakoff, MacKenzie, Moorman, & Fetter, 1990), the causality of the relationship between leadership and trust is unclear (Dirks & Ferrin, 2002).

I argue in the current study that trust plays a critical role in facilitating shared leadership. Shared leadership necessarily involves a very high degree of interdependence among team members, making trust vital for minimizing the risk that is inherent in such

relationships (Mayer, Davis, & Schoorman, 1995). It is risky to allow team members to have control over issues and decisions that are important for accomplishing team goals (Mayer et al., 1995). However, shared leadership requires that team members be willing to take such risks. Trust, defined as a willingness to be vulnerable to another party (Mayer et al., 1995), is an important determinant of team members' willingness to influence others and to accept influence (Zand, 1972). Therefore, in the present study, trust is considered an important antecedent of the development of shared leadership in teams.

Finally, in the present study, shared leadership in teams is approached from a social network analysis framework. Previous empirical research has primarily taken a "group-as-a-whole" or aggregation approach to measuring shared leadership (Avolio et al., 1996; Pearce & Sims, 2002; Pearce et al., 2004). In this approach, team members respond to survey items that assess the extent to which the team as a whole has engaged in leadership behaviors, and these responses are then aggregated to the team level. However, the aggregation process results in the loss of important information about the various influence relationships within the team. Social network analysis presents an alternative method of measuring shared leadership, in which the pattern of influence relationships among team members is examined (Mayo, Meindl, & Pastor, 2003; Seibert, Sparrowe, & Liden, 2003).

In summary, the purpose of the study was to test a model of the development of a shared leadership network in which trust plays a critical role. In the following sections, I will define and describe shared leadership and the leadership behaviors that are of interest in a theory of shared leadership. Then I will discuss the construct of trust as it relates to

the development of shared leadership in teams. Finally, I will describe social network analysis and its relevance to shared leadership theory and measurement. A model of the development of shared leadership in teams is proposed (see Figure 1, Appendix A) and tested. The findings are presented and discussed in terms of the implications and contributions for practice and future research.

CHAPTER 2

SHARED LEADERSHIP

Defining the Construct

Many definitions of leadership exist in the literature. However, they tend to converge on an underlying conceptualization of leadership as a process of influencing others. Yukl (2002) defines leadership as “the *process of influencing others* to understand and agree about what needs to be done and how it can be done effectively, and the process of facilitating individual and collective efforts to accomplish shared objectives” (p. 7, italics added). This definition treats leadership as both a role and a social influence process, and makes no assumptions about the direction of influence or the number of people who can perform the role (Yukl, 2002). Traditionally, leadership theories have focused on vertical leadership, in which a person who has been appointed to a position of authority exerts downward influence on subordinates. However, appointed leaders are not the only ones who can demonstrate leadership behavior. In team situations, team members can exert influence on each other and share the leadership process.

Shared leadership, also referred to as distributed leadership, is defined as a process of mutual influence, in which team members fully share in the leadership tasks of the team (Pearce & Manz, 2005; Pearce & Sims, 2000; Perry, Pearce, & Sims, 1999). It is a “team interaction process that involves behaviors in the domain of leadership” (Perry et al., 1999; p. 38). Shared leadership can be thought of as a serial emergence of multiple leaders over the life of a team (Pearce & Sims, 2002), or the simultaneous sharing of leadership responsibilities among team members (Houghton, Neck, & Manz, 2003), or even the transference of the leadership role from team member to team member, in order

to match the needs of the team to team members' knowledge, skills, and abilities (Burke, Fiore, & Salas, 2003). The key is that the team as a whole participates in the leadership process.

Shared leadership is similar to but distinct from a variety of leadership and team process concepts. This is because multiple lines of research have served as historical bases for the shared leadership concept (Pearce & Sims, 2000). Therefore, just as it is important to describe what shared leadership is, it is equally important to distinguish it from other related constructs, such as leader emergence, leader substitutes, empowerment and self-leadership, and teamwork.

First, shared leadership is often an emergent process. However, the traditional concept of leader emergence is concerned with the ultimate "appointment" of a single leader by the team. In contrast, shared leadership involves serial or simultaneous leader emergence, in which multiple team members emerge as a leader at different times or for different functions (Pearce & Sims, 2000).

Second, the leadership substitutes literature has proposed that conditions such as routinization of work can substitute for formal leadership. Although this framework has served as an historical foundation for understanding shared leadership, shared leadership is not a substitute for leadership; it is leadership (Pearce & Sims, 2000). It is an alternative source of leadership, and it is not intended to replace the traditionally studied source, vertical leadership. The relationship between these two leadership sources is an important empirical question that has yet to be answered.

Third, although decentralization of power is a primary issue in both empowerment and shared leadership, the two concepts are not synonymous (Pearce & Sims, 2000).

Empowering team members does not ensure that they will actively engage in the leadership process. Likewise, combining a group of self-leading team members does not insure the degree of collaboration and cooperation that is necessary for shared leadership (Pearce & Sims, 2000, 2002; Cox, Pearce, & Sims, 2003).

Perhaps the most difficult distinction to draw is between shared leadership and teamwork. This distinction is complicated by broad, all-encompassing definitions of teamwork. For example, Day, Gronn, and Salas (2004) defined teamwork as, “a set of interrelated and flexible cognitions, behaviors, and attitudes that are used to achieve desired mutual goals” (p. 863). Day et al. (2004) argue that shared leadership is an outcome of teamwork but also serves as an input for subsequent team process episodes (Day, Gronn, & Salas, 2004). That is, the collaboration, monitoring, and other behaviors that make up teamwork are necessary for team members to achieve the level of cooperation and common understanding of the team situation that is necessary for shared leadership to develop. Furthermore, shared leadership subsequently serves to facilitate the same teamwork processes that helped lead to its development. Thus, although they are conceptually distinct, shared leadership and teamwork are intricately intertwined developmentally.

Dimensions of Shared Leadership

Shared leadership varies along two dimensions: 1) the distribution of leadership influence and 2) the degree of leadership influence (Mayo et al., 2003). The distribution of leadership influence refers to the concentration of leadership in one versus many team members, and it can range from high to low. Leadership distribution is maximized when

leadership is attributed to all team members equally. Conversely, leadership distribution is minimized when leadership is attributed to only one team member.

Shared leadership can also be described in terms of the degree or amount of leadership in the team (Mayo et al., 2003). Like leadership distribution, the degree of leadership can range from high to low. The degree of shared leadership is high to the extent that team members attribute high levels of influence to each other. Conversely, the lower the level of influence that members attribute to one another, the lower the degree of shared leadership within the team.

Shared Leadership Behaviors

Researchers have disagreed about which leadership behaviors should be considered when examining shared leadership (Locke, 2003; Pearce & Sims, 2000, 2002). This is not surprising given the vast array of leader behavior taxonomies that have emerged over decades of leadership research. In an attempt to integrate the research on effective leader behavior, Yukl (1999, 2002) suggested a 3-dimensional taxonomy to parsimoniously classify leader behavior into broad categories.

Specifically, Yukl's (1999, 2002) taxonomy suggests that effective leaders engage in task-oriented, relations-oriented, and change-oriented behavior. Task-oriented behavior is primarily concerned with completing the task in a timely and organized manner. This type of leadership involves planning the activities of the work group, clarifying role expectations and performance goals, and monitoring the progress and quality of work (Yukl, 2002). Task-oriented leaders aim to keep the team on-task, coordinated, efficient, and productive.

Relations-oriented behavior is concerned primarily with improving relationships and cooperation among team members. This type of leadership includes showing support and concern for the needs of others, resolving conflict and maintaining harmonious relationships, and recognizing the accomplishments of others (Yukl, 2002). Relations-oriented leaders maintain a supportive, friendly, and cooperative environment.

Finally, change-oriented behavior is primarily concerned with improving flexibility and adaptability in order to facilitate change and innovation. Change-oriented leadership involves creating a new and exciting vision for the future and gaining commitment for that vision, implementing and encouraging others to experiment with new strategies and approaches, and facilitating learning (Yukl, 2002). Change-oriented leaders envision a new and different future, encourage others to think about problems differently, and create a learning and innovative environment.

Although these types of leadership behaviors have been largely discussed within a single-leader framework, there is nothing inherent in these behavior classifications that preclude them from being shared processes. The leader behavior categories included in Yukl's (1999, 2002) taxonomy do not require position power or formal authority, and are therefore applicable to leadership among peers. For example, all team members can be involved in the organization of the team's activities (task-oriented behavior), and everyone can support, encourage, and praise one another (relations-oriented behavior). Likewise, every team member can potentially contribute to the team's vision and strategic plan (change-oriented behavior). Although most research has examined these behaviors as demonstrated by a single leader, it is possible, and arguably beneficial, for all team members to engage in these behaviors.

CHAPTER 3

SHARED LEADERSHIP AND TEAM EFFECTIVENESS

The empirical research on shared leadership is scarce. However, existing empirical evidence suggests that shared leadership does exist in self-managing project teams and decision-making teams, and that it can be an important predictor of team outcomes, perhaps even more important than traditional vertical forms of leadership. Shared leadership has been found to be related to objective team performance (Bowers & Seashore, 1966), self-ratings of team effectiveness (Avolio, et al., 1996; Pearce et al., 2004), manager and customer ratings of team effectiveness (Pearce & Sims, 2002), extra effort (Avolio et al., 1996), satisfaction (Avolio et al., 1996; Bowers & Seashore, 1966), group potency (Avolio et al., 1996; Pearce et al., 2004), social integration (Pearce et al., 2004), and problem solving quality (Pearce et al., 2004).

Furthermore, in a field study of change management teams, Pearce and Sims (2002) found that shared leadership was an important predictor of team effectiveness, and was a more useful predictor than vertical leadership. Although vertical leadership was also an important predictor of team effectiveness, it did not predict incremental variance above shared leadership. Ensley, Hmieleski, and Pearce (2006) later replicated these findings using new venture executive teams. Similarly, Pearce and colleagues (2004) examined shared leadership in virtual teams and found that shared leadership was a more useful predictor of team dynamics (potency, social integration, problem-solving quality) and perceived effectiveness than was vertical leadership. In fact, none of the vertical leadership dimensions measured (i.e., directive, transactional, transformational, and empowering) was significantly related to any outcome measure, although all four shared

leadership behaviors were related to outcomes. Therefore, the empirical data suggest that shared leadership should be positively related to team effectiveness.

Hypothesis 1a: The distribution of leadership will be positively related to team effectiveness.

Hypothesis 1b: The degree of leadership will be positively related to team effectiveness.

Although both dimensions of shared leadership are hypothesized to positively influence team effectiveness, it is also proposed that the two dimensions will interact. Teams can vary from high to low on both shared leadership dimensions, and Mayo and colleagues (2003) described the possible interactive effects of these two dimensions. This interaction is illustrated in Figure 2 (see Appendix A). When the distribution of leadership is low but the degree of leadership is high, the team tends toward vertical leadership (Mayo et al., 2003). In this situation, one or a few team members are very influential in leading the team, but other team members do not contribute much to the leadership of the team. When the distribution and degree of leadership are both low, the team is leadership avoidant (Mayo et al., 2003). In this situation, leadership is concentrated in one or a few team members, but team members attribute very little influence to those individuals. Teams who are dominated by one or a few very influential members are likely to be effective in certain situations (e.g., military teams). However, teams that are highly interdependent, working on a difficult and creative task that is critical but not urgent will benefit from having all team members participate in the leadership of the team (i.e., high distribution of leadership; Cox, et al., 2003; Pearce & Manz, 2005).

When the distribution of leadership is high but the degree of leadership is low, teams experience low shared leadership (Mayo et al., 2003). Although leadership attributions are distributed among all or most team members, the overall amount of leadership is low, indicating a generally low level of participation by all team members. These teams are not likely to be as effective as teams with members who actively exert leadership influence over one another. When the distribution and degree of leadership are both high, shared leadership is maximized (Mayo et al., 2003). In these teams, all team members contribute to the leadership of the team and are active participants in this process. Consequently, the greatest performance outcomes can be expected from these teams, particularly in situations that require interdependence and creativity (Cox, et al., 2003; Mayo et al., 2003). Thus, the distribution of leadership and the degree of leadership are hypothesized have an interactive effect on team effectiveness.

Hypothesis 2: The degree of leadership within a team will moderate the relationship between leadership distribution and team effectiveness, such that the relationship will be stronger in teams with a high degree of leadership.

CHAPTER 4

TRUST AND SHARED LEADERSHIP

Trust has been defined in a variety of ways: as a personality trait (e.g., Rotter, 1967), in terms of overt trusting behaviors (e.g., Zand, 1972), or as a social reality existing only in the relationship between two individuals (e.g., Lewis & Weigert, 1985). However, the most frequently cited definition in recent trust research (Rousseau, Sitkin, Burt, & Camerer, 1998) has been that of Mayer, Davis, and Schoorman (1995), who define trust as a “willingness to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer et al., 1995, p. 712).

This conceptualization of trust as a willingness to be vulnerable distinguishes trust from its outcomes. Mayer et al. (1995) do not define trust in terms of risk-taking per se, but as a willingness to take risks in a relationship. In other words, risk-taking behavior is an outcome of trust, not trust itself. Risk-taking in a relationship (i.e., the outcome of trust) can include a variety of actions, such as sharing sensitive information, delegating tasks, and cooperating with others. Another risk-taking behavior is “voluntarily allowing the trustee control over issues that are important to the trustor” (Mayer & Davis, 1999; p. 124). Thus, trust is a willingness or intention to engage in risk-taking in a relationship with another party, and one such risk-taking behavior involves attempting to influence others and accepting influence in return (Zand, 1972).

At the team level, trust involves generalized expectations for all team members (Zand, 1972; Simons & Peterson, 2000). Intragroup trust is a generalized expectation that

other team members are honest, competent, and benevolent (Zand, 1972; Simons & Peterson, 2000). These three elements have been most frequently and consistently associated with trust (Butler, 1991; Butler & Cantrell, 1984; Mayer et al., 1995; Schindler & Thomas, 1993). At the group level, these expectations of honesty, competence, and benevolence manifest themselves as a willingness to be vulnerable to the team as a whole. Thus, intragroup trust is a willingness to engage in risk-taking within the team, and one such risk is attempting to influence team members and accepting influence in return (Zand, 1972). A high level of intragroup trust is necessary in order for team members to be willing to make themselves vulnerable by actively influencing and accepting influence from other team members.

Hypothesis 3a: Intragroup trust will be positively related to the distribution of leadership.

Hypothesis 3b: Intragroup trust will be positively related to the degree of leadership.

However, trust only becomes necessary under conditions of risk. In other words, trust will only lead to risk-taking behavior if the potential trusting parties perceive the situation as risky (Mayer et al., 1995). If the actor does not perceive a situation as potentially risky, then trust in the other party is irrelevant to his or her decision to engage in an action. Therefore, trust will only be relevant for shared leadership if team members perceive shared leadership to be risky. Given the current trend in leadership theory and education that emphasize a single heroic leader, it is likely that many people think of leadership as a role held by a single person. Because of this bias toward the leader, it may be difficult for the layperson to conceive of the team as a whole sharing in the leadership

process. Such a situation might be perceived as chaotic or unorganized at the least, and unproductive or detrimental at worst. Thus, these negative attitudes about shared leadership are analogous to the perceived risk of sharing leadership. In a situation in which team members held positive views of sharing the leadership process among team members, trust would become irrelevant because shared leadership would not be perceived as a risky behavior.

Hypothesis 4a: Attitudes about shared leadership will moderate the relationship between intragroup trust and the distribution of leadership.

Hypothesis 4b: Attitudes about shared leadership will moderate the relationship between intragroup trust and the degree of leadership.

CHAPTER 5

A SOCIAL NETWORK APPROACH TO SHARED LEADERSHIP

There are multiple methods for assessing shared leadership. The primary method used in most current empirical work (Avolio et al., 1996; Pearce & Sims, 2002; Pearce et al., 2004) is a survey-based approach using a modified version of traditional leadership items (e.g., MLQ). In this approach, items are phrased so that the group as a whole is the referent (i.e., team members are asked to indicate the degree to which team members in sum engage in leadership behaviors). Individual team members respond to the items, which are subsequently aggregated to form a group-level variable. This “group-as-a-whole” approach makes data collection relatively easy for both researchers and respondents. However, a great deal of information is lost in the aggregation process (Conger & Pearce, 2003), such as how leadership functions are distributed among team members.

Another way to approach shared leadership is to apply a social network framework (Mayo, Meindl, & Pastor, 2003; Seibert et al., 2003). A social network approach, which is an analysis of the network or pattern of social relationships, allows for the measurement of both dimensions of shared leadership (i.e., distribution and degree of leadership). Furthermore, social networks provide an appropriate framework for studying shared leadership because shared leadership necessarily involves multiple influence relationships among team members. A social network perspective can illuminate the pattern of influence relationships among team members.

A social network is defined as a set of actors who have relationships with one another (Hanneman & Riddle, 2005). The relationship among actors in a network

involves the exchange of information, influence, power, resources, or affect (Mayo et al., 2003). A network is composed of nodes (individual actors) and ties (relationships among actors). The focus however is on the relational ties among actors rather than the actors themselves (Hanneman & Riddle, 2005), such that the relationship is the “basic building block of a social network” (Mayo et al., 2003; p. 195). In a shared leadership model, the team is the network; the nodes are the individual team members; and the relational ties are the influence relationships (Mayo et al., 2003).

A network analysis provides information about each actor’s connections to other actors and the connectedness of the network as a whole (Hanneman & Riddle, 2005). In other words, an analysis of an influence network reveals the influence relationships of each individual team member and the integration of influence ties for the network as a whole. Some team members will have more influence than others, and some teams will have more integrated or well-connected influence ties than others. Thus, a social network perspective emphasizes multiple levels of analysis simultaneously (Hanneman & Riddle, 2005).

At the individual level, each team member can be more or less central in the team network. An individual’s centrality represents his or her prominence, opportunities, or status in the network, and it can be measured in a variety of ways. Degree centrality refers to the number of ties an individual has with other members of the network; an individual with more ties is more central in the network. This can be measured in terms of in-degrees (the number of ties reported by others) and out-degrees (the number of ties reported by the individual). An individual’s centrality in the network can also be measured as closeness centrality, which emphasizes the distance between the focal person

and all other members of the network. Finally, betweenness centrality measures the extent to which the focal person serves as a mediator between other un-tied network members (Hanneman & Riddle, 2005; Mayo et al., 2003).

However, the hypothesized shared leadership model describes the pattern of leadership relationships at the group level, rather than at the individual level. Specifically, the two dimensions of shared leadership (i.e., distribution and degree of leadership) can be measured using two network properties: network centralization and network density. Network centralization is a measure of the extent to which influence is concentrated in one or a few central individuals, and serves as the operationalization of the distribution dimension of shared leadership (Mayo et al., 2003). It measures the inequality of centralization of network members by describing the distribution of network ties and the extent to which they are concentrated around one or a few individuals in the network (Hanneman & Riddle, 2005; Mayo et al., 2003; Sparrowe, Liden, Wayne, & Kraimer, 2001).

For example, consider four teams, each with five members. In Team 1a, each team member attributes leadership to a different team member, such that each team member has one tie and no one team member is more central than the next (centralization = 0 or maximum leadership distribution; see Figure 2, Appendix A). In Team 2, each team member attributes leadership to all four other team members, such that each team member has four ties and no one team member is more central than the next (centralization = 0 or maximum leadership distribution; see Figure 2, Appendix A). Both cases illustrate the maximum possible distribution of shared leadership. Conversely, consider Team 3 and Team 4, in which four of the five members attribute some level of

leadership to the fifth team member. In these cases, leadership would be concentrated in the fifth team member and the team would be operating under vertical leadership conditions rather than shared leadership (see Figure 2, Appendix A).

A second network measure of interest in shared leadership is network density. Network density describes the number of ties in the network in proportion to the total number of possible ties (Hanneman & Riddle, 2005), and serves as the operationalization of the degree dimension of shared leadership (Mayo et al., 2003). It can be thought of as the mean number of ties per team member (Sparrowe et al., 2001), and it reflects the total amount or overall level of influence in the network. In a shared leadership framework, a dense network would be one in which members attribute a high level of leadership to other members (Mayo et al., 2003).

For example, consider Team 1a and Team 2 from the above example. In both teams, every team member was equally central in the influence network. However, members of Team 1a, in which each team member attributed leadership to only one team member, perceived considerably less leadership than members of Team 2, in which team members attributed leadership to all team members (see Figure 2, Appendix A). Thus, Team 2 is said to be a more dense network (i.e., a team with a higher degree of leadership) than Team 1a.

As another example, consider Team 2 (described above) in comparison to Team 1b. In both teams, all team members attribute leadership to all team members, thus maximizing shared leadership distribution. However, in Team 2, all team members engage in leadership frequently or almost all of the time, whereas in Team 1b, all team members only occasionally engage in leadership. Both cases illustrate maximum

distribution of leadership, but Team 2 demonstrates a much higher degree of leadership than Team 1b. Thus, the shared leadership network in Team 2 is much more dense. In this way, density reflects the total amount of leadership exhibited by the team (Mayo et al., 2003).

The vast amount of information that can be obtained through a network analysis is a critical benefit of exploring shared leadership in a social network framework. However, this informational benefit does not come without a cost. Sampling the full network involves gathering information about each actor's ties with all other actors, making data collection time consuming and difficult (Hanneman & Riddle, 2005). To examine shared leadership from a social network perspective, data collection involves modifying leadership questionnaire items so that each individual is measured as both the source and target of influence (Mayo et al., 2003). In other words, each team member would indicate the extent to which every other team member influenced him or her through the endorsement of multiple leadership items.

Although this type of measurement might be cumbersome for participants and require more complex analyses on the part of the researcher, it does allow for the examination of information that is lost in an aggregation method. Particularly, the data allows for an examination of the degree to which each team member is involved in the leadership process, how leadership is dispersed among members, and the influence pattern among team members (Conger & Pearce, 2003). Thus, social network analysis has the potential to provide a rich source of information about shared leadership, and is a more appropriate method of measuring the two dimensions of shared leadership (i.e., the distribution and degree of leadership). This type of analysis has been utilized in various

exchange relationships, such as advice networks (Sparrowe et al., 2001), and has been advocated as an appropriate framework for the shared leadership construct (Mayo et al., 2003; Seibert et al., 2003). However, the social network properties centralization and density have not yet been utilized in an empirical examination of the shared leadership dimensions, distribution and degree of leadership.

CHAPTER 6

METHOD

Participants

Participants were 290 undergraduate students enrolled in an upper-level business administration course at a large southeastern university. Students worked in 62 teams of four to five members on a semester-long market simulation game¹. Because the analyses were at the team level, two teams were dropped due to extensive missing data. Thus, the final sample size was 280 students working in 60 teams. Participants ranged in age from 19 to 42, with an average age of 22 (SD = 2.9). The sample consisted of 111 females (39.6%), 160 males (57.1%), and 9 individuals (3.2%) who did not report their gender. The majority of the sample (86.1%) was Caucasian. Participants reported having prior experience working with an average of 12 teams of various types (SD = 8.6). Additionally, 91.4% of the 256 participants who responded to questions about their prior leadership roles reported that they had at least one previous leadership experience.

Research Environment

The *Global Corporate Management in the Marketplace* simulation (Cadotte, 2003a) provided the research environment for testing the hypotheses. The Marketplace is a complex computer simulation that emulates the fast-paced, real-world global marketplace. Students participated in the game as part of an upper-level business administration course. The students enrolled in the course were divided into teams of four to five students. Each team took on the role of a top management team charged with starting a new manufacturing company in the microcomputer industry. Teams competed

¹ Because the results did not differ by team size, data for four- and five-member teams were combined. All subsequent results include all teams.

with each other for business in 20 international markets. To simplify the scenario and to alleviate concerns regarding the impact of differential starting points, all teams began the simulation with the same resources and market information. The simulation assumed that the PC industry was new and there was no history or other competitors outside of the teams involved in the simulation (Cadotte, 2003b).

The Marketplace was played over the course of the semester, and compressed eight quarters (two years) of simulated business in that time period. In each quarter, teams experimented with strategies and made tactical decisions in multiple areas, including marketing, manufacturing and supply chain, human resources, and finance. Teams started their companies from scratch, designed products, and developed marketing strategies for those products. Throughout the semester, they monitored their performance and adjusted their strategies in order to stay competitive (Cadotte, 2003b).

The first two quarters involved organizing the team and setting up the foundation of the company. In these quarters, teams were concerned with assigning responsibilities to team members, naming the company, developing an overall business strategy, and making tactical decisions such as brand design and plant location. In the third quarter, teams tested their strategies in a test market, elicited market research, and worked through hiring and production processes. In Quarter 4, teams received the market research data and information from the test market, which allowed them to adjust their strategies. In Quarters 5 through 8, teams continued to monitor their performance, created business plans to obtain more funding for their company, and expanded and improved their businesses (Cadotte, 2003b).

The Marketplace was deemed an appropriate setting for testing the hypothesized shared leadership model for several reasons. The intricacy and volume of decisions that must be made throughout the game required team members to work together and rely on one another to complete the tasks. The simulation required a significant amount of interaction among team members, which affords team members various opportunities to exhibit and observe leadership behavior. Furthermore, because their performance in the course depended in part on their teams' performance on the simulation, participants became engaged in the decision-making process and their teams' performance. Shared leadership is most applicable and beneficial for interdependent teams working on complex tasks that require creativity and have critical consequences (Cox et al., 2003). In addition, the Marketplace offers a fast-paced environment, another condition in which shared leadership may be beneficial (Cox et al., 2003). Thus, although the Marketplace is a simplification of real-world market conditions and performance, it nevertheless provided a sufficient setting for observing and measuring group processes.

Measures

Background information. All participants answered a short background survey (Appendix B), in which they provided demographic information (e.g., age, race, gender, GPA) and information regarding their leadership and team experience.

Attitude about shared leadership. Participants' attitudes about shared leadership were measured with 13 items developed for this study (Appendix C). Items were measured on a 5-point Likert scale (1 = *disagree strongly*; 5 = *agree strongly*), and they were scored such that high scores indicated a positive attitude toward shared leadership and low scores indicated a negative attitude toward shared leadership. Sample items

include, “A team is most productive when everyone contributes something to leading the team” and “High team performance is most likely to occur when a single person is in charge” (reverse scored). Three items from the original attitude scale were dropped as a result of a reliability analysis that indicated that these items had low item-total correlations. The final 10-item scale had an acceptable internal consistency reliability of .80.

Trust. Trust was assessed using the Intragroup Trust scale developed by Simons and Peterson (2000; Appendix D). The scale consisted of 5 items designed to measure team members’ perceptions of team-wide trust, their perceptions of the team’s expectations of honesty and integrity, and their perceptions of the competence of other team members (e.g., “We are all certain that we can fully trust each other”). Respondents indicated on a 7-point Likert scale (1 = *never*; 7 = *always*) how frequently each statement reflected what occurred on their teams as they competed in the Marketplace. The internal consistency reliability for the Intragroup Trust scale, as reported by Simons and Peterson (2000), was quite high ($\alpha = .89$; $n = 380$). This reliability estimate was similarly high in the current sample at both data collection time periods ($\alpha = .86$ and $.92$, for Time 1 and Time 2, respectively). In addition, the test-retest reliability for trust was $.42$. A paired samples t-test indicated that the mean intragroup trust score at Time 2 ($M = 6.48$) was marginally higher than the mean intragroup trust score at Time 1 ($M = 6.37$; $t(59) = -1.87$, $p = .07$). This marginal increase in trust may account for the low test-retest reliability that was observed.

Shared leadership. Leadership behavior was assessed with three 4-item scales, each measuring one of the three leader behavior categories: task-oriented, relations-

oriented, and change-oriented behavior (Appendix E). Participants rated the leadership behavior of each of their team members on a 5-point frequency scale (1 = *never*; 5 = *always*). The leader behavior measure was based on content from the Leader Behavior Description Questionnaire (LBDQ XII; Stogdill, 1963) and the Team Multifactor Leadership Questionnaire (TMLQ; Avolio, Sivasubramaniam, Murry, Jung, & Garger, 2003). Because the round-robin nature of the data collection made the assessment of leader behavior cumbersome for participants, the content of the LBDQ XII and TMLQ items were used in the development of a shorter, more condensed measure. Rather than measuring how frequently each team member engages in specific behaviors, the leader behavior measure assessed how frequently each team member engages in certain *types* of behaviors exemplified in each item. Multiple specific behaviors from the original scales were combined to create fewer, broader items assessing behavior types. Based on the instructions from the LBDQ XII, participants were asked to think about whether their teammates engaged in the types of behaviors described by each item.

Task-oriented leadership behavior was measured using 4 items developed for the study based on items from the Initiating Structure scale of the LBDQ XII (Stogdill, 1963). Initiating structure involves task-related leadership behavior, such as defining roles, organizing tasks, and maintaining performance standards. Sample initiating structure items include, “scheduled work to be done; assigned group members to particular tasks; decided what should be done and how it should be done” and “maintained definite performance standards; let group members know what was expected of them; articulated his/her expectations for the team’s performance”.

Relations-oriented leadership behavior was measured with 4 items developed for the study based on items from the Consideration scale of the LBDQ XII (Stogdill, 1963). Consideration involves relations-oriented leadership behavior, such as showing support and concern for others and behaving in a friendly manner. Sample consideration items include, “was friendly and approachable; looked out for the personal welfare of group members; did little things to make it pleasant to be a member of the group” and “treated all group members as his/her equals; acknowledged and considered suggestions from all team members ”.

Initiating structure and consideration have become relatively standard leadership categories, resulting from early research at Ohio State University (Yukl, 2002). These constructs were selected as operationalizations of task- and relations-oriented leadership because they clearly address the key leader behaviors in these areas.

Change-oriented leader behavior was measured using 4 items developed for the study based on items from the TMLQ (Avolio et al., 2003). The TMLQ was developed by adapting the single-leader Multifactor Leadership Questionnaire items to a team context (Avolio et al., 1996; Avolio et al., 2003). The transformational leadership construct was selected as the operationalization of change-oriented leadership because the facets of transformational leadership include behaviors related to envisioning, encouraging, and facilitating change.

Transformational leaders garner extra effort and extraordinary results from others by engaging in certain behaviors: inspirational leadership and idealized influence, intellectual stimulation, and individualized consideration. Idealized influence and inspirational motivation involve articulating an appealing vision and modeling

appropriate behaviors (Avolio et al., 1999). Intellectual stimulation involves encouraging others to recognize areas for improvement and question the established methods and procedures (Avolio et al., 1999). Finally, individualized consideration occurs when others' needs are given specialized attention in the form of support, guidance, or coaching (Bass, 1990). All of these behaviors focus on adapting and making improvements for the good of the group. Sample transformational leadership items include, "looked at problems differently; questioned others' strategies and decisions; encouraged rethinking of ideas" and "listened attentively to other team members; provided advice; treated others as individuals; encouraged others to develop their strengths".

A confirmatory factor analysis determined that the data for this sample did not fit this three-factor solution ($\chi^2(51, N = 1042) = 463.07$ and $427.92, p < .001$ for Time 1 and Time 2 data, respectively; RMSEA = 0.09 for both Time 1 and Time 2 data). Likewise, the results for a one-factor confirmatory factor analysis were similar, suggesting that the data was also only a moderate fit for a one-factor solution for Time 1 data ($\chi^2(54, N = 1042) = 509.63, p < .001$; RMSEA = .09) and for Time 2 data ($\chi^2(54, N = 1042) = 391.38, p < .001$; RMSEA = .08). Therefore, because the results were similar, the one-factor solution was retained for the analyses for reasons of parsimony. Additionally, the purpose of assessing multiple facets of leadership was simply to ensure that the leadership that occurred in the teams was fully captured, not to support a particular model of leadership behavior or to make differential predictions regarding the three leadership facets. Therefore, because the number of leadership behavior facets was not central to the hypotheses and because reducing the number of facets did not preclude the testing of any

hypotheses, a single leadership dimension was included in the analyses. This 12-item, single factor leadership scale had high internal consistency reliability at Time 1 and Time 2 administrations ($\alpha = .88$ and $.92$, respectively), and had a test-retest reliability of $.35$.

The leadership ratings for each team member (excluding self-ratings) were averaged across the 12 items for Time 1 and Time 2 administrations, such that there were two square matrices for each team, one for each time period. These matrices were analyzed using the UCINET 6.0 software package (Borgatti, Everett, & Freeman, 2002).

The distribution dimension of shared leadership was measured using network centralization. Centralization was calculated using Freeman's (1979) definition in the UCINET 6.0 software (Borgatti et al., 2002). First, individual centrality scores were calculated for each individual using an in-degree centrality index. In-degree centrality, as opposed to out-degree centrality, was appropriate in this study because the measurement of shared leadership involves the measurement of leadership attributed by others and is not concerned with self-ratings. In-degree centrality counts, for each team member, the leadership relationships that are reported by all other team members. Second, the sum of the differences between the largest centrality score and all other scores was computed in order to get a measurement of the differences in individual centrality scores. This was divided by the total possible sum of the differences (Wasserman & Faust, 1994). This resulted in a normalized centralization score expressed as a percentage. Larger leadership network centralization scores signify that a greater percentage of the maximum amount of variation in individual centrality scores exists. Thus, the larger the centralization score, the more centralized the team's leadership is, and the smaller the score, the more decentralized the team's leadership is. Because low leadership network centralization

scores indicate a high distribution of leadership influence, this centralization measure was transformed such that high scores would reflect the variable of interest, leadership distribution. That is, the centralization scale was inverted to reflect distribution by subtracting each observed value from the maximum centrality value in the dataset. Thus, high scores on the transformed variable represent high distribution of leadership. Consequently, all analyses were conducted using the transformed variable so that they reflect the appropriate direction of relationships with regard to leadership distribution.

The degree dimension of shared leadership was measured using the density of the leadership network. Because the leadership ratings were valued (i.e., rated on a scale of 1 to 5) as opposed to dichotomized, density was calculated as the sum of all *actual* responses (excluding self-ratings) divided by the total number of responses. This resulted in a measure of the average amount of leadership exhibited by team members (Borgatti et al., 2002).

Team effectiveness. A comprehensive assessment of team effectiveness should include evaluation of the team's current performance and the team's ability to work together in the future (Hackman, 1987; Sundstrom, DeMeuse, & Futrell, 1990). Effective teams not only produce acceptable products or make quality decisions, but they also maintain or enhance their willingness to continue working together. Therefore, the present study assessed both aspects of team effectiveness: team performance and team viability.

Objective team performance was measured using the *Marketplace* simulation's indication of total business performance. Total business performance is a "quantitative measure of the team's ability to effectively manage firm resources" (Cadotte, 2003b; p.

8). It was calculated by multiplying eight performance indicators: financial performance (i.e., profit per share of stock), market performance (i.e., average market share), marketing effectiveness (i.e., average consumer satisfaction with brand and ads), investments in the firm's future (i.e., proportion of revenues spent on activities that have a long-term payback), human resource management (i.e., employee satisfaction and productivity), asset management (i.e., total sales divided by total assets), manufacturing productivity (i.e., the product of the efficiency with which products are created and the reliability of the product), and creation of wealth (i.e., net equity divided by the total investments of the stockholders; Cadotte, 2003b). Each of these indicators was measured using data collected after each quarter of play. By combining all of these indicators, total business performance considers the team's performance in the preceding quarter and its long-term viability and future potential (Cadotte, 2003b). Therefore, total business performance is a global measure of a team's performance in all areas of the business.

A subjective measure of team performance was also obtained. Business coaches evaluated teams' effectiveness using a six-item measure developed for this study (Appendix F). At the beginning of the semester, each team was assigned a business coach, a graduate teaching assistant trained on the specifics of the simulation and on guiding teams through the process of developing their simulated businesses. The business coach served as a "Chairperson of the Board", and teams were required to meet with the coach each quarter to explain and defend their strategies and receive feedback. Thus, business coaches had a keen understanding of the teams' processes and performance. At each assessment period, business coaches indicated on a 7-point Likert scale (1 = very ineffective; 7 = very effective) how effective each team was in a variety of areas.

Consistent with the approach of Pearce and Sims (2002), the items were designed to tap six facets of effectiveness: timeliness, decision quality, adaptability, organizing and planning, interpersonal effectiveness, and creating a valued product. Sample items include: “How effective was the team in terms of maintaining healthy interpersonal relationships?” and “How effective was the team in terms of setting goals and priorities?” The internal consistency reliability estimates for this measure were high at both administrations of the measure ($\alpha = .88$ and $.91$ at Time 1 and Time 2, respectively). The test-retest reliability of the subjective performance measure was $.56$, and the mean scores did not significantly change from Time 1 ($M = 5.57$) to Time 2 ($M = 5.45$; $t(59) = -1.03$, $p = .31$).

Finally, team viability was assessed with nine items designed to measure team members’ willingness to work together in the future, their commitment to the team, and their satisfaction and involvement with the team (Organizational Research Group, 1998; Appendix G). Participants responded to the items on a 7-point scale (1 = *strongly disagree*; 7 = *strongly agree*). Sample items include: “Members give their best effort for the team” and “Team members would be willing to work with each other again.” This measure demonstrated very high internal consistency reliability estimates ($\alpha = .96$ and $.98$, at Time 1 and Time 2 administrations, respectively) and a test-retest reliability of $.50$. Additionally, a paired samples t-test indicated that the mean viability score for Time 1 ($M = 6.27$) was not significantly different from the mean Time 2 score ($M = 6.33$, $t(57) = -1.03$, $p = .31$).

Design and Procedure

Participants were assigned to teams of four to five as part of the Marketplace simulation. Data for the current study were collected at three points during the eight-quarter compressed simulation. At the beginning of the semester, participants completed a questionnaire that included only measures of individual differences (i.e., the background questionnaire and the attitude about shared leadership questionnaire). A questionnaire that included trust, leadership behavior items, and viability was administered to participants after Quarter 5 (Time 1) and after Quarter 8 (Time 2). Objective and subjective performance data were also collected following these two quarters. The data collection was begun after the fifth quarter in order to allow sufficient time for participants to adjust to their teams and the fast-paced environment in the game. See Table 1 (Appendix A) for a summary of the procedure.

Missing Responses

Because of the loss of statistical power and potential bias to parameter estimates that results from lost data (Roth, 1994), randomly missing responses in the current study were replaced using the expectation maximization (EM) method. The EM algorithm is an iterative procedure by which missing values are estimated using the covariance matrix among the variables in the data set (Enders, 2003). The covariance matrix is used to produce a series of regression equations, which are subsequently used to predict the values of the missing items. These predicted values become the estimates of the missing responses in the data (Enders, 2003).

With regard to the current study, 58 (0.3%) of the 22,120 potential item responses (not including demographic and background information) across all 280 participants were

missing due to respondents skipping items during data collection. This does not include participants who were absent at a particular survey administration, and consequently missed an entire wave of data. Rather, only missing data within each data collection wave was imputed using the EM method. Consequently, all randomly missing responses within each wave were estimated, although cases in which an entire wave of data was missing were not estimated.

Of the 280 participants in the study, eight were absent for an entire survey, six of whom were missing data on the first data collection wave at the beginning of the semester (i.e., attitude about shared leadership) and two who were missing the third wave of data collection (i.e., Time 2 intragroup trust, leadership, and viability). In these cases, the other team members for whom data was available were used when aggregating to the team level. Therefore, the individual level sample size for analyses involving attitude about shared leadership was 274 and the individual level sample size for analyses involving Time 2 viability and Time 2 trust was 278, although the team level sample size remained at 60 teams. An exception was for the two teams in which a member was absent for the administration of the leadership measure. Because the UCINET procedure requires a square matrix absent of missing responses, the measures of centrality (the operationalization of the distribution dimension of shared leadership) and density (the operationalization of the degree dimension of shared leadership) were not calculated for these two teams, resulting in a slightly smaller sample size ($n = 58$) for analyses involving these variables.

Data Preparation

An analysis of the study variables revealed that the objective performance variable was highly positively skewed. In order to meet the assumption of normality, a log transformation of the objective performance variable was computed (Tabochnick & Fidell, 2001). The transformed variable was subsequently used in all analyses.

CHAPTER 7

RESULTS

Descriptive Statistics and Correlations

After data collection, team-level variables for intragroup trust, viability, and attitude about shared leadership were created by computing the mean of the team members' individual scores for these variables. The level of within-team agreement for intragroup trust and viability was assessed using r_{wg} (James, Demaree, & Wolf, 1993). The mean r_{wg} score for intragroup trust measured at Time 1 was .95, and at Time 2 the mean r_{wg} for intragroup trust was .93. For viability, the mean r_{wg} was .94 at Time 1 and .87 at Time 2. Furthermore, although attitude about shared leadership was not considered in this study to be a team-level construct, it is important to note that the mean within-group agreement for this variable was quite high ($r_{wg} = .90$). This suggests that, although attitude about shared leadership was an individual construct aggregated to the team level in order to determine the teams' average attitude level, there was in fact a high level of agreement among team members regarding their individual attitudes about sharing the leadership among team members. Team-level scores for these variables were combined with the remaining variables (leadership distribution, leadership degree, objective team performance, and subjective team performance), which already existed at the team-level.

Means and standard deviations were calculated for all variables of interest. Pearson correlations were calculated to determine the relationships among these variables both within and between data collection time periods at the team level (Table 2; see Appendix A).

Interestingly, a paired samples t-test revealed that the degree of leadership significantly increased from Time 1 ($M = 4.27$) to Time 2 ($M = 4.46$; $t(57) = 5.41$, $p < .01$), suggesting that over time, teams reported engaging in more leadership behaviors. Similarly, the distribution of leadership significantly decreased from Time 1 ($M = 20.57$) to Time 2 ($M = 12.20$, $t(57) = -15.27$, $p < .01$). This suggests that over time, team leadership became less distributed and team members actually began to share less frequently in the leadership processes of the team.

The within time period correlations reveal that, as expected, leadership distribution was positively and significantly correlated with all three effectiveness measures at Time 1 ($r = .29$ and $r = .23$, $r = .75$ for objective performance, subjective performance, and team viability, respectively). Likewise, the distribution of leadership among team members was significantly correlated with team viability at Time 2 ($r = .67$), although the correlations with objective and subjective performance did not reach significance at Time 2 ($r = .19$, n.s. for both relationships). Thus, the more distributed the leadership within the team was, the better the team performed at Time 1 and Time 2.

Also as expected, the within-time period correlations revealed that the degree of leadership within the team was positively correlated with team viability at Time 1 ($r = .70$) and with all three team effectiveness variables at Time 2 ($r = .23$, $r = .41$, $r = .80$ for objective performance, subjective performance, and team viability, respectively). This suggests that the greater the degree of leadership the team exhibited, the better it performed.

In addition, the within time period correlations suggested a strong relationship between intragroup trust and leadership distribution ($r = .69$ and $r = .70$ at Time 1 and 2,

respectively) and the degree of leadership ($r = .73$ and $r = .76$ at Time 1 and Time 2, respectively), as expected. Furthermore, intragroup trust was also directly correlated with all three team effectiveness variables at Time 1 ($r = .26$, $r = .27$, $r = .81$ for objective performance, subjective performance, and team viability, respectively) and at Time 2 ($r = .24$, $r = .44$, $r = .91$ for objective performance, subjective performance, and team viability, respectively). This supports previous findings regarding the performance benefits of intragroup trust (Dirks, 1999; Porter & Lilly, 1996; Simons & Peterson, 2000).

Repeated Measures Framework

Although the within time period correlational results reviewed above are informative and encouraging, they are based on a sample of only 58 or 60 teams per time period. A more powerful way to analyze the data and to test the moderated model is to apply a repeated measures regression framework. Therefore, a repeated measures regression (RMR) framework was used to test the hypotheses in the present study. RMR provides a more powerful way to analyze the data and takes advantage of the multiple observations collected for each team (Cohen & Cohen, 1983; Hollenbeck, Ilgen, & Segoe, 1994). Hollenbeck et al. (1994) noted the benefits of this technique for team research in general and team leadership research in particular, given the impracticality of obtaining large sample sizes for such studies. Furthermore, this type of analysis makes testing moderation more feasible.

RMR involves “stacking” the multiple observations for each team, and then using traditional regression techniques to analyze the data, making adjustments for the fact that the observations are not independent (Mathieu, Heffner, Goodwin, Salas, & Cannon-

Bowers, 2000). This type of analysis involves partitioning the total variance into within-team variance and between-team variance, and thus allows for an examination of both between-team differences and differences that occur within teams over time.

Pearson correlations were also calculated to determine the relationships among the variables of interest within this repeated measures framework. These correlations (see Table 3, Appendix A) revealed a pattern similar to the results of the examination of the within-time period correlations. In addition, the results of the variance partitioning, which was used to adjust the effect sizes in the following hypotheses, are presented in Table 4.

Tests of Hypotheses

All hypotheses were tested within the RMR framework described above and were tested at the $p = .05$ level of significance. Hypotheses 1a and 1b proposed that the distribution and degree (respectively) of leadership would be positively related to team effectiveness. Hypothesis 1a was tested by regressing each of the team effectiveness variables (objective performance, subjective performance, and team viability) onto the distribution of leadership variable. The results of this regression analysis (see Table 5, Appendix A) were consistent with the within time period correlations. After adjusting the R^2 to account only for the variance attributable to between team differences, the results suggested that the distribution of leadership accounted for 12% of the between team variance in objective performance, 5% of the between team variance in subjective performance, and 54% of the between team variance in team viability. All of these regression models were significant ($F(1, 116) = 6.87$, $F(1, 116) = 4.65$, $F(1, 116) = 110.80$ for objective performance, subjective performance, and team viability, respectively). Therefore, Hypothesis 1a was supported, suggesting that the more

distributed the leadership among team members, the better the team performed, objectively, subjectively, and in terms of their willingness to work together in the future.

Likewise, Hypothesis 1b was tested by regressing each of the team effectiveness variables (objective performance, subjective performance, and team viability) onto the degree of leadership measure. The results of this regression analysis are also presented in Table 5 (Appendix A) and were consistent with the within time period correlation analysis. After adjusting the R^2 to account only for the variance attributable to between team differences, the results suggested that the density of the leadership network accounted for 22% of the between team variance in objective performance, 9% of the between team variance in subjective performance, and 61% of the between team variance in team viability. All of these regression models were significant ($F(1, 116) = 13.71$, $F(1, 116) = 8.22$, and $F(1, 116) = 139.08$ for objective performance, subjective performance, and team viability, respectively) providing support for Hypothesis 1b. Thus, a higher degree of leadership within the team was related to improved performance, both objective and subjective, and in terms of the team's willingness and ability to work together again.

Hypothesis 2 proposed that the degree of leadership would moderate the relationship between leadership distribution and team effectiveness. To test this Hypothesis, distribution and degree of leadership were centered and an interaction variable was created between the new centered variables. Hypothesis 2 was tested using hierarchical regression, entering leadership distribution (centered) and degree (centered) in Step 1, and the interaction term in Step 2, using each team effectiveness variable as a dependent variable in separate regressions. The results of these analyses (see Table 6, Appendix A) provided initial partial support for the interaction between leadership degree

and distribution. Specifically, the interaction term was significant for team viability ($\Delta R^2 = .03$; $F(1, 114) = 9.21$, $p < .01$) but not for objective or subjective performance.

Post hoc analyses were conducted in order to compare the relationship between the leadership distribution within the team and viability for teams with high versus low degree of leadership. High and low degree of leadership were defined as one standard deviation above and one standard deviation below (respectively) the mean score for degree of leadership. As depicted in Figure 3 (see Appendix A), the positive relationship between leadership distribution and team viability was stronger for teams with a low degree of leadership ($r = .71$, $p < .01$) than for teams with a high degree of leadership ($r = .44$, $p < .05$), although both relationships were significant. In other words, leadership distribution was more strongly positively related to team viability when the degree of leadership within the team was low rather than high. Thus, although the predicted interaction between leadership distribution and degree was significant for team viability, the direction of the interaction was opposite from what was expected. Consequently, Hypothesis 2 was not supported.

Hypotheses 3a and 3b proposed that intragroup trust would be positively related to the distribution and degree (respectively) of leadership. Hypothesis 3a was tested by regressing leadership distribution onto intragroup trust. Likewise, Hypothesis 3b was tested by regressing leadership degree onto intragroup trust. The results of these analyses are presented in Table 7 (Appendix A). As can be seen in Table 7, intragroup trust accounted for 59% of the between team variance in leadership distribution and 72% of the between team variance in the degree of leadership. Both of these regression models were significant ($F(1, 116) = 102.24$ and $F(1, 116) = 143.10$). Thus, consistent with the

within time correlation analyses, the results of the repeated measures regression analyses provide support for Hypotheses 3a and 3b. The results suggested that the higher the level of trust within the team, the more distributed the leadership was among team members and the greater the degree of leadership within the team.

Finally, Hypotheses 4a and 4b proposed that attitude about shared leadership would moderate the relationship between intragroup trust and the distribution and degree (respectively) of leadership influence. To test these hypotheses, the trust and attitude variables were centered, and an interaction term was created using the centered variables. Hierarchical regression was used to test Hypotheses 4a and 4b. For Hypothesis 4a, intragroup trust (centered) and attitude about shared leadership (centered) were entered in Step 1, and the interaction term in Step 2, using leadership distribution as the dependent variable. To test Hypothesis 4b, the same regression equation was computed, using the degree of leadership as the dependent variable. The results of these hierarchical regressions are presented in Table 8 (Appendix A). As can be seen in Table 8, the interaction between attitude about shared leadership and trust was not significant in predicting the distribution or the degree of the leadership within the team. Thus, Hypotheses 4a and 4b were not supported. Attitude did not moderate the relationship between trust and the distribution of leadership, nor did it moderate the relationship between trust and the degree of leadership in the team.

CHAPTER 8

DISCUSSION

The present study used social network analysis to examine two dimensions of shared leadership in teams: the distribution of leadership influence and the degree of leadership influence. Team members rated the amount of leadership that was exhibited by all other team members. This round-robin data was analyzed using the UCINET software in order to determine the centrality score and density score for each team. Centrality measured the extent to which leadership was concentrated in one or a few team members. Thus, low centrality scores indicated a high level of leadership distribution. Density measured the overall amount of leadership attributed to all team members, and was therefore the operationalization of the degree of leadership in the team.

The purpose of the study was to examine the outcomes and antecedents of shared leadership. Specifically, it was proposed that both shared leadership dimensions (degree and distribution) would be positively related to team effectiveness, and that these two dimensions would interact to have an effect on team effectiveness. Additionally, trust was expected to be an antecedent to shared leadership in teams. High intragroup trust was hypothesized to be positively related to the degree and to the distribution of leadership within the team. Finally, this relationship between trust and shared leadership was expected to be moderated by the team's collective attitude about shared leadership, such that the relationship was expected to be more strongly positive for teams with a negative attitude about shared leadership.

In the following sections, the empirical findings of the study are summarized. Then, the potential limitations and contributions of the study's findings are discussed. Finally, the implications for future research and for practice are highlighted.

Summary of Empirical Findings

The results of the study revealed two key findings. First, the results indicated that trust was related to both dimensions of shared leadership (degree and distribution of leadership), suggesting that trust might be an important antecedent to shared leadership in teams. Second, the degree and distribution of leadership were related to all three measures of team effectiveness (objective and subjective performance and team viability). Therefore, the amount of leadership behavior exhibited by a team and the distribution of those behaviors among team members appear to be important for the team's success.

Because intragroup trust was also directly related to all three team effectiveness variables ($r = .26, .37, .87$, for objective performance, subjective performance, and team viability, respectively), exploratory analyses were conducted to determine if the two shared leadership dimensions were mediators of this relationship. The results of these analyses suggested that the distribution and degree of leadership were partial mediators of the relationship between intragroup trust and team viability. Using Baron and Kenny's (1986) approach to testing mediation, results indicated that the relationship between trust and team viability ($b = 1.17, t(118) = 19.23, p = .00$) was significantly decreased when controlling for leadership distribution ($b = 1.00, t(115) = 12.39, p = .00$) and when controlling for degree of leadership ($b = .97, t(115) = 11.06, p = .00$). The Sobel test revealed that this change in the unstandardized beta was significant for leadership

distribution ($Z = 3.04$) and for degree of leadership ($Z = 2.97$). However, shared leadership did not mediate the relationship between intragroup trust and objective or subjective performance. Therefore, these post-hoc analyses suggested that intragroup trust affected team viability directly and indirectly through shared leadership.

As hypothesized, the distribution of leadership and the degree of leadership also interacted to affect team viability, in addition to their main effects. However, contrary to the hypothesized direction of the interaction, leadership distribution and team viability were more strongly positively related when the degree of leadership in the team was low rather than high (see Figure 3). This contradictory finding may be explained by a difference in variability in viability scores for teams with a high versus a low degree of leadership. Specifically, the coefficient of variation (i.e., the standard deviation relative to the mean) of team viability for teams with a high degree of leadership was only 5.8% compared to 12.9% for teams with a low degree of leadership. Thus, the weaker relationship between leadership distribution and team viability for teams with a high degree of leadership may have been a result of attenuation in variability in viability for these teams compared to the teams with a low degree of leadership.

In order to explore the interaction further, a one-way analysis of variance (ANOVA) was conducted in order to identify performance differences among the different leadership “types” (as named by Mayo et al., 2003) depicted in Figure 2. In order to create the four “types”, high and low levels of leadership degree and distribution were computed using a mean split for each variable, and teams were categorized according to their levels on both leadership dimensions. Interestingly, 45% of the sample were high shared leadership teams (high distribution, high degree), 18.3% were low

shared leadership teams (high distribution, low degree), 8.3% were vertically led (low distribution, high degree), and 26.7% were leadership avoidant (low distribution, low degree).

A one-way ANOVA (Table 9, Appendix A) revealed mean differences among the leadership types in objective performance ($F(3, 114) = 3.81, p < .05$) and in team viability ($F(3, 114) = 24.23, p < .01$). Post hoc Tukey honestly significant difference (HSD) comparisons (Table 10, Appendix A) revealed that for objective performance, shared leadership teams (high distribution, high degree) performed better than leadership avoidant teams (low distribution, low degree). For team viability, the differences were more complex. Tukey HSD comparisons suggested that leadership avoidant teams had significantly lower team viability than any of the other types and that shared leadership teams had significantly higher viability than low shared leadership teams (high distribution, low degree). However, shared leadership teams and vertically led teams (low distribution, high degree) were not significantly different in terms of mean team viability.

Overall, the post hoc analyses of the interaction between degree and distribution of leadership suggested that as long as teams engaged in high amounts of leadership overall (high degree), then the distribution of leadership was less important for team viability. However, when teams had an overall low level of leadership behavior, they experienced more viability if that leadership behavior was distributed across team members. Although this finding was contrary to what was hypothesized, the results of the test provide important insight into the interactive effect of the two dimensions of shared leadership, and this interaction is one that should be explored further in future empirical research.

It is important to note that the power to detect the .03 effect size associated with the interaction between distribution and degree of leadership in predicting viability was quite high (power = .88) due to the large portion of the variance in viability that was accounted for by the main effects of distribution and degree ($R^2 = .62$). However, the interaction between distribution and degree of leadership failed to predict objective and subjective performance. The main effects for distribution and degree accounted for much less of the variance in objective performance ($R^2 = .11$) and subjective performance ($R^2 = .07$), which means that the effect size for the interaction term would have to be substantially larger in order to have sufficient power in this study to detect it. The current study did not have sufficient power (power = .51 and .49 for objective and subjective performance, respectively) to detect a small effect size similar to that which was reported for viability ($\Delta R^2 = .03$). In order to have sufficient power (.at least .80; Cohen, 1988), the effect size for the interaction term in predicting both objective and subjective performance would have had to be closer to moderate in size (around .06). Therefore, lack of power may have been one reason for the lack of support for Hypothesis 2 with regard to subjective and objective performance.

The other hypothesized moderator in the current study was the team's collective attitude about shared leadership. It was proposed to moderate the relationship between trust and the two shared leadership dimensions. However, results did not support this hypothesis, nor did the findings suggest that attitude about shared leadership was related to any variable in the study. Collectivism and agreeableness were also measured for exploratory purposes and aggregated to the team level. Neither of these variables moderated the relationship between trust and shared leadership.

Because such a large amount of the variance in distribution ($R^2 = .48$) and degree ($R^2 = .56$) of leadership, the current study had sufficient power (greater than .80; Cohen, 1988) to detect a relatively small interaction effect (ΔR^2 of approximately .03), if one had existed. Thus, power does not seem to be an issue for this test. Rather, one explanation for this result may be that a team's collective attitude about shared leadership is simply not a critical component in the development of shared leadership. If this result is replicated in future research, it points toward a new direction in theory development. Research should begin to uncover other potential antecedents and moderating variables for the development of shared leadership.

Overall, the results of the study supported the proposition that trust is a key antecedent to shared leadership in teams, and that shared leadership has performance benefits for temporary, self-managing project teams.

Limitations

As is the case with any empirical investigation, there were limitations in the present study that may affect the generalizability of the findings. Limitations with respect to measurement, the research environment, potential threats to internal validity, and concerns regarding the direction of causal influence will be discussed.

Measurement issues. A key concern in the present study is the construct validity of the leadership measure. The measure was designed to measure three facets of leadership behavior (i.e., task-oriented, relations-oriented, and change-oriented), a taxonomy suggested by Yukl (1999, 2002). However, the data in the current study suggested that a one-factor solution was more parsimonious than a three-factor solution. The purpose current study was to simply tap into a variety of leadership items so as to

sufficiently capture the leadership that occurred within the teams, not to support a particular model of leadership behavior. Nonetheless, the findings regarding the leadership measure do pose questions regarding its construct validity.

The content for items measuring change-oriented leadership was derived from the transformational leadership dimension of the TMLQ (Avolio et al., 2003). The TMLQ is a team-level measure of the original single-leader MLQ developed by Bass (1985) to measure of transformational and transactional leadership. Prior research has demonstrated evidence for the construct and predictive validity of transformational leadership as a higher order facet as measured by the original MLQ (e.g., Carless, 1998; Howell & Avolio, 1993; Tejada, Scandura, & Pillai, 2001). Furthermore, although the TMLQ is a newer adaptation of the MLQ, Avolio et al. (2003) presented some initial evidence that the leadership constructs of transformational and transactional leadership defined at the individual level of analysis could be elevated to the team level. The results of their 3-part validity study suggested that the factor structure for the MLQ held at the team level for the TMLQ. Thus, the TMLQ appears to be a valid team-level equivalent to the individual level MLQ, which has been found to be a valid measure of transformational leadership.

However, prior research regarding the construct validity for the other two facets of leader behavior measured in the current study is more complex. The content for items measuring task-oriented and relations-oriented leadership behavior were derived from the initiating structure and consideration factors LBDQ XII (Stogdill, 1963). Although some evidence for the construct validity of the LBDQ (Stogdill, 1967) and its factor structure (e.g., Schriesheim and Stogdill, 1975) has been published, Tracy (1987) argued that the initiating structure and consideration scales are not independent dimensions (a contention

that was further supported in the current study). Likewise, Tracy noted that hidden dimensions might be contaminating both leadership dimensions. Specifically, Tracy (1987) found in a construct validity study of the LBDQ XII that the consideration subscale reflected judgments of good or desirable leadership, and the initiating structure subscale reflected judgments of strong or active leadership. He concluded that evidence suggests that these two scales may be valid measures of consideration and structuring behavior, but that they might be measuring attributions of leader behavior rather than true behavioral descriptions. However, for the purposes of the current study, these subscales appear to be sufficient inasmuch as they reliably and validly measure attributions of leadership behavior. However, the issue of contamination by desirability and implicit leadership theories is one that should be addressed in future studies of shared leadership in teams.

Another measurement concern is one of multicollinearity. As can be seen in Table 2 and Table 3 (Appendix A), intragroup trust and team viability were very highly related. This leaves open the potential for a lack of discriminant validity and the influence of common method variance. However, a principle components factor analysis with a non-orthogonal rotation, revealed that these two variables clearly factored apart at Time 1. At Time 2, only three of the items cross-loaded on both factors.

In addition, the two dimensions of shared leadership were also highly positively correlated ($r = .69$, see Table 3), suggesting that teams engaged in more leadership (degree of leadership) as more members participated in the leadership (leadership distribution). Although this makes conceptual, practical, and mathematical sense, it does introduce a potential methodological constraint for the social network analysis approach

to measuring shared leadership. These two dimensions are conceptually distinct, but their positive relationship represents a methodological challenge for this area of leadership. This multicollinearity will make it difficult to examine the simultaneous effects of these two dimensions of shared leadership.

Hierarchical regression analysis was used to explore the relative effects of distribution and degree of leadership on the team effectiveness variables (i.e., objective performance, subjective performance, and team viability). The findings suggested that the degree of leadership accounted for significant incremental variance in all three team effectiveness variables. Specifically, degree of leadership accounted for an additional 5%, 3%, and 13% of variance in objective performance, subjective performance, and team viability (respectively) above and beyond the variance accounted for by leadership distribution (see Table 11, Appendix A). Additionally, leadership distribution accounted for significant incremental variance in team viability (7%) beyond that accounted for by the degree of leadership in the team (see Table 12, Appendix A).

Nonetheless, the social network approach to measuring shared leadership appears to provide more valuable information than the typical aggregated “group-as-a-whole” approach. Traditional aggregated approaches measure only the degree dimension of shared leadership; they only consider how much leadership the team as a whole exhibits. The social network approach allows for the measurement of the overall amount of leadership within the team and the distribution of it. However, future research on the validity of these social network measures of leadership distribution and degree should empirically compare this measurement approach to the more traditional aggregated approach.

Research environment. Students working on the class project for this study had no history of working together and no prospect of working together after the conclusion of the semester. This may limit the generalizability of the findings to existing work teams in organizations. However, these students worked together on a semester-long project, which contributed to their grades in the course, thereby enhancing the fidelity of the situation. Nevertheless, given the nature of the teams used in this study, these results may be most applicable to newly formed teams. In addition, it is important to remember that shared leadership is a relatively new construct. Therefore, using a controlled environment is a conservative way to begin research in such a new field.

History effects. Given the longitudinal nature of the study and the field-study research environment, there is always the possibility that history effects may have threatened the internal validity of the study (Cook & Campbell, 1979). It is nearly impossible to control for the possibility that the results of the study were due to some outside event that occurred between Time 1 and Time 2 data collection periods. The external validity gained by using a field study as opposed to laboratory research does come with the potential cost to internal validity. Therefore, it is possible that the results of the study were partially attributable to events outside of the study that occurred during the semester. However, perhaps the relatively large sample size served to minimize that possibility.

Direction of causal influence. Although the repeated measures multiple regression framework for analyzing the data improves the power of the hypothesis tests, it also calls into question the direction of causal influence for the reported relationships. However, the relationships appeared to hold when examined across time periods. Specifically,

intragroup trust measured at Time 1 was significantly correlated with the degree and distribution of leadership measured at Time 2 ($r = .66$ and $.43$, respectively), providing additional support for Hypothesis 3. Likewise, supporting Hypothesis 1, Time 1 leadership distribution was significantly related to objective and subjective performance and team viability measured at Time 2 ($r = .32, .39, .53$, respectively), as was the degree of leadership ($r = .24, .37, .45$, respectively). These cross-time period results suggested that the hypothesized direction of causal influence was supported.

Similarly, the results for Hypothesis 2 were unchanged when using Time 2 criteria and Time 1 shared leadership variables. As was the case with the repeated measures multiple regression analyses, the interaction between distribution and degree of leadership was significant only for team viability. Likewise, findings regarding Hypothesis 4 also remained unchanged when using Time 1 trust variables and Time 2 shared leadership variables. The hypothesized interaction between trust and attitude about shared leadership were unsupported when examining the cross-time period results. However, these cross-time period analyses in sum provide support for causal influences that were hypothesized.

Strengths and Contributions

Shared leadership is a relatively new construct, only in its infancy in terms of theoretical development and empirical investigation. The current study adds to this small body of literature in both areas. Theoretically, the study introduced intragroup trust as a potential antecedent of shared leadership in teams. Trust has been widely considered a critical component to teamwork, and the present study extends this notion by also exemplifying its importance in the distribution of leadership behavior. The theoretical

and empirical research on antecedents of shared leadership is virtually nonexistent.

Therefore, this study makes a significant contribution toward advancing the nomological net for shared leadership. Likewise, this study adds to the small but growing empirical literature on the outcomes of shared leadership, the effects that shared leadership has on team effectiveness.

The present research also makes methodological contributions to the literature. Due to the difficult nature of data collection, longitudinal studies in the areas of teams and leadership are not common. The current study utilized a repeated measures regression data analysis framework in order to take advantage of the longitudinal nature of this quasi-field data. However, the most significant methodological contribution made was the use of network analysis. The present study was one of the first empirical studies of both dimensions of shared leadership using the network analysis approach as suggested by Mayo et al. (2003). The social network approach has the potential to provide additional information about the way in which leadership is shared among team members and the influence networks that exist within the team. This approach to measuring shared leadership has been discussed in recent publications, but empirical examinations of the interaction of both shared leadership dimensions using this measurement approach have yet to be published. Therefore, this study makes a significant contribution to the literature regarding the empirical use of social network analysis in the measurement of shared leadership.

Implications and Future Research

The current study has implications for practice and future field research. From a practical standpoint, the study suggests that organizations that utilize project teams may

benefit from training and/or encouraging employees to share in the leadership of the team. The results of the study suggested that the distribution and degree of leadership within the team had positive effects on team performance, both objectively and subjectively measured, and on the ability and willingness of team members to work together in the future. Therefore, organizations may consider team-oriented leadership training to facilitate the distribution of leadership behaviors among team members. The current findings also suggested that this distribution training might be particularly important for teams in which team members on the whole do not frequently engage in leadership behaviors (i.e., teams that experience a low degree of leadership). Furthermore, part of this training should focus on the importance of trust building among team members, according to these research findings.

In addition to the practical application of these findings, the results pave the way for many avenues of future research in this area. First, the study gives merit to the fledgling concept of shared leadership. This new construct, still in the infancy of its theoretical development, deserves more research attention and empirical examination. The results of the study have provided support for the potential performance benefits of shared leadership. However, future research should begin to examine how these positive effects are garnered (i.e., the processes through which shared leadership produces performance benefits). Perhaps shared leadership results in increased cohesion or in motivational outcomes such as identification with the team or improved collective efficacy, and these outcomes subsequently engender high team performance. Similarly, researchers have also hypothesized that certain moderating factors such as communication skills (O'Toole, Galbraith, & Lawler, 2003) and task interdependence

(Cox, Pearce, & Perry, 2003) may improve the odds that shared leadership will be effective. Thus, the question of the “black box” through which shared leadership produces team performance benefits is one that future research should begin to address empirically.

Likewise, the question of how the leadership responsibilities are shared has yet to be answered. Researchers should begin to focus on the way in which the leadership behaviors distributed among team members, whether a fluid changing of hands of the team’s leadership from person to person over the life of a team (Pearce & Sims, 2002); or a simultaneous sharing of responsibilities by all team members as needs arise (Houghton et al., 2003); or an assigning of roles such that some team members are relationship team leaders, others task team leaders, and others change-oriented team leaders (Burke et al, 2003). These questions were beyond the scope of the current research, but are nonetheless critical questions to be answered in the theoretical development of the construct of shared leadership. Thus, research, theoretical and empirical, is needed to examine the process of shared leadership.

Similarly, future research should also address the evolution of the leadership network over time. The results of the current study suggested that there might be some dynamic process occurring within teams across time. For example, paired sample t-tests showed that leadership degree increased over time, while leadership distribution degreed. Furthermore, although both dimensions of shared leadership were related to team viability across both time periods, the relationships with objective and subjective performance varied. Specifically, distribution of leadership was positively related to objective and subjective performance at Time 1, but unrelated at Time 2. However, the

results for leadership degree were the opposite: degree of leadership was unrelated to objective and subjective performance at Time 1, but was significantly related to both at Time 2 (see Table 2, Appendix A). These findings suggest that the nature of the leadership changes within teams over time, as does the relative importance of each shared leadership dimension. Thus, the leadership processes within the team may change alongside the team's developmental processes. In other words, in the beginning of their developmental processes, it may be important for the team's development for all team members to be engaged in the team's leadership and decisions regarding the team. However, as the team develops, team members become aware of each other's abilities, skills, and motivations. Consequently, the leadership needs of the team may change, or perhaps team members may simply better understand these needs. These changes may subsequently result in a transformation in the team's leadership structure. Thus, the results of the current study suggest that future research should begin to address these issues regarding the development of shared leadership in teams over time.

As these questions of the process of shared leadership are addressed, researchers can begin to develop a better understanding of how best to measure it. Therefore, research on the measurement of shared leadership should develop alongside research on how it occurs. One measurement issue that needs to be addressed in future research is the construct validity of the leadership measure of interest. As previously discussed, the measure of leadership that was used in the current study was based on previously validated measures of leader behavior. However, it is possible that these measures become contaminated by factors such as liking and desirability when examining the social networks with regard to leadership. For example, Morris and Hackman (1967)

found that the prime index of perceived leadership was participation in the group's tasks; team members who were active participants were perceived as leaders by their teammates. Thus, it is possible that in the current study, team members who were active participants were rated highly on the leadership behavior items, regardless of the content of their participation. In the current study, it was not possible to partial out activity level or liking in order to determine the effects of these potential contaminators on the leadership network. However, future research should address the influence that these perceptual biases might have on the relationship between shared leadership and criteria. Doing so will strengthen the argument that what is being measured is in fact a leadership network as opposed to a network of friendship, liking, or popularity.

Another methodological avenue for future research is in level of analysis. The current study analyzed shared leadership strictly at the group level. However, future research should explore potential cross-level effects of shared leadership. For example, Bligh, Pearce, and Kohles (2006) propose that self-leadership is an indirect antecedent to shared leadership, through its effects on individual-level and team-level trust, efficacy, and commitment. Furthermore, shared leadership may also have effects on individual-level outcomes (e.g., motivation, satisfaction) in addition to team performance. Future research should begin to examine these cross-level relationships in addition to the group level effects that are currently the focus of empirical work.

Furthermore, the current study highlighted the key role that trust plays in team dynamics in general and shared leadership in particular. However, trust is certainly not the only antecedent of shared leadership in teams. Future research should continue to explore other antecedents and persist in the development of a more complete model of

shared leadership. It was hypothesized that team members' attitudes about shared leadership would moderate the relationship between trust and shared leadership. Although the lack of support for this hypothesis was disappointing, it points toward the need to explore other potential contributing factors, both direct and moderating, to shared leadership. Understanding the antecedents of shared leadership is vital in being able to make practical use of our knowledge about its benefits.

One category of variables that may play a role in the prediction of shared leadership is team composition. Team composition factors were largely unexplored in the current study, with the exception of the measurement of team members' attitudes about shared leadership. The composition of the team, in terms of demographics, personality, and skills and abilities, could have an effect on the team's ability and willingness to share the leadership responsibilities among team members. For example, if age is a component of team members' prototypes for leadership, then the composition of age may play a role in the willingness of the team members to share the team's leadership. In other words, if age implies authority and leadership for a particular team, and that team is composed of one member who is noticeably older than the rest, that team may be less likely to share leadership and more likely to adopt a more centralized leadership structure with the older member at the top of the hierarchy. Additionally, personality composition may also play a role. For example, if a team member with a high need for power is working with a team of low need for power individuals, it may be more likely that that team will adopt a more centralized leadership network as opposed to a distributed one. These effects of team composition currently remain unexamined; although other researchers (e.g., Cox, Pearce, & Perry, 2003) have hypothesized that diversity among team members will inhibit the

development of shared leadership in teams. Therefore, the effect of team composition on shared leadership is another area ripe for future exploration.

Finally, the current study utilized project teams, in which team members were peers of equal status. It is possible that only certain types of teams may benefit from sharing the leadership responsibilities among team members. In addition to the project team type examined in the current study, other teams types, using Cohen and Bailey's (1997) typology, could also potentially benefit from shared leadership. For example, it is not difficult to conceive of how work teams, the type of team that most people think of when they talk about teams, with stable and full-time membership, could benefit from sharing in the leadership responsibilities among team members, particularly if they are self-managing teams of cross-trained workers. Likewise, cross-functional parallel teams used for improvement or problem solving activities could also likely benefit if leadership behaviors were distributed among team members. Also, management teams, with the right composition of team members, could be expected to garner performance benefits from sharing the leadership role.

However, some team types, such as some of those that fall in Sundstrom et al.'s (1990) category of action and negotiation teams, may benefit instead from a more centralized leadership network. For example, surgical teams may be better off with a single person assuming the team's leadership responsibilities and "calling the shots," albeit with considerable cooperation and interdependence from the rest of the team (one hopes). Likewise, military teams may not incur benefits from the sharing of leadership responsibilities among team members given unpredictable circumstances in which they work and the intense, improvisational nature of their tasks. The effects that shared

leadership might have in these all of these types of teams are yet unknown. Therefore, the role of team type in the shared leadership model should be examined.

Concluding Remarks

In summary, this study improved our knowledge of some of the causes and benefits of shared leadership in teams. Trust appears to be a key contributor not only to team effectiveness in general, but also to the amount and distribution of leadership behavior within the team, which itself appears to be beneficial to team performance and viability. The ineffectiveness of attitude about shared leadership as a contributing factor was disappointing, but highlighted the need for future research to uncover other potential antecedents to shared leadership in teams. Using a network analysis approach to shared leadership, despite its potential negative side effects, may also be a fruitful avenue for future research in the area of shared leadership. Given the youth of this line of research, the avenues for future research are virtually limitless; given the initial positive results regarding the benefits of shared leadership, it is imperative that we explore them.

LIST OF REFERENCES

List of References

- Avolio, B. J., Bass, B. M., & Jung, D. I. (1999). Re-examining the components of transformational and transactional leadership using the multifactor leadership questionnaire. *Journal of Occupational and Organizational Psychology*, 72, 441-462.
- Avolio, B. J., Jung, D. L., Murry, W., & Sivasubramaniam, N. (1996). Building highly developed teams: Focusing on shared leadership processes, efficacy, trust, and performance. In M. Beyerlein, D. Johnson, & S. Beyerlein (Eds.), *Advances in interdisciplinary studies of work teams: Team leadership* (Vol. 3, pp. 173-209). Greenwich, CT: JAI Press.
- Avolio, B. J., Sivasubramaniam, N., Murry, W. D., Jung, D., & Garger, J. W. (2003). Assessing shared leadership: Development and preliminary validation of a team multifactor leadership questionnaire. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 143-172). Thousand Oaks: Sage.
- Barron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Barry, D. (1991). Managing the bossless team: Lessons in distributed leadership. *Organizational Dynamics*, 21(1), 31-47.
- Bass, B. M. (1985). *Leadership and Performance Beyond Expectations*. New York: Free Press.

- Bass, B. M. (1990). From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, 18(3), 19-31.
- Bligh, M. C., Pearce, C. L., & Kohles, J. C. (2006). The importance of self- and shared leadership in team based knowledge work. *Journal of Managerial Psychology*, 21, 296-318.
- Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). UCINET for Windows: Software for social network analysis (Version 6). Harvard, MA: Analytic Technologies.
- Bowers, D. G. & Seashore, S. E. (1966). Predicting organizational effectiveness with a four-factor theory of leadership. *Administrative Science Quarterly*, 11(2), 238-263.
- Burke, C. S., Fiore, S. M., & Salas, E. (2003). The role of shared cognition in enabling shared leadership and team adaptability. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 103-122). Thousand Oaks: Sage.
- Butler, J. K. (1991). Toward understanding and measuring conditions of trust: Evolution of a conditions of trust inventory. *Journal of Management*, 17, 643-663.
- Butler, J. K. & Cantrell, R. S. (1984). A behavioral decision theory approach to modeling dyadic trust in superiors and subordinates. *Psychological Reports*, 55, 19-28.
- Cadotte, E. R. (2003a). *Global Corporate Management in the Marketplace* [computer simulation]. Knoxville, TN: Innovative Learning Solutions, Inc.

- Cadotte, E. R. (2003b). Overview. In E. R. Cadotte & H. J. Bruce (Eds.), *The Management of Strategy in the Marketplace* (pp. 1-13). Cincinnati, Ohio: South-Western College Publishing.
- Carless, S. A. (1998). Assessing the discriminant validity of transformational leader behaviour as measured by the MLQ. *Journal of Occupational and Organizational Psychology, 71*, 353-358.
- Cohen, S. G. & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management, 23*, 239-290.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Cohen, J. & Cohen, P. (1983). *Applied multiple regression/correlational analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Colquitt, J. A., Noe, R. A., & Jackson, C. L. (2002). Justice in teams: Antecedents and consequences of procedural justice climate. *Personnel Psychology, 55*, 83-109.
- Conger, J. A. & Pearce, C. L. (2003). A landscape of opportunities: Future research on shared leadership. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 285-303). Thousand Oaks: Sage.
- Cook, T. D. & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Boston: Houghton Mifflin.
- Cox, J. F., Pearce, C. L., & Perry, M. L. (2003). Toward a model of shared leadership and distributed influence in the innovation process. In C. L. Pearce & J. A. Conger

- (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 48-76). Thousand Oaks: Sage.
- Cox, J. F., Pearce, C. L., & Sims, H. P., Jr. (2003). Toward a broader leadership development agenda: Extending the traditional transactional-transformational duality by developing directive, empowering, and shared leadership skills. In S. Murphy & R. E. Riggio (Eds.), *The future of leadership development*. Mahwah, NJ: Lawrence Erlbaum.
- Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *Leadership Quarterly, 15*, 857-880.
- Dirks (1999). The effects of interpersonal trust on work group performance. *Journal of Applied Psychology, 84*, 445-455.
- Dirks, K. T., & Ferrin, D. L. (2002). Trust in leadership: Meta-analytic findings and implications for research and practice. *Journal of Applied Psychology, 87*(4), 611-628.
- Enders, C. K. (2003). Using the expectation maximization algorithm to estimate coefficient alpha for scales with item-level missing data. *Psychological Methods, 8*, 322-337.
- Ensley, M. D., Hmieleski, K. M., & Pearce, C. L. (2006). The importance of vertical and shared leadership within top management teams: Implications for the performance of startups. *Leadership Quarterly, 17*, 217-231.
- Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks, 1*, 215-239.

- Goldberg, L. R. (1992). The Development of Markers for the Big-Five Factor Structure. *Psychological Assessment, 4*, 26-42.
- Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315-342). Englewood Cliffs: Prentice Hall.
- Hanneman, R. A. & Riddle, M. (2005). *Introduction to social network methods*.
Riverside, CA: University of California, Riverside.
- Hollenbeck, J. R., Ilgen, D. R., & Segoe, D. J. (1994). Repeated measures regression and mediational tests: Enhancing the power of leadership research. *Leadership Quarterly, 5*, 3-23.
- Houghton, J. D., Neck, C. P., & Manz, C. C. (2003). Self-leadership and superleadership: The heart and art of creating shared leadership in teams. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 123-140). Thousand Oaks: Sage.
- Howell, J. M. & Avolio, B. J. (1993). Transformational leadership, transactional leadership, locus of control, and support for innovation: Key predictors of consolidated-business-unit performance. *Journal of Applied Psychology, 78*, 891-902.
- James, L. R., Demaree, R. G., & Wolf, G. (1993). r_{wg} : An assessment of within-group interrater agreement. *Journal of Applied Psychology, 78*(2), 306-309.
- Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems, 14*, 29-64.

- Jung, D. K., & Avolio, B. J. (2000). Opening the black box: An experimental investigation of the mediating effects of trust and value congruence on transformational leadership and transactional leadership. *Journal of Organizational Behavior, 21*, 949-964.
- Klein, J. A. (1984). Why supervisors resist employee involvement. *Harvard Business Review, 62*(5), 87-95.
- Lewis, J. D. & Weigert, A. (1985). Trust as a social reality. *Social Forces, 63*(4), 967-985.
- Locke, E. A. (2003). Leadership: Starting at the top. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 271-284). Thousand Oaks: Sage.
- Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E. & Cannon-Bowers, J.A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85*, 273-283.
- Mayer, R. C. & Davis, J. H. (1999). The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of Applied Psychology, 84*, 123-136.
- Mayer, R. C., Davis, J. H., and Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review, 20*, 709-734.
- Mayo, M., Meindl, J. R., & Pastor, J. (2003). Shared leadership in work teams. A social network approach. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 193-214). Thousand Oaks: Sage.

- Morris, C. G. & Hackman, J. R. (1969). Behavioral correlates of perceived leadership. *Journal of Personality and Social Psychology, 13*, 350-361.
- O'Toole, J., Galbraith, J., & Lawler, E. E. (2003). The promise and pitfalls of shared leadership: When two (or more) heads are better than one. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 250-267). Thousand Oaks: Sage.
- Pearce, C. L. & Conger, J. A. (2003). All those years ago: The historical underpinnings of shared leadership. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 1-18). Thousand Oaks: Sage.
- Pearce, C. L. & Manz, C. C. (2005). The new silver bullets of leadership: The importance of self-and shared leadership in knowledge work. *Organizational Dynamics, 34*, 130-140.
- Pearce, C. L., & Sims, H. P., Jr. (2000). Shared leadership: Toward a multi-level theory of leadership. In M. Beyerlein, D. Johnson, & S. Beyerlein (Eds.), *Advances in interdisciplinary studies of work teams* (Vol. 7, pp. 115-139). New York: JAI Press.
- Pearce, C. L., & Sims, H. P., Jr. (2002). Vertical vs. 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*(2), 172-197.
- Pearce, C. L., Yoo, Y., & Alavi, M. (2004). Leadership, social work, and virtual teams: The relative influence of vertical vs. shared leadership in the nonprofit sector. In

- R. E. Riggio and S. Smith Orr (Eds.), *Improving leadership in nonprofit organizations*. San Francisco: Jossey-Bass.
- Perry, M. L., Pearce, C. L., & Sims, H. P., Jr. (1999, Summer). Empowered selling teams: How shared leadership can contribute to selling team outcomes. *Journal of Personal Selling and Sales Management*, 3, 35-51.
- Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly*, 1(2), 107-142.
- Porter, T. W. & Lilly, B. S. (1996). The effects of conflict, trust, and task commitment on project team performance. *The International Journal of Conflict Management*, 7, 361-376.
- Roth, P. L. (1994). Missing data: A conceptual review for applied psychologists. *Personnel Psychology*, 47, 537-560.
- Rotter, J. B. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality*, 35, 651-665.
- Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, 23, 393-404.
- Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar Big Five markers. *Journal of Personality and Assessment*, 63, 506-516.
- Schindler, P. L. & Thomas, C. C. (1993). The structure of interpersonal trust in the workplace. *Psychological Reports*, 73, 563-573.

- Schriesheim, C. A. & Stogdill, R. M. (1975). Differences in factor structure across three versions of the Ohio State leadership scales. *Personnel Psychology*, 28, 189-206.
- Siebert, S. E., Sparrowe, R. T., & Liden, R. C. (2003). A group exchange approach to leadership in groups. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 173-192). Thousand Oaks: Sage.
- Simons, T. L., & Peterson, R. S. (2000). Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust. *Journal of Applied Psychology*, 85(1), 102-111.
- Sinclair, A. (1992). The tyranny of a team ideology. *Organization Studies*, 13(4), 611-626.
- Sparrowe, R. T., Liden, R. C., Wayne, S. J., & Kraimer, M. L. (2001). Social networks and the performance of individuals and groups. *Academy of Management Journal*, 44, 316-325.
- SPSS, Inc. (2003). *SPSS base 12.0 user's guide*. Chicago, IL: SPSS Inc.
- Stewart, G. L., & Manz, C. C. (1995). Leadership for self-managing work teams: A typology and integrative model. *Human Relations*, 48(7), 747-770.
- Stogdill, R. M. (1963). *Manual for the Leader Behavior Description Questionnaire--Form XII*. Columbus, OH: The Ohio State University, Bureau of Business Research, College of Commerce and Administration.
- Stogdill, R. M. (1969). Validity of leader behavior descriptions. *Personnel Psychology*, 22, 153-158.
- Sundstrom, E., DeMeuse, K. P., & Futrell, D. (1990). Work teams: Applications and effectiveness. *American Psychologist*, 45, 120-133.

- Tabochnick, B.G. & Fidell, L.S. (2001). Using multivariate statistics. Boston: Allyn and Bacon.
- Tejada, M. J., Scandura, T. A., & Pillai, R. (2001). The MLQ revisited: Psychometric properties and recommendations. *Leadership Quarterly*, 12, 31-52.
- Tracy, L. (1987). Consideration and Initiating Structure: Are they basic dimensions of leader behavior? *Social Behavior and Personality*, 15, 21-33.
- Wagner, J. A., III (1995). Studies of individualism-collectivism: Effects on cooperation in groups. *Academy of Management Journal*, 38, 152-172.
- Wasserman, S. & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, England. Cambridge University Press.
- Yukl, G. (2002). *Leadership in organizations* (5th edition). Upper Saddle River, NJ: Prentice Hall.
- Yukl, G. (1999). An evaluative essay on current conceptions of effective leadership. *European Journal of Work and Organizational Psychology*, 8, 33-48.
- Zand, D. E. (1972). Trust and managerial problem solving. *Administrative Science Quarterly*, 17, 229-239.

APPENDICES

Appendix A

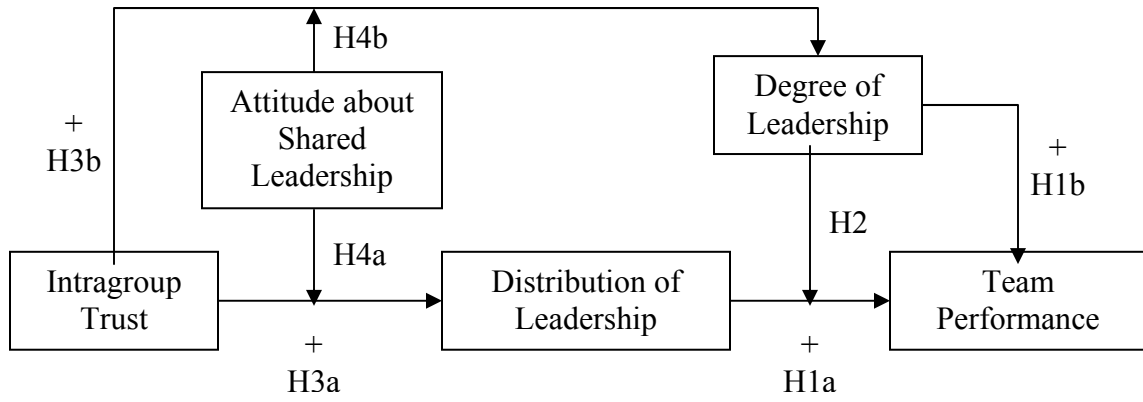


Figure 1. Heuristic of Hypotheses

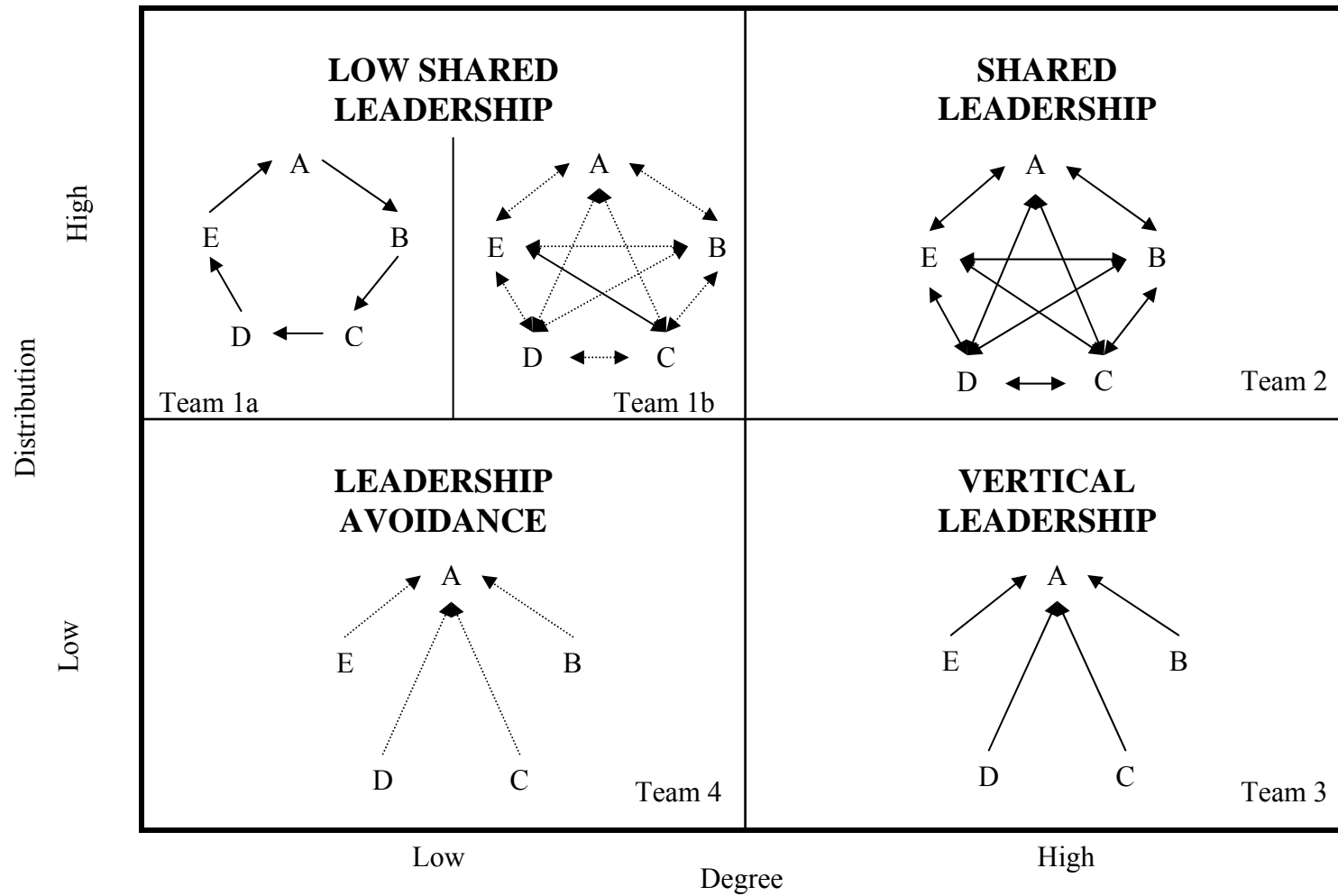


Figure 2. Interaction between distribution and degree of leadership.

Note. Solid lines indicate high levels of attributed leadership. Dotted lines indicate low levels of attributed leadership. Adapted from “Shared Leadership in Work Team” by M. Mayo, J.R. Meindl, and J.C. Pastor, 2003. In C.L. Conger and J. A. Pearce (Eds.), *Shared Leadership: Reframing the Hows and Whys of Leadership* (p. 206). Thousand Oaks: Sage.

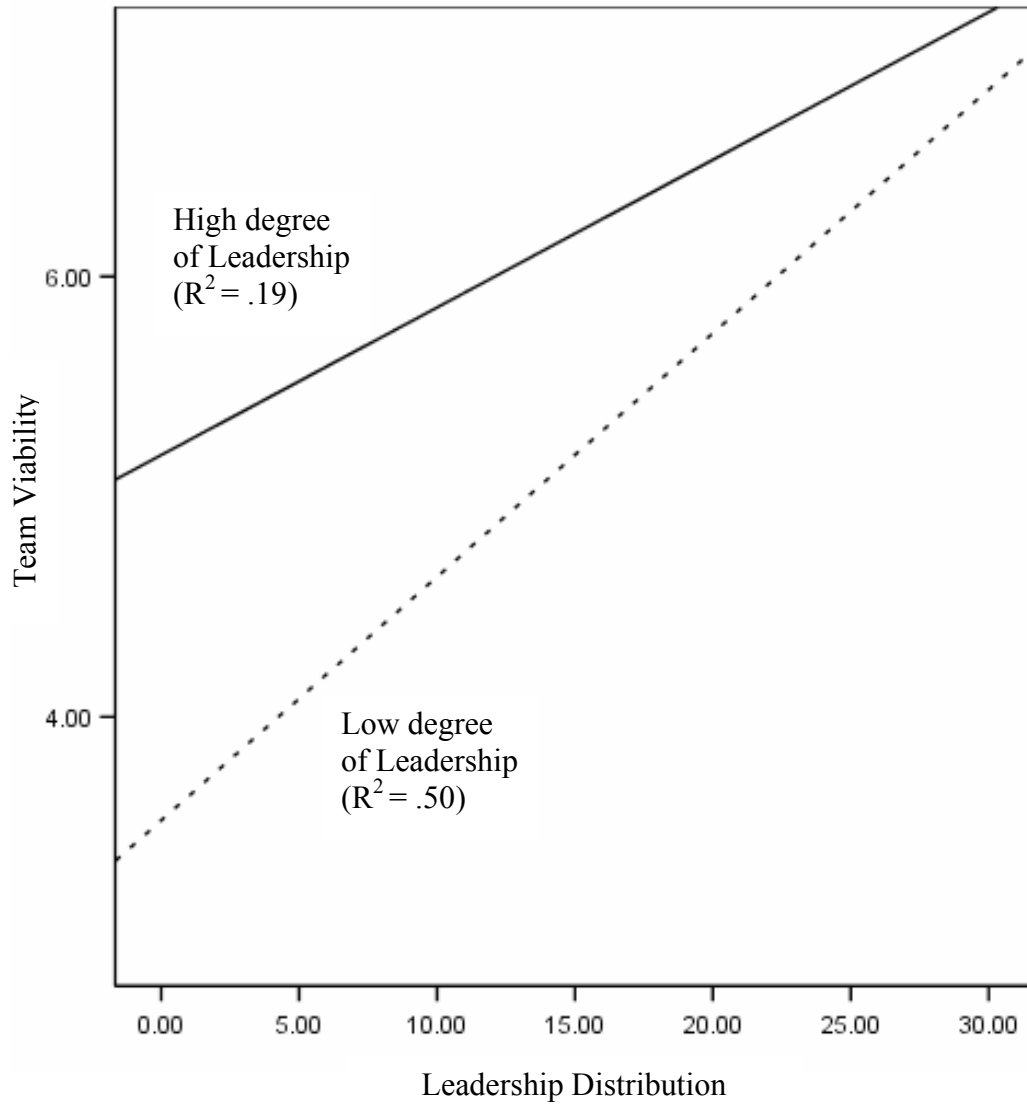


Figure 3. Interaction between degree of leadership and distribution of leadership

Table 1

Summary of Procedure

Time	Variables collected
Start of Semester	Background survey Attitude about shared leadership
After Quarter 5	Time 1 team member survey <ul style="list-style-type: none"> • Leadership behaviors • Intragroup trust • Viability Time 1 objective performance computed Time 1 business coach effectiveness ratings collected
After Quarter 8 (End of Semester)	Time 2 team member survey <ul style="list-style-type: none"> • Leadership behaviors • Intragroup trust • Viability Time 2 objective performance computed Time 2 business coach effectiveness ratings collected

Table 2

Team Level Descriptive Statistics and Within Time Period Correlations

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Attitude about Shared Leadership	2.80	.31	.80						
Time 1									
2. Intragroup Trust	6.37	.42	.10	.86					
3. Distribution of Leadership	20.59	4.22	-.19	.69**	--				
4. Degree of Leadership	4.26	.29	-.08	.73**	.70**	--			
5. Objective Performance ^a	2.28	5.88	-.04	.26*	.29*	.19	--		
6. Subjective Performance	5.57	.94	.02	.27*	.23*	.13	.40**	.88	
7. Team Viability	6.27	.62	-.09	.81**	.75**	.70**	.24*	.36**	.96
Time 2									
8. Intragroup Trust	6.48	.62	.01	.66**	.57**	.49**	.13	.34**	.78**
9. Distribution of Leadership	12.20	4.28	.01	.43**	.53**	.36**	.06	.20	.51**
10. Degree of Leadership	4.46	.34	-.01	.66**	.53**	.65**	.18	.18	.76**
11. Objective Performance ^a	101.46	275.52	-.07	.28*	.32**	.24*	.59**	.49**	.31**
12. Subjective Performance	5.45	1.21	-.07	.43**	.39**	.37**	.53**	.66**	.52**
13. Team Viability	6.33	.79	.01	.61**	.53**	.45**	.19	.36**	.81**

Note. Scale reliabilities are presented along the diagonal, where applicable.

N = 58-60 teams. * $p < .05$; ** $p < .01$

^a Due to skewness, the log transformation of the objective performance was used in computing all correlations.

Table 2, Continued

Team Level Descriptive Statistics and Within Time Period Correlations

Variable	8	9	10	11	12	13
1. Attitude about Shared Leadership						
Time 1						
2. Intragroup Trust						
3. Distribution of Leadership						
4. Degree of Leadership						
5. Objective Performance						
6. Subjective Performance						
7. Team Viability						
Time 2						
8. Intragroup Trust	.92					
9. Distribution of Leadership	.70**	--				
10. Degree of Leadership	.76**	.68**	--			
11. Objective Performance	.24*	.19	.23*	--		
12. Subjective Performance	.44**	.19	.41**	.79**	.91	
13. Team Viability	.91**	.67**	.80**	.28*	.53**	.98

Note. Scale reliabilities are presented along the diagonal, where applicable.

N = 58-60 teams. * p < .05; ** p < .01

^a Due to skewness, the log transformation of the objective performance was used in computing all correlations.

Table 3

Correlations among Variables in the Repeated Measures Framework

Variable	1	2	3	4	5	6	7
1. Attitude about Shared Leadership	--						
2. Intragroup Trust	.05	--					
3. Distribution of Leadership	-.09	.68**	--				
4. Degree of Leadership	-.04	.74**	.69**	--			
5. Objective Performance ^a	-.05	.26**	.24**	.33**	--		
6. Subjective Performance	-.03	.37**	.20*	.26**	.54**	--	
7. Team Viability	-.04	.87**	.70**	.74**	.24**	.46**	--

N = 58-60 teams, 118-120 observations.

^aDue to skewness, the log transformation of the objective performance was used in computing all correlations.

* $p < .05$; ** $p < .01$

Table 4

Variance Partitioning for Dependent Variables

Variable	Between Team Variance	Total Variance	Proportion of Variance Attributed to Between Team Differences	Proportion of Variance Attributed to Within Team Factors
Distribution of Leadership	14.421	18.163	.7940	.2060
Degree of Leadership	.083	.109	.7615	.2385
Objective Performance ^a	.355	.695	.5108	.4892
Subjective Performance	.958	1.164	.8230	.1770
Team Viability	.449	.499	.8998	.1002

^a Due to skewness, the log transformation of the objective performance variable was used in making variance calculations.

Table 5

Results of Regression Analyses for Shared Leadership Predicting Team Effectiveness

Independent Variable	Objective Performance ^a				Subjective Performance				Team Viability			
	β	R ²	F	Between Teams R ²	β	R ²	F	Between Teams R ²	β	R ²	F	Between Teams R ²
Distribution of Leadership	.24	.06	6.87**	.12	.20	.04	4.65*	.05	.70	.49	110.80**	.54
Degree of Leadership	.33	.11	13.71**	.22	.26	.07	8.22**	.09	.74	.55	139.08**	.61

Note: “Between Teams R²” is an adjustment to R², which accounts only for the proportion of variance attributed to between team differences. Each line represents a separate regression analysis with each dependent variable. N = 118 observations.

^a Due to skewness, the log transformation of the objective performance variable was used in relevant regression equations.

* p < .05; ** p < .01

Table 6

Results of Hierarchical Regression Analyses for the Interaction of Shared Leadership Variables Predicting Team Effectiveness

Variable and Step	β	R^2	ΔR^2	ΔF	df
Objective Performance^a					
Step 1		.11		6.82**	2, 115
Distribution of Leadership	.03				
Degree of Leadership	.31*				
Step 2		.11	.00	.20	1, 114
Distribution x Degree	.05				
Subjective Performance					
Step 1		.07		4.13*	2, 115
Distribution of Leadership	.04				
Degree of Leadership	.23				
Step 2		.07	.01	.78	1, 114
Distribution x Degree	-.10				
Team Viability					
Step 1		.62		91.86**	2, 115
Distribution of Leadership	.36**				
Degree of Leadership	.49**				
Step 2		.64	.03	9.21**	1, 114
Distribution x Degree	-.22**				

^a Due to skewness, the log transformation of the objective performance variable was used in relevant regression equations.

* $p < .05$; ** $p < .01$

Table 7

Results of Regression Analyses for Intragroup Trust Predicting Shared Leadership

Independent Variable	Distribution of Leadership				Degree of Leadership			
	β	R^2	F	Between Teams R^2	β	R^2	F	Between Teams R^2
Intragroup Trust	.68	.47	102.24**	.59	.74	.55	143.10*	.72

Note: “Between Teams R^2 ” is an adjustment to R^2 , which accounts only for the proportion of variance attributed to between team differences. N = 118 observations.

* $p < .05$; ** $p < .01$

Table 8

Results of Hierarchical Regression Analysis for the Interaction of Attitude about Shared Leadership and Intragroup Trust Predicting Shared Leadership

Variable and Step	β	R^2	ΔR^2	ΔF	df
Distribution of Leadership					
Step 1		.48		53.67**	2, 115
Attitude about Shared Leadership	-.12				
Intragroup Trust	.69**				
Step 2		.48	.00	.34	1, 114
Attitude x Trust	.04				
Degree of Leadership					
Step 1		.56		72.30**	2, 115
Attitude about Shared Leadership	-.07				
Intragroup Trust	.75**				
Step 2		.56	.00	1.10	1, 114
Attitude x Trust	-.07				

* $p < .05$; ** $p < .01$

Table 9

Analysis of Variance for Leadership Type

Source	df	Objective performance ^a		Subjective performance		Team viability	
		F	η^2	F	η^2	F	η^2
Leadership type	3	3.81*	.09	1.27	.03	24.12**	.39
Within group error	114	(.62)		(1.16)		(.32)	

Note. Values in parentheses represent mean square errors.

^a Due to skewness, the log transformation of the objective performance variable was used in relevant regression equations.

* $p < .05$ ** $p < .01$

Table 10

Team Effectiveness Means and Standard Deviations by Leadership Type

Team Effectiveness Variable	High Distribution		Low Distribution	
	High Degree	Low Degree	High Degree	Low Degree
	Shared Leadership	Low Shared Leadership	Vertical Leadership	Leadership Avoidance
Objective Performance ^a	.91 _a (.95)	.69 _{ab} (.75)	.47 _{ab} (.41)	.33 _b (.56)
Subjective Performance	5.69 _a (1.00)	5.30 _a (1.19)	5.42 _a (.96)	5.32 _a (1.15)
Team Viability	6.73 _a (.28)	6.10 _b (.46)	6.37 _{ab} (.68)	5.68 _c (.87)

Note. Means in the same row that do not share the same subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison. Values in parentheses are standard deviations.

^a Due to skewness, the log transformation of the objective performance variable was used in relevant regression equations.

Table 11

Results of Exploratory Hierarchical Regression Analyses of the Incremental Effect of Degree of Leadership over Distribution of Leadership

Variable and Step	β	R^2	ΔR^2	ΔF	df
Objective Performance^a					
Step 1		.06		6.87*	1, 116
Distribution of Leadership	.24*				
Step 2		.11	.05	6.44*	1, 115
Degree of Leadership	.31*				
Subjective Performance					
Step 1		.04		4.65*	1, 116
Distribution of Leadership	.20*				
Step 2		.07	.03	3.50†	1, 115
Degree of Leadership	.23†				
Team Viability					
Step 1		.49		110.80**	1, 116
Distribution of Leadership	.70**				
Step 2		.62	.13	37.79**	1, 115
Degree of Leadership	.49**				

^a Due to skewness, the log transformation of the objective performance variable was used in relevant regression equations.

* $p < .05$; ** $p < .01$; † $p < .10$

Table 12

Results of Exploratory Hierarchical Regression Analyses of the Incremental Effect of Distribution of Leadership over Degree of Leadership

Variable and Step	β	R^2	ΔR^2	ΔF	df
Objective Performance^a					
Step 1		.11		13.71**	1, 116
Degree of Leadership	.33**				
Step 2		.11	.00	.04	1, 115
Distribution of Leadership	.03				
Subjective Performance					
Step 1		.07		8.22**	1, 116
Degree of Leadership	.26**				
Step 2		.07	.00	.09	1, 115
Distribution of Leadership	.04				
Team Viability					
Step 1		.55		139.08**	1, 116
Degree of Leadership	.74**				
Step 2		.62	.07	20.85**	1, 115
Distribution of Leadership	.36**				

^a Due to skewness, the log transformation of the objective performance variable was used in relevant regression equations.

* $p < .05$; ** $p < .01$; † $p < .10$

Appendix B

Background Information

The following information will be used ONLY for statistical purposes. All responses will be kept strictly confidential.

Demographic Information:

Age: _____

Major: _____

Gender

(Circle one): F M

Grade Point Average (GPA): _____

Race

(Circle one): African American
Asian/Pacific Islander
Native American
Caucasian
Other: _____

Class Rank

(Circle one): Freshman
Sophomore
Junior
Senior

Team Experience: Below is a list of different types of teams. Please indicate **how many** of each type of team you have been a member of since graduating high school. If you have participated in many of one type of team, please provide your best approximation.

_____ Class project teams (i.e., teams formed to complete tasks for a class)

_____ Sports/Athletic teams (e.g., collegiate sports, intramurals, recreational)

_____ Work Teams (i.e., teams formed at work)

_____ Other (e.g., Home Owner's Association, committees) Please list below:

Leadership Experience:

Consider the teams from the above list that you were/are a member of. In how many of these teams were you considered the team leader? _____

Do you have any other leadership experience that is not listed above (e.g., student government, management job)? No Yes

If yes, please list: _____

Appendix C

Attitude about Shared Leadership

Please circle the number that indicates how much you agree or disagree with the following statements.

	Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
1. High team performance is most likely to occur when a single person is in charge. (R)	1	2	3	4	5
2. It would be chaotic if multiple people took on leadership responsibilities of a team. (R)	1	2	3	4	5
3. A team's performance will be at risk if everyone participates in the leadership role (R).	1	2	3	4	5
4. To ensure that a team will be effective, the leadership role should rotate among team members.	1	2	3	4	5
5. A team will run more smoothly if only one person is in charge of important team decisions. (R)	1	2	3	4	5
6. It would be unwise for a team to make single person accountable for the team's performance.	1	2	3	4	5
7. It is efficient to have one person in charge of a team. (R)	1	2	3	4	5
8. Team productivity will suffer if all team members are involved in the leadership responsibilities. (R)	1	2	3	4	5
9. It is usually best for a team to appoint the most capable person as the leader. (R)	1	2	3	4	5
10. A team is vulnerable when everyone takes responsibility for leading the team. (R)	1	2	3	4	5
11. Putting a single person in control detracts from a team's potential to succeed.	1	2	3	4	5
12. A team is most productive when everyone contributes something to leading the team.	1	2	3	4	5
13. It is beneficial to utilize every team member's leadership capabilities to the fullest.	1	2	3	4	5

Note. Scale scores were computed by taking the mean of responses after recoding reverse-scored items. High scores indicate positive attitude toward sharing leadership; low scores indicate negative attitude toward sharing leadership.

Appendix D

Intragroup Trust

Select the number that best describes how frequently each of the following statements reflected what occurred on your team as you worked together.

	Never	Once in a While	Sometimes	Fairly Many Times	Often	Constantly	Always
1. We absolutely respect each other's competence.	1	2	3	4	5	6	7
2. Every team member present shows absolute integrity.	1	2	3	4	5	6	7
3. We expect the complete truth from each other.	1	2	3	4	5	6	7
4. We are all certain that we can fully trust each other.	1	2	3	4	5	6	7
5. We count on each other to fully live up to our word.	1	2	3	4	5	6	7

Note. Scale scores were computed by taking the mean of responses for items 1-5 after recoding reverse-scored items. High scores indicate high intragroup trust; low scores indicate low intragroup trust.

Simons, T. L., & Peterson, R. S. (2000). Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust. *Journal of Applied Psychology*, 85(1), 102-111.

Appendix E

Leadership Behavior

On the following three pages is a list of items that may be used to describe the behavior of your team members. Each item describes different types of behavior, but does not ask you to judge whether the behaviors are desirable or undesirable. Although some items are similar, they express differences that are important in the description of team member behavior. Each item should be considered as a separate description. This is not a test of ability or consistency in making answers. Its purpose is only to make it possible for you to describe, as accurately as you can, the behavior of your teammates.

READ each item carefully. THINK about whether your teammates engage in the types of behaviors described in each item. DECIDE whether s/he Always, Often, Occasionally, Seldom, or Never acted as described by the item during **Quarters 1-5 (6-8)**. CIRCLE one of the five response options for each team member (including yourself) to indicate your response.

1. scheduled work to be done; assigned group members to particular tasks; decided what should be done and how it should be done
2. encouraged the use of uniform procedures; asked that group members follow standard rules and procedures during team meetings and when making decisions
3. maintained definite performance standards; let group members know what was expected of them; articulated his/her expectations for the team's performance
4. made his/her attitude clear to the group; tried out his/her own ideas with the group; made sure that his/her own part in the group was clearly understood by all team members
5. kept to him- or herself; acted without consulting the group; refused to explain his/her actions (R)
6. was friendly and approachable; looked out for the personal welfare of group members; did little things to make it pleasant to be a member of the group
7. treated all group members as his/her equals; acknowledged and considered suggestions from all team members
8. was willing to make changes; gave advance notice of changes
9. looked at problems differently; questioned others' strategies and decisions; encouraged rethinking of ideas
10. listened attentively to other team members; provided advice; treated others as individuals; encouraged others to develop their strengths
11. clarified the team's objectives and strategies; fostered a collective sense of the team's identity; talked up trust
12. was optimistic about the future of the team; articulated a plan for the team's future; set high standards for the team

Each item was rated using the following format:

	Never	Seldom	Occasionally	Often	Always
Member A name	1	2	3	4	5
Member B name	1	2	3	4	5
Member C name	1	2	3	4	5
Member D name	1	2	3	4	5
Member E name	1	2	3	4	5

- Task-oriented Leadership = Items 1-4 (based on Initiating Structure items from LBDQ XII)
- Relations-oriented Leadership = Items 5-8 (based on Consideration items from LBDQ XII)
- Change-oriented Leadership = Items 9-12 (based on Transformational items from TMLQ)

Note: Scale scores were computed by taking the mean of responses for items within each subscale. High scores on a subscale indicate high levels of that leadership behavior type attributed to a person; low scores on a subscale indicate low levels of that leadership behavior type attributed to a person.

Instructions were adapted from the Leader Behavior Description Questionnaire, Form XII (Stogdill, 1963).

Stogdill, R. M. (1963). *Manual for the Leader Behavior Description Questionnaire--Form XII*. Columbus, OH: The Ohio State University, Bureau of Business Research, College of Commerce and Administration.

Avolio, B. J., Sivasubramaniam, N., Murry, W. D., Jung, D., & Garger, J. W. (2003). Assessing shared leadership: Development and preliminary validation of a team multifactor leadership questionnaire. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 143-172). Thousand Oaks: Sage.

Appendix F

Team Effectiveness

TEAM NAME: _____

Consider the performance of the team named above. Using your knowledge and experience with this simulation as a reference, please rate each team's effectiveness in completing *Quarters X-X*.

Keep in mind that the top performing team in a particular class may not actually have been effective at all, but only performed well relative to very poor competition. Conversely, the lowest performing team within a particular competition may actually have performed quite well, but only performed poorly relative to very tough competition.

Therefore, please use your own knowledge and expertise regarding the simulation and your understanding of the team's performance during *Quarters X-X*, rather than solely the team's performance ranking, when evaluating the team's performance effectiveness.

Indicate the most appropriate response to each of the statements by selecting one of the following response options:

1	2	3	4	5	6	7
Very ineffective	Ineffective	Marginally ineffective	Neither effective nor ineffective	Marginally effective	Effective	Very effective

How effective was the team in terms of...

- _____ 1. Delivering its commitments on time?
- _____ 2. Making quality decisions?
- _____ 3. Changing their behavior to meet the demands of the situation?
- _____ 4. Setting goals and priorities?
- _____ 5. Maintaining healthy interpersonal relationships?
- _____ 6. Creating a successful company?

Note. Scale scores were computed by taking the mean of responses for items 1-6. High scores indicate high team effectiveness; low scores indicate low team effectiveness.

Appendix G

Team Viability

For each statement, select the number that best describes how much you agree or disagree.

	Strongly disagree	Disagree	Moderately disagree	Neither agree nor disagree	Moderately agree	Agree	Strongly disagree
1. The people on this team have “team spirit.”	1	2	3	4	5	6	7
2. Team members are satisfied with working on this team.	1	2	3	4	5	6	7
3. Team members actively participate in meeting the team’s goals.	1	2	3	4	5	6	7
4. The people on this team are “team players.”	1	2	3	4	5	6	7
5. Members are highly committed to the team.	1	2	3	4	5	6	7
6. Team members would enjoy working together as a team in the future.	1	2	3	4	5	6	7
7. Team members are motivated to work on this team.	1	2	3	4	5	6	7
8. Members give their best effort for the team.	1	2	3	4	5	6	7
9. Team members would be willing to work with each other again.	1	2	3	4	5	6	7

Note. Scale scores were computed by taking the mean of responses for items 1-9. High scores indicate high team viability; low scores indicate low team viability.

Copyright ©1998 Organizational Research Group

VITA

Erika Engel Small was born and raised in Little Rock, Arkansas. She graduated from Mount Saint Mary Academy in 1997. She went on to graduate with honors from Louisiana State University in 2001 with a B.S. in Psychology. Erika is currently pursuing her doctorate in industrial and organizational psychology at The University of Tennessee, Knoxville. She will be an assistant professor in the Department of Management, Marketing, and Law at Coastal Carolina University beginning in the fall semester of 2007.