ENABLING SHARED LEADERSHIP IN HIERARCHICAL GROUPS

by

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To my family

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To a young doctoral student, a dissertation seems like an almost mythical undertaking. In my first few years in the doctoral program in the Management and Organizations Department at the University of Michigan's Ross School of Business, I remember being regaled with tales of dissertations from days gone by, and watching as senior students defended their theses. I wondered how those students could have produced such incredible work all by themselves. At the time, the thought of designing and conducting an independent research study was terrifying, and nearly as intimidating was the idea of producing a piece of writing long enough to describe that study.

So it is somewhat surreal to find, some years later, that *I* have completed a dissertation, and one I feel quite proud of. This project has been the source of much personal development and learning, and one of the most important things I have learned is that my initial perception of a dissertation as an individual undertaking was totally inaccurate. While this project represents my original thinking and I worked long and hard to bring it to completion, I could not have done so without the assistance of an extensive support group. Words cannot express how grateful I am to these individuals for their efforts on my behalf. Although it is not feasible to recognize everyone who assisted in this project, I want to highlight a few folks to whom I am particularly indebted.

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And now, on with the show…

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ABSTRACT

Despite the long-recognized importance of informal influence processes in organizations, leadership researchers have traditionally assumed that the designated managers of groups fulfill all of the groups' leadership responsibilities. However, scholars are increasingly acknowledging that leadership may be more accurately conceptualized as an emergent property that can be shared by multiple members of a group and across levels of formal hierarchy. Although early studies hint at the potential value of adopting a more holistic perspective on leadership, extant research does not provide the theoretical or empirical tools necessary to fully describe group-level leadership activity, nor does it consider how informal processes interact with formal hierarchy in determining leadership emergence. In this dissertation I develop a conceptual model of shared leadership in hierarchical settings that addresses these gaps. I explain how leadership structures emerge at the group level as a result of the leading-following interactions that develop between group members, and identify three properties that can be used to describe the nature and configuration of these interactions. Next, I argue that formal hierarchical differentiation is likely to encourage the consolidation of leadership influence in the hands of designated

managers, but identify several conditions under which hierarchically organized groups will more fully share their leadership responsibilities, to the benefit of the groups and their members. The results of a survey-based field study and a lab experiment confirm that under some conditions hierarchy does restrict informal leadership emergence, but reveal that this relationship is weaker and more contingent than has been previously assumed by leadership scholars. Moreover, they suggest that groups may benefit from adopting hybrid leadership structures characterized by a blend of formal and informal properties.

CHAPTER I

Introduction

Leadership, commonly defined as a social influence process that involves determining a group's objectives, motivating task behavior in pursuit of these objectives, and influencing group maintenance and culture (Yukl, 1989), has assumed a prominent position in efforts to understand and improve organizations (Meindl, Ehrlich & Dukerich, 1985). Perhaps one reason leadership is so appealing to both scholars and practitioners is that it represents an important mechanism through which individuals, rather than environmental forces (e.g. Thompson, 1967; Hannan & Freeman, 1977; 1984: Pfeffer & Salancik, 1978; DiMaggio & Powell, 1983) shape and direct the activities of larger collectives (Quinn & Wellman, 2011). Although some have argued that our collective infatuation with leadership is the product of an individualistic bias in the explanation of organizational events rather than the actual importance of leadership in producing these events (Pfeffer, 1977; Meindl et al., 1985), evidence has accumulated that soundly refutes such arguments. Leadership has been found to exert an important influence on the strategy (Hambrick & Mason, 1984; Chaganti & Sambharya, 1987; Norburn & Birley, 1988), culture (Schein, 2004), and performance (Burke, Stagl, Klein, Goodwin, Salas, & Halpin, 2006) of collectives as well as the motivation (Bono & Judge, 2003) and

satisfaction of their members (DeRue, Nahrgang, Wellman & Humphrey, 2011). Thus, at the present time it seems incontrovertible that leadership matters to groups and organizations in a number of important ways.

The traditional approach to understanding leadership has involved acting as though the patterns of leadership that develop in organizations perfectly mirror the organizations' formal hierarchical structures (Bedeian & Hunt, 2006). This approach to studying leadership, which has been referred to as the vertical leadership model (Pearce & Sims, 2002; Ensley, Hmieleski, & Pearce, 2006; Carson, Tesluk, & Marrone, 2007), assumes that the designated supervisor of a group performs all of the group's leadership functions and all that other group members are "followers" who support the leader but do not initiate leadership themselves. Studies adopting the vertical leadership model operationalize leadership as the personal traits or behavioral styles of designated managers and have investigated the relationship between a vast array of managerial characteristics and group and individual outcomes (Bass, 2008; DeRue et al., 2011).

Recently, however, scholars have begun to question with renewed vigor whether the vertical leadership model accurately describes the nature of leadership in organizations. For instance, Bedeian and Hunt (2006) pointed out that "the notion that leaders can be identified by their location in a hierarchy...(lacks) even simple face validity. Occupying or being appointed to a managerial position doesn't magically make one a leader" (pg. 191). Similarly, Morgeson, DeRue, & Karam (2010) noted that "extant research has…tended to focus primarily on formal team leadership structures (i.e. hierarchically, formally appointed leaders). This has occurred despite the long-recognized

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fact that leadership is often distributed within a team (Bales & Slater, 1955)" (pg. 6). Uhl-Bien and colleagues (2007) expressed concern that researchers' "inability to move beyond….traditional bureaucratic mindsets limits the applicability of mainstream leadership theories" (pg. 301) to modern organizations. These critiques are particularly significant in light of longstanding sociological evidence that informal patterns of interaction and influence emerge in organizations, which can complement or even compete with the organizations' formal authority structures (Simon, 1997; Coleman, 1988; Burt, 1992; Brass, 1984; Adler, Kwon, & Heckscher, 2008). Together, they suggest that traditional approaches to understanding leadership are inherently limited because the actual leadership structures in groups – that is, the enduring and persistent patterns of leadership influence that develop (Ranson, Hinnings, & Greenwood, 1980) – do not necessarily mirror the groups' formal authority structures.

In response to these concerns, leadership researchers have begun to explore approaches that relax the assumptions of the vertical model. One of the most significant outcomes of this exploration has been the emergence of models that portray leadership as "an emergent team property that results from the distribution of leadership influence across multiple team members" (Carson et al., 2007, pg. 1218). Studies adopting these "shared" leadership models focus primarily on informal leadership in groups without formally designated managers. They have found that many groups have multiple leaders and that higher overall levels of leadership, regardless of its source, tend to improve group performance (Pearce & Sims, 2002; Ensley et al., 2006; Mehra, Smith, Dixon, &

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Robertson, 2006; Carson et al., 2007). Thus, shared leadership models are an enticing

option for leadership scholars seeking to address the limitations of traditional approaches.

While the shared leadership literature hints at the potential value of relaxing the

individualistic assumptions that have dominated leadership research, there are several

reasons why it is important to further explore the patterns of leadership influence that

emerge in groups, as well as the causes and consequences of these patterns. First,

although shared leadership research highlights the importance of informal leadership that

is distributed throughout groups, it tends to go to the other extreme and portray leadership

as something that all members of a group participate in equally (e.g. Pearce & Sims,

2002; Hiller, Day, & Vance, 2006; Carson et al., 2007). Research on status and hierarchy,

however, suggests that even in groups without a formally designated manager only a

relatively small cohort of individuals emerge as leaders, and that the number and

distribution of these leaders within the group can be highly consequential (Leavitt, 2005;

Sidanius & Pratto, 2001; Anderson & Brown, 2010). Because shared leadership models

assume all group members participate equally in the leadership process, they cannot

describe variations in the way that leadership is distributed in groups, or explain why

these variations are important (DeRue, 2011). Thus, it is important to adopt a more

specific language for thinking and talking about the patterns of leadership that emerge in

groups, one that captures the distribution and/or variability of individual group members'

leadership contributions.

Second, shared leadership models tend to retain a view of leadership relationships

that is deeply rooted in hierarchical assumptions. In most shared leadership research, as

in the leadership literature in general, leadership relationships are thought to involve one or more "leaders" who unilaterally influence one or more "followers." Leadership is something the leader (or leaders in shared leadership models) in a relationship "do" to the follower(s) and problems emerge when leader and follower roles are not clearly established (Bass, 2008). However, this static perspective may not adequately describe the nature of the relationships that develop in groups that share leadership. Traditional leader and follower roles are likely only marginally relevant in relationships in which both partners actively engage in leading each other and are also receptive to each others' leadership (DeRue & Ashford, 2010). Rather than one individual emerging as "the lone star at the top," (Jordan, 2004, pg. 12), shared leadership is more likely to be created through interactions in which dominance and rigidity are replaced by responsiveness, participation, and mutual influence between parties that mutually acknowledge and respect each other's leadership abilities (Rost, 1995; Mehra et al., 2006; Uhl-Bien, 2006). Until new theory is developed that allows scholars to move past institutionalized, hierarchical assumptions about the nature of leadership relationships, scholars will continue to overlook the potential for reciprocal dynamics in the leadership process.

Finally, few attempts have been made to integrate the shared and vertical leadership models by identifying how organizations' formal hierarchies impact the informal and emergent dynamics identified by shared leadership researchers. As Morgeson and colleagues (2010) noted, leadership studies have tended to focus on either formal or informal leadership in groups, rather than explaining how these two types of leadership interact. Studies of shared leadership investigate informal leadership

dynamics, but tend not to explore how group-level patterns of emergent leadership interaction are impacted by the presence of formal authority figures (although see Zhang, Waldman, & Wang, 2012). Conversely, vertical leadership studies explain how formal managers can lead groups effectively, but do not consider how this formal leadership is affected by or interacts with informal or emergent leadership processes. The failure to explore the impact of a designated manager on the leadership structures that emerge in groups is particularly significant given that theories of bureaucracy and hierarchy (Weber, 1968; Magee & Galinsky, 2008) suggest that introducing hierarchical differentiation into groups by formally appointing one or more members to positions of authority may create an organizationally sanctioned system of deference and control that may restricts the emergence of shared leadership dynamics. Therefore, integrating the shared and vertical leadership models by identifying the impact formal authority figures have on group leadership structures and exploring factors that can encourage emergent, informal leadership in the presence of formal leaders is a critical next step in the development of leadership theory.

In my dissertation I address these and related issues by developing and testing theory explaining the development of shared leadership structures in hierarchical settings. The thesis is anchored by the following three research questions: 1) How does formal hierarchy shape leadership activity in groups? 2) How can hierarchically differentiated groups promote the emergence of shared leadership? and 3) How do different patterns of emergent leadership activity influence group and individual outcomes?

The dissertation unfolds as follows. In the second chapter, I review the literatures relevant to my research questions and draw on social network theory to develop a means of describing and differentiate between shared and vertical leadership structures. In the third chapter, I develop a theory explaining the development of group leadership structures in hierarchical settings. I propose that introducing formal hierarchy into groups by designating one or more members as managers will encourage the development of vertical leadership structures, but identify three group-level characteristics – empowering behavior by a group's designated manager, shared group-level leadership structure schemas (mental models of how leadership is best structured in groups, DeRue & Ashford, 2010; Wellman, Ashford, DeRue, & Sanchez-Burks, 2013), and a positive group mood – that should encourage the emergence of shared leadership structures in groups with formal hierarchical differentiation. Finally, I propose that the emergence of shared leadership structures in hierarchical groups will promote the satisfaction and psychological growth of individual group members and also improve group performance by enhancing the groups' ability to identify, assimilate, and apply external knowledge. However, I also suggest that the emergence of shared leadership structures will be associated with an increase in some forms of group conflict (Jehn, 1995; Jehn, Northcraft, & Neale, 1999). A graphical representation of my complete conceptual model is presented in Figure 1.

Next, I present two studies I conducted to test my conceptual model. In Chapter 4, I describe a survey-based field study of 2,259 members of 147 clinical nursing shifts in five mid-sized hospitals. In Chapter 5, I describe a controlled experiment with 60

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problem-solving groups. For each study, I provide a brief overview of the objectives of

the study, describe the methodology and analysis approach employed, present the results

of analyses I conducted to test my hypotheses, and discuss the implications of the finding.

In the sixth and final chapter of this dissertation, I articulate the central findings of

this project, its high-level limitations and strengths, and its implications for

organizational theory and practice,

Figure 1. Conceptual model of the relationship between formal hierarchical differentiation, shared leadership structures, and group outcomes.
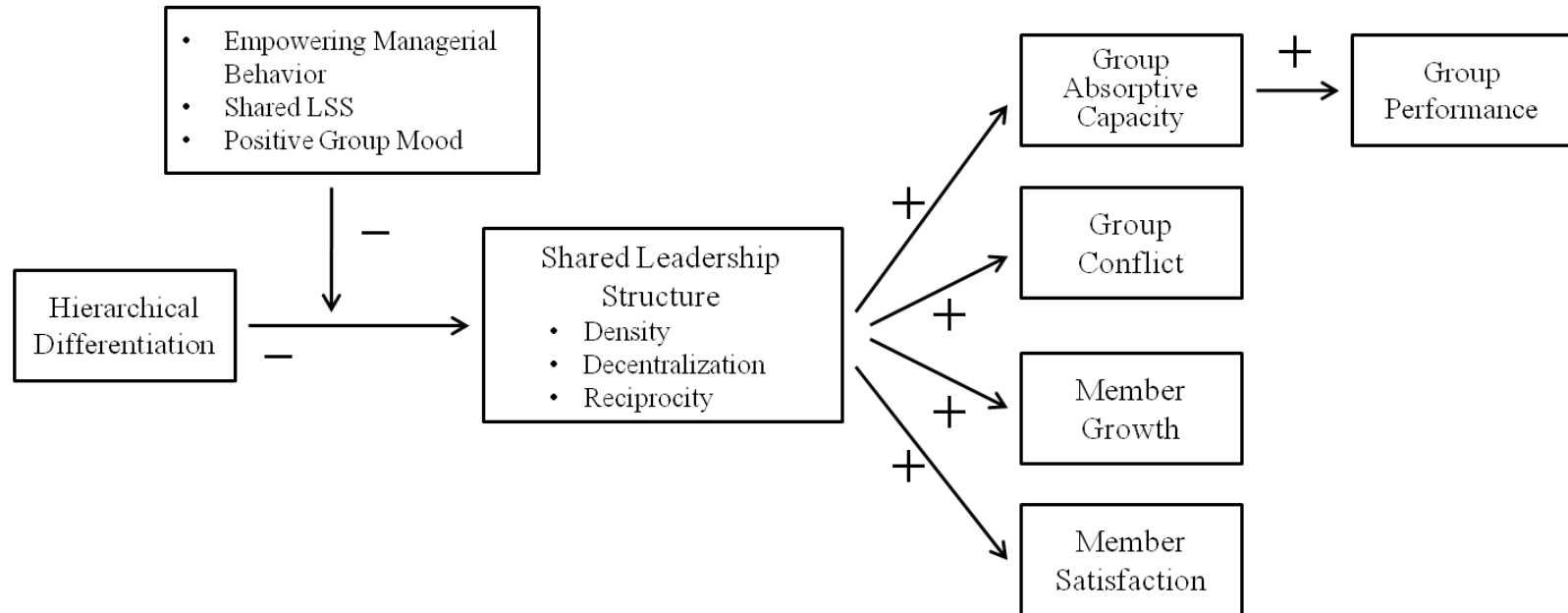
CHAPTER II

Literature Review

A recent review by Ancona and Backman (2008) found that 84% of the leadership

studies published from 2003-2008 adopted a vertical leadership model in that they

focused exclusively on individuals in formal managerial positions. These studies can

largely be grouped into two paradigms (Bennis, 1959; DeRue et al., 2011). The first,

which DeRue and colleagues (2011) recently referred to as the leader trait paradigm,

examines how traits such as intelligence (Judge, Colbert, & Ilies, 2004), gender (Eagly,

Karau, & Makhijani, 1995) or personality (Judge, Bono, Ilies, & Gerhardt, 2002) impact

the effectiveness of designated managers. The second, which DeRue and colleagues

referred to as the leader behavior paradigm, explores the relationship between various

"leadership styles," or patterns of managerial behavior [e.g. initiating structure-

consideration (Judge, Piccolo, & Ilies, 2004), transactional leadership-transformational

leadership (Judge & Piccolo, 2004)] and group and individual outcomes. Regardless of

whether they focus on traits or behaviors, studies adopting the vertical leadership model

assume that the designated managers of groups perform all of the groups' leadership

responsibilities and equate leadership with the characteristics or behaviors of designated managers (Bedeian & Hunt, 2006).

The prevalence of vertical leadership models is understandable given that many of the prominent leadership theories were developed at a time when large, bureaucratic organizations dominated the corporate landscape (Uhl-Bien et al., 2007). However, despite the dominance of these models in the leadership literature, their theoretical foundation is rarely made explicit. Vertical leadership model are rooted in functional theories of hierarchy. Hierarchy, broadly defined as a rank ordering of individuals along one or more socially important dimensions (Parsons, 1940; Weber, 1968; Blau & Scott, 1962; Laumann, Siegel, & Hodge, 1970) has been called "one of the most fundamental forms of social relations" (Magee & Galinsky, 2008, pg. 352). Most organizations rely on formal hierarchies to manage their activities. In hierarchically-arranged organizations, individuals who demonstrate exceptional competence are promoted to supervisory roles and granted the authority to give commands and make decisions that govern the activities of lower-ranking members. Thus, hierarchical or bureaucratic organizations operate on the basis of a clearly established system of super- and sub-ordination in which lower offices are supervised and controlled by higher ones (Weber, 1968).

Functional theories of hierarchy (e.g. Parsons, 1940; Weber, 1968; Thibaut & Kelly, 1959; Frank, 1985) argue organizations adopt formal hierarchies because they offer significant advantages over other forms of organizing (Anderson & Brown, 2010). Indeed, Weber (1968) suggested that, "the purely bureaucratic type of administrative organization is capable of obtaining the highest degree of efficiency and is the most

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rational known means of exercising control over human beings" (pg. 223). Formal

hierarchies are thought to offer two principal benefits to organizations (Magee &

Galinsky, 2008). First, they provide clear lines of direction and deference that allow

organizations to efficiently coordinate their task activities. Second, by making

advancement at least partially contingent upon technical performance, formal hierarchies

incentivize employees to work hard to obtain promotions to higher-level positions.

The vertical leadership model has resulted from researchers adopting the

assumptions embedded in functional theories of hierarchy and conceptualizing leadership

as a top-down, unidirectional influence process that is dominated by designated managers

(Parsons, 1940; Weber, 1968; Carson et al., 2007). The vertical model is commonly

viewed by researchers who adopt it as both descriptive, in that it accurately describes the

leadership structures of groups and organizations, and prescriptive, in that hierarchical

leadership arrangements are thought to produce a number of functional benefits for

groups.

Some very persuasive evidence suggests, however, that the vertical leadership

model is not necessarily descriptive *or* prescriptive. Real-world organizations,

particularly modern organizations, do not always operate in the neat, orderly manner

described by functional theories of hierarchy (Uhl-Bien et al., 2007). Informal leadership

also emerges that complements and at times competes with organizations' formal

authority structures. (Mayo, 1933; Lewin, 1947; Bales, 1953; Mechanic, 1962; Katz &

Kahn, 1978; Brass & Burkhardt, 1993; Ibarra, 1993: Scott & Davis, 2007; Adler, Kwon,

& Heckscher, 2008). Dalton (1959) presented a compelling, if somewhat dated,

illustration of the pervasiveness of informal leadership in organizations. During his case study of a manufacturing company, Dalton was puzzled by the gap between the organization's formal hierarchy and the way work was actually completed. He concluded that the organization's formal authority system did not adequately prescribe the behaviors necessary to address changing and challenging situations, so organizational members amended existing policies and practices to better fit their environments. As a result of this informal, emergent activity, some organizational members assumed a degree of informal influence with respect to the organization's operations that exceeded that prescribed by their formal job title.

The significance of informal and emergent leadership in organizations has only increased in recent times. In the modern business environment, flexibility, innovation, and adaptability are critical to organizational survival (Bettis & Hitt, 1995). Groups operating in this environment must negotiate tasks that are complex, ambiguous, and novel (Schilling & Steensma, 2001; Heifetz, 1994). While hierarchical leadership from individuals in formal managerial positions is well-suited for organizing work on simple, repetitive tasks, it can be too rigid and slow-moving to effectively accomplish the more complex coordination activities demanded of modern groups (Anderson & Brown, 2010). Successfully completing ambiguous and highly interdependent work requires rapid, spontaneous coordination and mutual adjustment among members of a group, coordination that can best be accomplished by informal, as opposed to formal, leadership activity (Thompson, 1967; Carson et al., 2007; Heckscher & Adler, 2007; Day, Harrison, & Halpin, 2009; Gittell, 2003).

This emergent, informal leadership is the focus of studies adopting shared leadership models. To date, shared leadership research has focused primarily on two issues: 1) what conditions increase the overall amount of informal leadership in self-managing groups? and 2) what is the relationship between the level of informal leadership in groups and group performance? The results of these studies have established that internal group environments characterized by a shared purpose, collectivism, social support, and voice, as well as coaching originating from external sources, increase the level of informal leadership in groups without a formally designated manager. Moreover, receiving higher collective levels of leadership, whether it is initiated by managers or other group members, tends to improve group performance, particularly in contexts high in ambiguity and interdependence (Pearce & Sims, 2002; Ensley et al., 2006; Manz & Sims, 1987; Pearce & Sims, 2002; Hiller et al., 2006; Carson et al., 2007).

While shared leadership models present a promising avenue for scholars looking to move beyond an exclusive focus on formal leaders, they also introduce significant challenges. Specifically, if leadership structures are not assumed to be rigid and centralized around formal authority figures, then describing the actual flows of intra-group leadership influence becomes an important problem. Because shared leadership models focus on the overall level of informal leadership in groups, rather than its distribution across members, they are limited in their ability to address this problem. However, other literatures offer relevant insights. For instance, early psychological and sociological studies examined the emergence of informal leadership hierarchies in small

problem-solving groups (Leavitt, 1951; Bales, 1953; Bales & Slater, 1955; Slater, 1955; Bavelas, Hastorf, Gross, & Kite, 1965). These studies charted or experimentally manipulated groups' communication patterns, used sociometric questionnaires to identify emergent leaders, and then attempted to define the behavioral precursors of the leaders' emergence (Bavelas et al., 1965). They found that individuals who participated frequently in group interactions (Bales, Strodtbeck, Mills, & Roseborough, 1951), or who occupied a central location in group communication structures (Bavelas et al., 1965), were most likely to be perceived as informal leaders. They also found that two different types of leaders tended to emerge in groups: task leaders, whose leadership focused on acquiring and distributing necessary resources, and social leaders, who focused on maintaining integration between group members and developing a system of social norms (Bales, 1953; Etzioni, 1965). Perhaps most interestingly, the small group studies revealed that the task and social leadership functions in groups tended to be fulfilled by different individuals.

The early small group experiments were the precursors of later work that examined informal influence in groups using social network analysis. Social network analysis describes relationships between actors in a social system as a series of nodes and ties, with the nodes representing actors and the ties representing a particular type of relationship between those actors (Wasserman & Faust, 1994). Studies of intra-group social networks have found that individuals who are experienced, well-educated, charismatic, or who engage in certain types of influence behaviors (Klein, Lim, Saltz, & Mayer, 2004; Brass & Burkhardt, 1993; Ibarra, 1993) tend to acquire dominant positions

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in groups' networks of social relationships (e.g. communication, advice, friendship, or workflow networks). Moreover, they have identified several locations in informal networks that facilitate the acquisition of influence. For instance, Burt (1998; 1997; 1992) found that individuals who bridge "structural holes" in networks by connecting two or more parties who would not otherwise have a tie, tend to be especially influential, while Brass and colleagues (Brass, 1984; Brass & Burkhardt, 1993) found that a central location in communication and workflow networks was positively associated with power and influence. Network studies have also established that groups perform better when their formal leaders occupy central locations in their informal social networks (Balkundi & Harrison, 2006). However, the group networks literature has by and large concentrated on identifying how individuals' network position can facilitate or constrain their acquisition of influence (or leadership), rather than examining how this influence is actually structured at the group level.

The most comprehensive effort to date to leverage social network concepts to describe group-level leadership structures was undertaken by DeRue (2011; although see also Mayo, Miendl, & Pastor, 2003; Mehra et al., 2006; Carson et al., 2007). DeRue argued that "double interacts" of leading and following behavior form the foundational units of leadership structures. He proposed that the arrangement of leading-following-leading double interacts in groups influences the construction of leader and follower identities at the individual, relational, and group level, and that these identities then contribute to leadership structure emergence. Moreover, he suggested that the social

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network concepts of density, centralization, and centrality variance could be used to describe and differentiate between different types of group leadership structures.

DeRue's work made important strides towards leveraging network concepts to better understand emergent leadership activity in groups, but several points of ambiguity remain. For instance, it is debatable whether a double interact, which, according to Weick (1979) and DeRue (2011), occurs when an action by actor A evokes a response in actor B, which is then *in turn responded to by actor A*, necessarily comprises the foundational unit of leadership influence. Indeed, most descriptions of leadership portray it as a unidirectional process, such that a simple "interact" in which a leadership action by actor A that evokes a response from actor B would qualify as leadership (even without a subsequent response or reaction from A). Moreover, it is unclear how the development of distinct leader and follower identities at the individual, group, and/or relational levels helps facilitate, or is even commensurate with, the patterns of mutual leadership influence described by shared leadership models. Thus, in this chapter I present an alternative approach to understanding and describing group leadership structures, which is in some respects convergent with, and in others divergent from, that advocated by DeRue. The aspiration is to "plant, nurture, and cultivate" the seeds of continued dialogue and improved theoretical precision (Van Maanen, 1995: 140).

Understanding Group Leadership Structures

I define group leadership structures as the relatively enduring configurations of leadership interaction that develop within groups (Ranson et al., 1980). This definition views leadership structures not as formally prescribed frameworks (e.g. Weber, 1968;

Hall, 1963; Child, 1972) but rather as patterned regularities of social activity (Bittner, 1965; Garfinkel, 1967; Zimmerman, 1971; Weick, 1979). Because leadership structures are patterns of connectivity within social systems, they are a type of social structure (Wellman & Berkowitz, 1988). However, they can be distinguished from other social structures in that the patterns of connectivity that they describe involve the repeated transmission of leadership influence between members of a group.

Group leadership structures are complex mediums of control and coordination that are not only continually produced by interactions between members of a group but also shape the nature of these interactions (Ranson et al., 1980; Giddens, 1986; Weick, 1993). A substantial body of empirical evidence suggests that stable patterns of leadership interaction develop spontaneously and rapidly in groups (Bales et al., 1951; Hollander, 1985; Anderson, John, Keltner, & Kring, 2001), and that members of the same group tend to agree in their assessments of these patterns (Schmid Mast & Hall, 2004). Once established, group leadership structures become normative and taken-for-granted, thereby influencing the subsequent thoughts, feelings, and behaviors, and interactions of group members (Giddens, 1986). Thus, in addition to describing groups' typical patterns of leadership interaction, leadership structures are also a powerful force that "differentially enables certain kinds of conduct, conferring support for forms of commitment, as well as constraining and obligating those who reject (their) claims" (Ranson et al., 1980, pg. 3).

In this dissertation, I examine dyadic leadership relationships as the foundational unit of group leadership structures. I define these relationships as reoccurring patterns of

interaction between two individuals that result in leadership influence being exerted (Uhl-Bien, 2006). Drawing on the literature on interpersonal influence, I propose that interactions that produce leadership will occur when the following two conditions are met: 1) one individual [who, following the convention in the literature on interpersonal influence (e.g. Yukl & Tracey, 1992; Falbe & Yukl, 1992), I refer to as the agent] engages in leadership behavior, 2) another individual (who I refer to as the target) responds by altering his or her cognitions or behavior in a manner that is relevant to the content of the agent's original leadership message. Below I describe the two components of leadership interactions in more detail.

Leadership interactions are initiated when individuals engage in leadership behavior. A substantial body of literature has established that influence is initiated by the observable behaviors or "tactics" of individuals (e.g. Kipnis, Schmidt, & Wilkinson, 1980; Kipnis & Schmidt, 1988; Wayne & Ferris, 1992; Yukl & Tracey, 1992; Falbe & Yukl, 1992; Brass & Burkhardt, 1993; Higgins, Judge, & Ferris, 2003). As Hinkin and Schrisheim (1990) noted, "the process of exerting influence *involves an agent acting* so as to obtain particular compliance behaviors on the target's part" (pg. 222, emphasis added). Although some have suggested that influence can also result from the perceptions or attributions of others [for example, attributions of power (Calder, 1977), or leadership (Lord & Maher, 1991)], even these attributions are likely to be based on behavioral cues (Lord & Maher, 1991; Manz & Gioia, 1983; Yukl, 2006).

Although I have defined leadership as an influence process, not all influence is leadership. Rather, leadership is a particular sort of influence, one directed at establishing

shared goals for a group, encouraging task behavior in pursuit of those goals, and promoting a motivational social climate (Yukl, 1989). Theories of leadership behavior suggest that the behaviors that produce leadership influence can be classified into two broad categories (Bales, 1953; Stogdill, 1963; Blake & Mouton, 1978; Fiedler, 1967; Bass, 2008). The first category includes behaviors that facilitate the performance of group tasks and help groups solve task-related problems. These task-focused leadership behaviors include activities such as defining the problem and identifying its key components, developing and communicating a long-term vision for the group, assigning task roles, coordinating group members' actions, facilitating information exchange, evaluation, and analysis, proposing problem solutions, and determining and enforcing performance standards (Lord, 1977; Bass, 2008). The second category includes behaviors that build and maintain a positive relational climate within the group (Fleishmen, 1953; Stogdill, 1963; Lord, 1977; Blake & Mouton, 1978). These social-focused leadership behaviors involve activities that foster strong interpersonal relationships between group members, motivate members to exert their full effort towards group tasks, and ensure members feel their work has meaning and purpose (Burns, 1978; Bass, 2008). Examples of social-focused leadership behavior include demonstrating respect and consideration for the needs of other group members, acting to resolve interpersonal conflicts, and encouraging members to focus on the welfare of the group (Yukl, 2006). In this dissertation, I propose that leadership interactions are initiated when an actor engages in task-focused or social-focused leadership behavior.

The simple enactment of task-focused or social-focused behavior, however, does not result in leadership influence unless the target of the behavior responds by modifying his or her own behavior or thoughts in a way that is relevant to the original leadership action (Jones & Gerard, 1967; Mehrabian, 1969; Davis & Perkowitz, 1979; DeRue & Ashford, 2010). For example, a relevant response to a proposed plan for overcoming a task problem might involve asking for clarifying information about the plan, internally committing to dedicate oneself to the plan, or altering ones' work activities in the manner suggested by the plan (Lord, 1977; Capella, 1997). Receiving a relevant response to leadership behavior means the agent of the behavior has successfully exerted some degree of influence over the target (Davis & Holtgraves, 1984). Although the agent is unlikely to determine the exact nature of the target's response, the target's responsiveness allows the agent to influence its general content area. Responsiveness also often facilitates the perception of a relationship between members of an interaction. If the target of a leadership behavior is unresponsive, both members of the interaction may be left feeling like there is not a true connection between them, and that a leadership relationship does not exist (Davis & Perkowitz, 1979).

It is important to note that the two-part "interact" outlined above describes only the most basic unit of leadership, in which one individual unilaterally influences another. More complex leadership interactions can and do result when multiple basic leadership units are linked together in a single exchange. When this occurs, leadership interactions become double (or even triple or quadruple) interacts and produce reciprocal (or mutual) leadership influence (Weick, 1979; Darley & Fazio, 1980; Lord & Maher, 1991; DeRue,

2011). In these reciprocal leadership interactions, the target responds to the agent's initial leadership behavior with leadership of his or her own, which in turn receives a relevant response from the agent. A reciprocal leadership interaction might involve, for instance, one partner reminding the other of the importance of adhering to their group's core values, the other partner jumping in to suggest how the pair could change their approach to a shared task to align more closely with these values, and then the original member pointing out a flaw in the suggestion and offering a counterproposal. In this example, the individuals' mutual responsiveness to each others' leadership produces a more complex, reciprocal, leadership interaction in which each individual builds on and improves the other's leadership with leadership of his or her own (Davis & Perkowitz, 1979).

As members of a group engage in leadership interactions, dyadic leadership relationships develop between them. While individuals' initial behavior in leadership interactions may be shaped by many factors, including their formal hierarchical position, self-concept, perceptions of the other party, motivation, abilities, and experiences (Howell & Shamir, 2005; DeRue & Ashford, 2010), as they interact with a particular partner over time they will develop a sense of "being-in-relation" (Miller, 1991, pg. 13) to that individual based on the nature and outcomes of their prior leadership exchanges (Graen & Uhl-Bien, 1995). When this occurs, leadership interactions between the two individuals will assume a more stable and predictable character (Jordan, 2004). Leadership relationships that develop such that they include clearly established leader and follower roles and are characterized by unidirectional interactions can be referred to as *unidirectional leadership relationships*. Leadership relationships as they are typically

described in the literature are unidirectional. However, if both members of a leadership relationship commonly serve as agents in successful leadership interactions, if a clearly defined follower role does not emerge, and/or if leadership interactions between the two members involve tend to involve multiple interacts such that they are reciprocal rather than unidirectional, a *reciprocal leadership relationship* can be said to exist between the two members. In reciprocal leadership relationships, both parties acknowledge each other as leaders and are mutually responsive to each others' leadership efforts (Gittell & Douglass, 2012).

The existence of reciprocal leadership relationships might seem unlikely given the hierarchical manner in which leadership relationships have traditionally been described. However, the shared leadership literature has hinted at the importance of reciprocity and mutual influence in leadership relationships. For instance, Katz and Kahn (1978) suggested that in some groups, members voluntarily and spontaneously offer their influence to each other in pursuit of shared goals. Rost (1995) and Carson and colleagues (2007) described shared leadership as involving a form of mutual leadership influence that transcends traditional notions of leader and follower, while Klein, Ziegert, Knight, and Xiao (2006) described how the active leadership role shifted dynamically and fluidly between multiple members of a hospital's emergency action teams. Finally, Gittell and Douglass (2012) argued for the presence of reciprocal leadership relationships characterized by "a collective self-control," that involves "recognizing authority in each position, based on the knowledge associated with it" (pg. 719).

Moreover, real-world illustrations of reciprocal leadership relationships abound. Dwayne Wade of the NBA's Miami Heat provided an example of reciprocal leadership as he described his relationship with teammate LeBron James (Windhorst, 2011).

> "From Day 1 we kind of understood even from our teammates that we were going to be the two guys that everyone looked at to see how we reacted to things. To see how we handled the change, to see how we reacted to playing with each other. We realized that and it is something we communicated and talked about from the beginning, that we had to be always on the same page. And if we weren't on the same page, always communicate with each other. Having each other's back in bad times or good times….There's been times where he's gotten on me for something and vice versa. If I make a mistake and he calls me out on it ... I might say you're right. Sometimes I won't agree with him and I'll say, 'I don't agree,' and we'll move on. We'll come back later and we'll discuss it. We're not always patting each other on the back. Our job is to get the best out of each other so when we see an opportunity to do that, we have to be leaders and step up and do that."

In this excerpt, Wade describes a relationship in which two players who recognize each other as leaders and who are viewed as leaders by their teammates work together to construct generative dialogue, resolve conflict, serve as role models, and monitor and correct each other's behavior. Neither member of the relationship is a follower in the traditional (vertical) sense. Rather, both partners easily move from leading to following and back again – sometimes exchanging roles multiple times in the same interaction – as they push each other for the betterment of the group.

If interactions between members of a work group seldom or never result in leadership influence, a leadership relationship does not exist between the two individuals. A leadership relationship can fail to develop in a dyad if neither partner attempts to lead the other, or if the partners do not reinforce each others' leadership attempts with relevant

responses (DeRue & Ashford, 2010), or both. The absence of a leadership relationship between two individuals does not imply that the individuals do not interact with each other socially, or work together on group tasks. However, it does imply that their interactions are likely to be based on accomplishing predetermined goals using predetermined procedures. When a situation arises for which existing policy does not adequately prescribe a course of action, interpersonal problems arise, or other opportunities for leadership present themselves, members who are not connected by a leadership relationship are likely to seek leadership from other sources in the group.

Leadership structures, the enduring patterns of leadership activity within groups, result from different arrangements of dyadic leadership relationships between group members. As Giddens (1986) noted, "the structural properties of social systems exist only in so far as forms of social conduct are reproduced chronically across time and space" (pg. xxi). Indeed, structure is frequently conceptualized as a patterning of social relations. In the case of group leadership structures, these patterns emerge as leadership relationships develop or fail to develop between group members. Members' sense of "being-in-relation-to" each other then influences their behavior when an opportunity for leadership arises. Individuals who have assumed leadership roles in unidirectional leadership relationships will typically respond to leadership opportunities by engaging in leadership behavior themselves. In contrast, individuals who have assumed follower roles will tend to look to their leaders for suggestions about how they should behave and then attempt to implement those suggestions. Members of reciprocal leadership relationships will either initiate a leadership interaction themselves, or wait for their partner to initiate

a leadership interaction and, if necessary, build on the initial behavior with their own leadership. Group members who do not have leadership relationship with each other will tend not to engage in leadership interactions at all.

Thus, I propose that the presence and absence of dyadic leadership relationships among members of a group are the building blocks of group leadership structures. While others have attempted to explicate the relational dynamics underlying group leadership activity, my theorizing is less grounded than prior approaches in theories of identity (e.g. DeRue, 2011) and social exchange (e.g. Seibert, Sparrowe, & Liden, 2003), and more deeply rooted in the literatures on influence (Kipnis et al., 1980; Yukl & Tracey, 1992), communication (Davis & Perkowitz, 1979; Davis & Holtgraves, 1984; Capella, 1997), leadership behavior (Bales, 1953; Stogdill, 1963; Blake & Mouton, 1978; Fiedler, 1967; Bass, 2008) and relationships (Jordan, 2004; Gittell & Douglass, 2012; Graen & Uhl-Bien, 1995). Further, while prior theories have assumed double interacts form the foundational units of leadership influence, the present approach adopts the interact as the most basic leadership unit, and argues that whether leadership activity between two individuals tends to be characterized by single or double interacts is a key factor differentiating reciprocal and unidirectional leadership relationships (and structures). In the following section, I integrate concepts from social network analysis with the approach developed above to articulate the differences between the shared and vertical leadership models.

Differentiating Between Shared and Vertical Leadership Structures

To enable greater clarity in my theorizing, I focus on comparing the patterns of dyadic leadership relationships in the pure-type shared and vertical leadership structures[1], which are depicted in Figure 2. The prototypical vertical leadership structure, depicted in Figure 2a, reflects the pattern of intra-group leadership relationships described by functional theories of hierarchy and implicitly assumed by most leadership research. In this structure, a single individual (usually the group's formally designated leader or manager) fulfills all of the group's leadership responsibilities by initiating unidirectional leadership interactions (Mehra et al., 2006). Other group members adopt follower roles and do not attempt to lead each other or the individual who was assigned or has emerged as the leader (DeRue & Ashford, 2010). Rather, they focus on executing the single leader's directives to the best of their ability (Biggart & Hamilton, 1984; Dornbusch & Scott, 1975). In contrast, the prototypical shared leadership structure, depicted in Figure 2b, represents the most extreme example of the type of leadership described by shared leadership models (Carson et al., 2007; Mehra et al., 2006; DeRue, 2011). In this structure, leadership emerges from a pattern of reciprocal influence among group members rather than a set of activities performed by a single designated manager. In the pure-type shared leadership structure, every group member initiates leadership

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[1] In actuality, most real-world groups likely develop hybrid leadership structures that combine elements of both the shared and vertical models. Studies of informal leadership have found that many groups have multiple members who play a leadership role (Slater, 1955; Etzioni, 1965; Oh, Chung, & Labianca, 2004), but that in most groups, even those without formally designated managers, a relatively small cohort of individuals tend to emerge as leaders (Shaw, 1964; Krackhardt, 1994; Mehra et al., 2006). Nevertheless, understanding the structural properties that distinguish between the prototypical shared and vertical leadership structures is valuable because it will enable researchers to determine whether a given leadership structure is "more shared" or "more vertical."

interactions with every other group member and all members are mutually responsive to each others' leadership (Pearce & Conger, 2003; Pearce & Sims, 2002; Carson et al., 2007).

Figure 2. The shared and vertical leadership models.
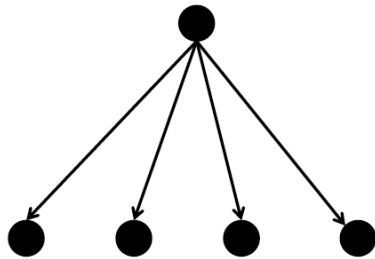
A. Vertical leadership model   B. Shared leadership model
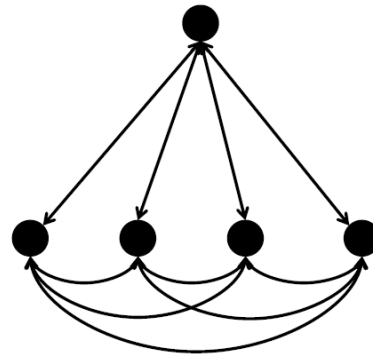
I have argued that group leadership structures result from the dyadic leadership relationships that form between group members. As such, the shared and vertical models can be described using concepts from social network analysis (Wasserman & Faust, 1994; Mayo et al., 2003; Carson et al., 2007; DeRue, 2011). In a network approach, group leadership structures are conceptualized as "networks" of leadership activity, with nodes (circles) representing group members and the ties (arrows) between members representing dyadic leadership relationships between members. Moreover, the differences between the patterns of dyadic leadership relationships assumed by the shared and vertical leadership models can be articulated in terms of network properties. Three

properties are particularly useful in differentiating between shared and vertical leadership

structures: the density of the dyadic leadership relationships in the structure, the

centralization of the dyadic leadership relationships in the structure, and the reciprocity of

the dyadic leadership relationships in the structure. Below, I more fully describe each of

these structural properties.

Density. The density of a group's leadership structure refers to the percentage of

possible dyadic leadership relationships in the group that actually form (Wasserman &

Faust, 1994; Coleman, 1988). Figure 3a displays a high and a low density leadership

structure. In the prototypical vertical leadership structure, one individual initiates

leadership interactions with each of the other group members, but the other members do

not lead each other (DeRue & Ashford, 2010). As such, dyadic leadership relationships

form between the individual who has emerged as the leader and all other group members,

but other members do not form leadership relationships amongst themselves. In contrast,

in the prototypical shared leadership structure all group members are fully engaged in

leading the group (Pearce, 2004), and members are receptive to informal leadership from

multiple group members (Carson et al., 2007). As a result, more dyadic leadership

relationships develop between the group members of groups that share leadership,

producing denser leadership structures.[2]

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[2] Burt (1980; 1992) has proposed that constraint, which is related to density, is another defining
characteristic of networks. He defines constraint as the extent to which networks contain structural holes
(groups of individuals who are not otherwise connected to each other). However, Burt (2002) noted that
high constraint can result either from a network of contacts that are all connected to each other (i.e. the
shared leadership model) *or* from a network of contacts that are all strongly tied to one central actor (i.e. the

vertical leadership model). Because both the shared and vertical leadership models are high in constraint, I do not consider constraint in the present discussion.

Figure 3. Three differences between shared and vertical leadership structures.

<table>
<tr><td></td><td align="center">*More shared*</td><td align="center">*More vertical*</td></tr>
<tr><td>A</td><td align="center">High density leadership structure</td><td align="center">Low density leadership structure</td></tr>
<tr><td>B</td><td align="center">Decentralized leadership structure</td><td align="center">Centralized leadership structure</td></tr>
<tr><td>C</td><td align="center">Reciprocal leadership structure</td><td align="center">Unidirectional leadership structure</td></tr>
</table>
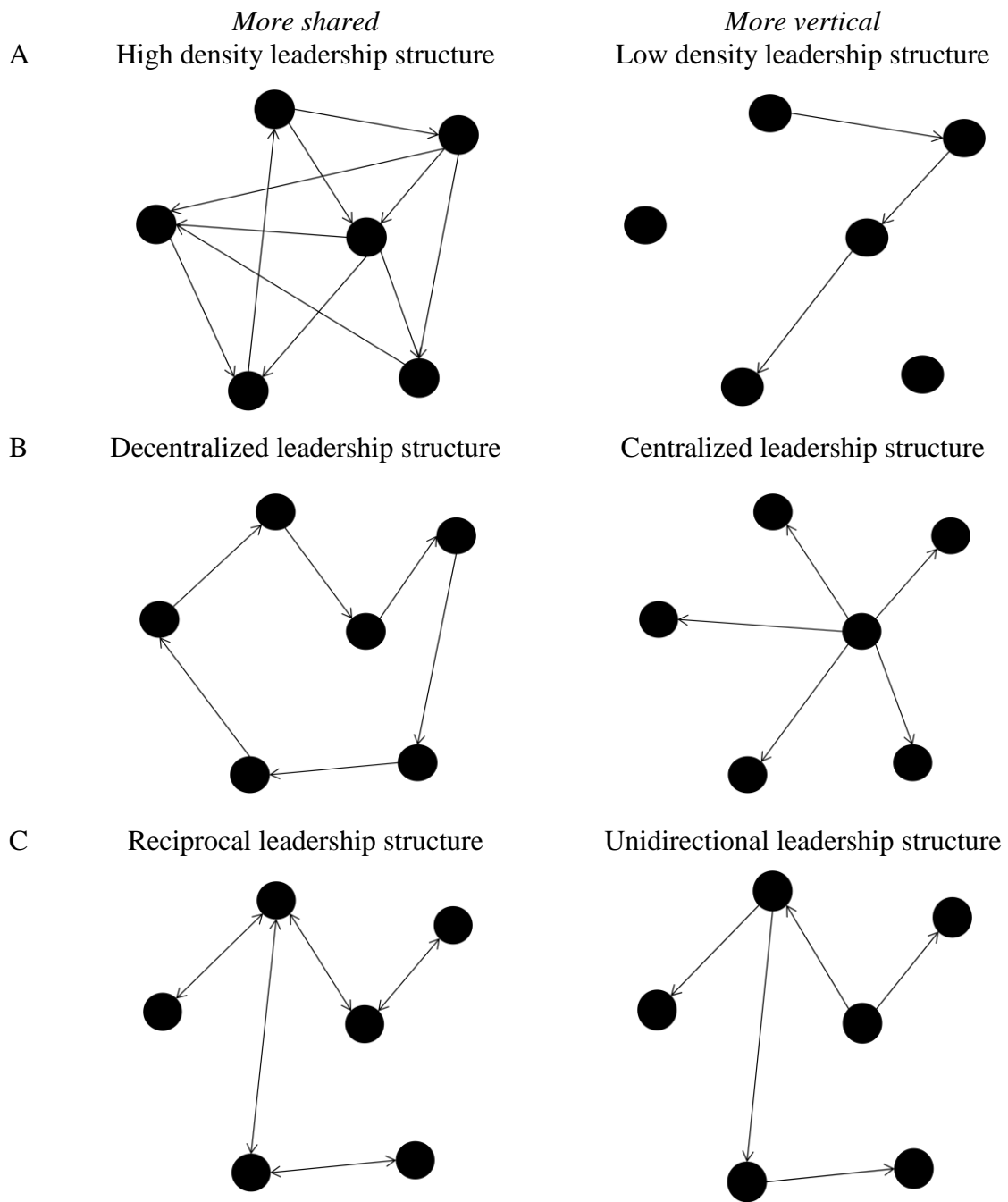
Centralization. Another important differentiator between shared and vertical

leadership structures is the extent to which a group's dyadic leadership relationships are

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centralized (Freeman, 1977; 1979). Although network scholars have identified many different types of centralization (e.g. degree, closeness, betweenness, eigenvector), I focus on degree centralization, which I define as the extent to which a single individual habitually serves as the leader in all of the group's dyadic leadership relationships. This choice is consistent with my theoretical argument that leadership influence accrues to individuals primarily as a result of their initiating successful dyadic leadership interactions (rather than "passing" leadership messages between otherwise unconnected individuals).

Figure 3b depicts a decentralized and a centralized leadership structure. The prototypical vertical leadership structure is highly centralized. In this structure the group member who emerges as the leader of a group is responsible for initiating all of the group's leadership interactions. No other group member provides any leadership (Mehra et al., 2006; Carson et al., 2007). In contrast, the prototypical shared leadership structure is highly decentralized. All group members contribute equally to the leadership process and no one individual serves as a leader in a disproportionate number of relationships (Pearce & Conger, 2003). As such, leadership structures can be considered more shared to the extent that they are low in centralization. Interestingly, despite the fact that the decentralization of leadership is frequently mentioned as a key differentiator of shared leadership structures (e.g. Pearce & Sims, 2002; Pearce & Conger, 2003; Ensley et al., 2006; Carson et al., 2007), centralization has seldom been used as an indicator of shared leadership in empirical examinations (although see Mehra at al., 2006, for one exception).

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Reciprocity. The reciprocity of dyadic relationships is the final attribute that distinguishes between shared and vertical leadership structures (Katz & Powell, 1955). A dyadic leadership relationship is reciprocal if both partners habitually initiate unidirectional leadership interactions, or if leadership interactions between the partners tend to be reciprocal rather than unidirectional, or both. Figure 3c depicts a reciprocal and a unidirectional leadership structure. All of the dyadic leadership relationships in the prototypical shared leadership structure are reciprocal. In contrast, the relationships in the prototypical vertical leadership structure are all unidirectional.

While I have described the three network properties differentiating shared and vertical leadership structures separately, it is important to note that they are not completely independent. For example, because both members of reciprocal leadership relationships frequently initiate leadership interactions, while only one member of unidirectional leadership relationships initiates leadership interactions, reciprocal leadership structures should tend to be denser and more decentralized than unidirectional leadership structures. Similarly, because the densest leadership networks can only occur when multiple group members initiate leadership interactions, the density and centralization of a group's leadership structure are likely to be negatively correlated. Although the density, centralization, and reciprocity of a group's leadership structure are related, each of these three properties is fundamentally different and impacts group functioning through a unique set of mechanisms (Wasserman & Faust, 1994). As such, in this proposal I define, theorize about, measure, and analyze the three properties as independent constructs.

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CHAPTER III

Enabling Shared Leadership in Hierarchical Groups

In this chapter, I develop theory explaining the causes and consequences of group leadership structures in hierarchical contexts. I describe how introducing formal hierarchical differentiation into groups by formally designating one or more members as a leader should encourage the development of vertical rather than shared leadership structures. I propose, however, that this relationship is contingent upon several aspects of the group context: namely, the level of empowering behavior performed by the groups' designated manager, the level of positive mood in the group, and group members' shared mental models of how leadership is most appropriately structured. I then go on to argue that hierarchically differentiated groups that develop more shared leadership structures should outperform groups with more vertical structures with respect to several important outcomes.

Hierarchy Inhibits the Development of Shared Leadership Structures

The extent to which shared leadership structures are possible in hierarchically differentiated groups remains an open question. The vast majority of studies employing

shared leadership models have focused on workgroups that are intentionally designed to eliminate hierarchy (e.g. Manz & Sims, 1987; Hiller et al., 2006; Carson et al., 2007). The failure of shared leadership models to acknowledge the potential for hierarchical differentiation to influence the emergence of informal leadership in groups is particularly interesting given that research on power and authority suggests that assigning group members to management positions should tend to discourage informal leadership activity, resulting in leadership structures that are more vertical, rather than more shared (Blau, 1964; Weber, 1968; Keltner, Gruenfeld, & Anderson, 2003; Galinsky, Gruenfeld, & Magee, 2003; Anderson & Brown, 2010). Due to their position in the formal organizational structure, designated managers are endowed with a disproportionate amount of organizational resources, making them unusually powerful (Emerson, 1962; Keltner et al., 2003). Managers occupy what are said to be "linking pin" positions in the formal organizational structure (Likert, 1961), connecting their groups to flows of communication, information, and influence from higher levels of the organization (Graen, Cashman, Ginsburg & Schiemann, 1977). Managers also play a key role in organizational feedback and promotion processes, and are often endowed with the ability to assign group members to particular tasks (Bass, 2008). As such, designated managers have a unique ability to reward and punish group members by granting or denying access to promotions or desirable jobs (French & Raven, 1959). Finally, managers are endowed with legitimate power by virtue of their formal position, which influences the social interaction process through which leadership structures develop (DeRue & Ashford, 2010). Group members tend to recognize the right of higher-ranking members to lead and

to defer to their leadership in most situations (Barnard, 1938; Emerson, 1962; Mechanic, 1962).

The power imbalances created by assigning one or more group members to managerial positions should produce sparser, more centralized, and more unidirectional leadership structures by influencing the behavior and perceptions of group members who are not formally designated as leaders (whom I refer to in this dissertation as non-designated leaders, or NDLs). For shared leadership structures to emerge in groups with formal hierarchies, leadership relationships must develop between NDLs, and within the group as a whole, that are reciprocal rather than unidirectional. These relationships can develop only if NDLs consistently 1) initiate leadership interactions by engaging in leadership behavior, and 2) respond to each others' leadership attempts by changing their own behavior in a relevant way (Katz & Kahn, 1978; Carson et al., 2007). The available evidence suggests, however, that introducing hierarchical differentiation in groups should reduce the likelihood that either of these conditions will be met.

Formally appointing managers in groups is likely to cause NDLs to look to their managers to lead them rather than attempting leadership themselves (DeRue & Ashford, 2010). The tendency of individuals to defer to others they believe to be legitimate authority figures is well-documented. For instance, participants in experiments conducted by Milgram (1974) delivered what they believed to be a series of increasingly harmful electric shocks to others simply because they were ordered to do so by an authority figure (in this case, an experimenter in a lab coat). Instead of attempting to lead by influencing the experimenter to discontinue the experiment, most participants complied with the

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experimenter's instructions despite being extremely uncomfortable with their behavior. In a similar vein, more recent research on the psychological consequences of power and powerlessness suggests that individuals assigned to subordinate roles are less likely than individuals assigned to managerial roles to engage in leadership-like forms of proactivity (Galinsky et al., 2003), and more likely to view themselves as instruments of authority figures (Keltner et al., 2003). This evidence suggests that designating certain members of a group as managers should tend to discourage leadership behavior from the other group members. Taken to the extremes, Gemmill and Oakley (1992) have argued that a collective reliance on formal authority figures in coordinate work activities can become "an iatrogenic social myth that induces massive helplessness among members of a social system" (pg. 115).

Formally appointing a group manager should also decrease the likelihood that NDLs in the group will respond in a relevant way to informal leadership attempts. Because members of hierarchically arranged groups expect the designated manager to be the primary leader, they will be less likely to notice leadership behaviors performed by other members of the group (Lord & Maher, 1991; DeRue & Ashford, 2010). In the event that group members do recognize that a non-designated manager is attempting to lead them, this attempt is likely to be viewed as illegitimate and a threat to the groups' established social order. For example, in a controlled experiment Anderson and colleagues (Anderson, Srivastava, Beer, Spataro, & Chatman, 2006; Anderson, Ames, & Gosling, 2008) found low-status individuals who engaged in leadership were liked and accepted less by their peers and perceived as more disruptive to group processes than

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individuals who did nothing. Thus, informal leadership attempts in hierarchical groups are unlikely to receive the relevant response necessary for them to be successful. In extreme cases, non-managers who attempt to lead may even be met with social sanctions or rejection by other group members (Anderson et al., 2006).

The increased resources and authority possessed by designated managers in hierarchically differentiated groups, combined with the tendency of NDLs to defer to the managers' leadership, should cause the managers to assume a leader role in unidirectional leadership relationships with other group members. Subordinate group members are likely to adopt follower roles in which they do not attempt to lead either the designated manager or each other. Additionally, NDLs should be less likely to recognize each other's leadership attempts, and informal leadership attempts that are recognized will be perceived as illegitimate, causing fewer leadership relationships to form between subordinate group members. Thus, groups with formal hierarchical differentiation should tend to develop leadership structures that are less dense, more centralized, and less reciprocal than groups with less differentiation.

Hypothesis 1. Hierarchical differentiation in groups reduces the a) density, b) decentralization, and c) reciprocity of the groups' leadership structure.

Overcoming the Influence of Hierarchy

Most modern organizations employ some degree of formal hierarchical differentiation (Leavitt, 2005; Tannenbaum, Kavcic, Rosner, Vianello, & Wieser, 1974). These organizations face a fundamental challenge in that they operate in environments that demand ever higher levels of creativity, innovation, and adaptability – the very

capabilities thought to be enhanced by shared leadership structures (Pearce & Conger, 2003; Pearce, 2004; Adler, Kwon, & Heckscher, 2008) – but are designed in a manner that is likely to restrict the sharing of leadership activity. Thus, in addition to explaining the influence of formal hierarchy on the leadership structures that emerge in groups, it is important to identify the ways hierarchically differentiated groups and organizations can encourage the emergence of shared leadership structures.

Two theoretical perspectives guide my exploration of the factors that can enable hierarchical groups to overcome the tendency towards vertical leadership structures: power theory (French & Raven, 1959; Blau, 1964; Emerson, 1962; Conger & Kanungo, 1988; Spreitzer, 1995; 1996; Keltner et al., 2003) and dual-process theories of motivation (Zajonc, 1980; Carver & Scheier, 1981; Metcalfe & Mischel, 1999; Haidt, 2001). Previously, I argued that the power imbalances created by hierarchical differentiation play a major role in inhibiting shared leadership. Power theory suggests that reducing these power imbalances might be one way to promote shared leadership activity. One way of doing this would be to implement self-managing teams, which do not have a formally designated manager (e.g. Manz & Sims, 1987). However, because I am explicitly focusing on groups that are hierarchically differentiated, I identify empowering behavior by designated managers (Emerson, 1962; Blau, 1964; Homans, 1974; Kirkman & Rosen, 1997, 1999; Chen, Kirkman, Kanfer, Allen, & Rosen, 2007) as an alternative means of reducing intra-group power imbalances.

Empowering Managerial Behavior

Theories of power and empowerment suggest it should be possible for designated managers to reduce the salience of the power imbalances in hierarchical groups through their behavior (Emerson, 1962; Blau, 1964; Homans, 1974; Kirkman & Rosen, 1997, 1999). If designated managers behave in a manner that increases other group members' real or perceived power, the managers' their formal authority will shift from a deterrent to patterns of shared leadership to an enabler of such patterns. Consistent with the literature on empowerment, I use the term empowering managerial behavior to describe behaviors by designated managers that increase their group's actual or perceived ability to take actions and make decisions independently (Burke, 1986). These behaviors include giving the group increased responsibility, encouraging the group to set and enforce its own goals, providing the group with information that is relevant to important decisions, staying out of the way when the group works on performance problems, and displaying trust in the group's abilities (Kirkman & Rosen, 1997; 1999; Chen et al., 2007).

I follow previous work (e.g. Seibert, Silver & Randolph, 2004; Chen et al., 2007) in conceptualizing empowering managerial behavior as a shared, group-level construct. Empowering behaviors are thought to be directed at groups as a whole rather than their individual members, and prior research suggests that group members are likely to converge in their perceptions of this sort of ambient behavior (Chen et al., 2007). As group members interact and share stories with each other, they develop a shared sense of the extent to which their designated manager behaves in a manner that enables and encourages informal leadership (Seibert et al., 2004). This shared perception then serves

as an important driver of subordinate group member's informal leadership behavior and their perceptions of other's informal leadership (James & Jones, 1974; Schneider, Bowen, Erhart, & Holcombe, 2000).

Earlier, I suggested that designated managers possess an unusually high degree of information, reward, and legitimate power (French & Raven, 1959; Yukl, 2006) that inhibits leadership behavior in NDLs and makes group members unresponsive to each others' leadership attempts. However, through empowering behavior designated managers can increase subordinates' real and perceived ability to engage in informal leadership. For instance, by providing group members with information that is relevant to important group decisions, designated managers can reduce the discrepancy in information power they enjoy due to their "linking pin" positions in the formal organizational structure (Likert, 1961). Similarly, by staying out of the way when the group addresses performance problems designated managers can reduce their reward power by allowing the group to develop its own system of reward and punishment. Further, by encouraging the group to set its own goals and have high performance standards (Kirkman & Rosen, 1999) designated managers increase the perceived legitimacy of leadership behavior from subordinates and motivates subordinates to take responsibility for important group leadership functions (Morgeson et al., 2010).

By reducing the power differentials within groups, empowering behavior by designated managers should promote the emergence of shared leadership structures. Groups with managers that engage in empowering behavior will have more members who feel motivated and informed enough to initiate leadership interactions. Similarly,

subordinates whose managers encourage the group to take ownership of its task-related problems and social climate will expect each other to lead and be more receptive to each others' leadership attempts. As a result, more leadership relationships will develop between group members who are not designated as managers, resulting in denser, more decentralized leadership structures. By increasing members' receptivity and responsiveness to each others' leadership, managerial empowering behavior will also cause the leadership relationships that develop in groups to be more reciprocal. Thus, hierarchically differentiated groups with designated managers who engage in high (as opposed to low) levels of empowering behavior should be more likely to develop shared (as opposed to vertical) leadership structures.

> *Hypothesis 2. Empowering managerial behavior moderates the relationship between hierarchical differentiation and the development of shared leadership structures such that hierarchical groups with high levels of empowering managerial behavior will develop leadership structures that are more a) dense b) decentralized and c) reciprocal than hierarchical groups with low levels of empowering managerial behavior.*

Power theory suggests that one way to encourage the emergence of shared leadership structures in hierarchical contexts is to reduce the power imbalances that formal hierarchical differentiation produces. However, as it may not always be possible for groups to completely eliminate these imbalances, it is also important to identify aspects of groups that will encourage informal leadership emergence regardless of the power imbalances that might exist. Dual process theories of motivation, suggest two such

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conditions. These theories have identified two relatively separate systems that govern

individuals' attitudes, decisions, and behavior: the rational system and the intuitive

system (Haidt, 2001). The rational system is primarily cognitive. It is characterized by

effortful mental processes that anticipate future conditions, make conscious decisions,

and form behavioral intentions (Smith & DeCoster, 2000). The intuitive system, which is

primarily affective, operates more quickly than the rational system and causes immediate,

affectively driven reactions (Zajonc, 1980; Carver & Scheier, 1981). Thus, dual process

theories suggest that the NDL behaviors that lead to the development of shared leadership

structures can be encouraged by both cognitive factors (which operate via the rational

system) and affective factors (which operate via the intuitive system). Building on this

theoretical base, I identify one cognitive feature [shared mental models about how the

leadership process is best structured in groups, which have been referred to as leadership

structure schemas, (DeRue & Ashford, 2010; Wellman et al., 2013)] and one affective

feature (a high level of positive group mood) of groups that is likely to encourage the

emergence of shared group leadership structures despite the presence of formal

hierarchical differentiation.

Shared Leadership Structure Schemas

A substantial body of research has established that knowledge structures play an

important role in the leadership process (e.g. Lord, Foti, & deVader, 1984; Maurer &

Lord, 1991; Lord & Maher, 1991; Epitropaki & Martin, 2004). Knowledge structures are

the mental templates that individuals rely on to bring form and meaning to complex

environments, thus facilitating their information-processing and decision-making (Walsh,

1995). Traditionally, researchers interested in the role of knowledge structures in the leadership process have focused on implicit leadership theories: individuals' mental prototypes of the attributes and behaviors of "ideal" leaders. Individuals develop implicit theories about the attributes of leaders at a relatively young age (Matthews, Lord, & Walker, 1990) and use these theories to categorize targets as leaders or not leaders based on whether the targets' traits and behaviors "match" the attributes of their leader prototype (Lord & Maher, 1991).

Recently, researchers have suggested that in addition to knowledge structures concerning what leaders do and look like, individuals also develop knowledge structures concerning how leadership should be structured in groups (DeRue & Ashford 2010; Wellman et al., 2013). These knowledge structures, referred to as leadership structure schemas (LSS), can range from a hierarchical model of leadership structure representing a belief that leadership is most effective when initiated by only a single group members (a hierarchical LSS), to a more egalitarian model of leadership structure in which leadership is most effective when all group members engage in leadership behavior (a shared LSS). Research has established that leadership structure schemas develop at both the individual and the group level, and influence group members' leadership-related expectations, perceptions, reactions, and behavior (Wellman et al., 2013).

Existing theory and evidence suggests that over time, groups should converge on a dominant group-level LSS. Douglas (1986) argued persuasively that group membership can shape the content of individuals' knowledge structures. She notes that "our social interaction consists very much in telling one another what right thinking is and passing

blame on wrong thinking. This is indeed how we build the institutions, squeezing each others' ideas into a common shape" (pg. 91). Supporting Douglas' argument, studies of shared mental models suggest that group members develop shared knowledge structures through a process of negotiation and reaction to internal and external events. For instance, problem-solving groups have been found to develop shared mental models of the group task, the location of particular knowledge or information within the group, and common patterns of group interaction (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). Drawing on this work, Wellman and colleagues (2013) proposed that as members of a group interact over time in a common environment, they develop shared leadership structure schemas that represent the groups' dominant understanding about how leadership is most appropriately structured. Therefore, in this dissertation I treat LSS as a shared, group-level construct.

Hierarchically differentiated groups that converge around a shared LSS will be more likely than hierarchical groups that converge around a hierarchical LSS to develop shared leadership structures, for several reasons. First, a shared LSS should make non-designated leaders in hierarchical groups more likely to engage in leadership behavior. Members of hierarchically arranged groups that converge around a hierarchical LSS should tend to believe that leadership is most appropriately initiated by only the groups' designated manager. NDLs in these groups should therefore be unlikely to perceive events as opportunities for leadership or see leadership as their responsibility, and as such should engage in less leadership behavior (Wellman et al., 2013). In contrast, NDLs in groups that converge around a shared LSS view leadership as most effective when all

group members play an active leadership role, and therefore are more likely to view initiating leadership as an appropriate and desirable activity (Ashford & DeRue, 2010). As a result, when an opportunity for informal leadership arises, NDLs in hierarchical groups with a shared group-level LSS will be more likely to respond by engaging in informal leadership behavior than will NDLs in hierarchical groups with a hierarchical group-level LSS.

Convergence around a shared LSS should also increase the extent to which members of groups with formal hierarchical differentiation provide relevant response to leadership behavior from NDLs. Knowledge structures such as leadership structure schemas impact the environmental stimuli individuals attend to and retain (Walsh, 1995). Because members of hierarchical groups that converge around a hierarchical LSS expect leadership to emanate from the designated manager, they may fail to recognize leadership behaviors performed by non-designated managers and therefore not respond to these behaviors. In contrast, members of groups that converge around a shared LSS will be more sensitive to, aware of and attentive to leadership behavior from non-designated managers. Further, because individuals in groups that converge around a hierarchical LSS will tend to view leadership a zero-sum (that is, they believe that there can only be one leader in a group, DeRue & Ashford, 2010), they are likely to view attempts at informal leadership as an effort to overthrow or usurp the group's formally designated manager. This will cause them to perceive the informal leadership behavior as inappropriate and make them less likely to their own activities in response to the leadership behavior. In contrast, members of groups that converge around a shared LSS are more likely to view

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informal leadership as legitimate and important (DeRue & Ashford, 2010), and to respond to informal leadership behavior in a relevant way.

Because NDL members of hierarchically differentiated groups that converge around a shared LSS will be more likely than NDLs in groups that converge around a hierarchical LSS to engage in leadership, and also more likely to be cognizant of and responsive to each other's leadership, groups with a shared LSS will develop leadership structures that contain more leadership relationships, are more reciprocal, and are more decentralized. In other words, a shared LSS will encourage the development of shared leadership structures in hierarchically differentiated groups.

> *Hypothesis 3. Group-level LSS moderates the relationship between hierarchical differentiation and the development of shared leadership structures such that hierarchical groups with a shared LSS will develop leadership structures that are more a) dense b) decentralized and c) reciprocal than hierarchical groups with a vertical LSS.*

Positive Group Mood

While a shared, group-level LSS is a cognitive factor that should promote the development of shared leadership structures by encouraging the formation of stable patterns of leadership behavior and relevant responses between NDLs, dual process theories of motivation suggest affective pathways can be as important as cognitive ones in motivating informal leadership emergence (Zajonc, 1980; Carver & Scheier, 1981; Haidt, 2001). In this section I argue that positive group mood, a form of positive affect, is likely to promote the development of shared leadership structures in groups with

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designated managers (Newcombe & Ashkanasy, 2002; Fredrickson, 2001; Fredrickson & Losada, 2005; Sy, Cote & Saavedra, 2005).

Group moods are diffuse and relatively enduring affective states that are shared among members of a group (Bartel & Saavedra, 2000). Moods are distinct from emotions in several ways. Whereas emotions are typically associated with specific events and are intense enough that they can disrupt thought processes, moods are generalized feeling states that are not typically identified with a particular stimulus and are not sufficiently intense to disrupt thought processes (Clark & Isen, 1982; Brief & Weiss, 2002). Moreover, while emotions tend to be treated in their discrete forms (e.g. anger, fear, joy), moods are most commonly described in terms of whether they are primarily characterized by positive or negative affect. In this dissertation, I adhere to this convention by focusing on positive group mood, which I define as a relatively enduring affective state that is shared among members of a group and that is characterized by predominantly positive feelings (e.g. excitement, happiness, contentment; Tellegen, Watson & Clark, 1999).

Members of groups tend to converge on a common mood (Bartel & Saavedra, 2000; Barsade, 2002). In fact, some have suggested that the experience and development of collective moods is one of the fundamental processes through which a collection of individuals come to perceive themselves as a group in the first place (Sandelands, 1998; Collins, 2004). Group emotional contagion, the transfer of moods among people in a group, is a key driver of mood convergence (Barsade, 2002). Emotional contagion is thought to occur through a rapid-fire process of automatic, continuous, nonverbal mimicry and feedback. In other words, people in groups have an innate tendency to

mimic each others' affective states and once they do this they become more likely to experience these states themselves (Adelmann & Zajonc, 1989; Hatfield, Cacioppo, & Rapson, 1992). Since the emergence of shared moods is an important component of group interaction (Sandelands & Boudens, 2000), I conceptualize positive group mood as a shared, group-level construct (Kozlowski & Klein, 2000).

Positive group moods are likely to enable shared leadership structures in hierarchically differentiated groups by encouraging informal leadership behavior and making members more receptive to each other's leadership. Members of groups with shared positive moods should experience more positive affect, which they are likely to experience as intrinsically rewarding (George, 1990). Sociological theories of relational cohesion suggest that when individuals experience positive emotions in a group setting, they tend to attribute these emotions to their group membership, which strengthens their perceived connection to the group and motivates them to invest time and energy in helping the group succeed (Lawler & Yoon, 1996; Lawler, Thye, & Yoon; 2000; Lawler, 2001). One way members of hierarchically differentiated groups with high levels of positive mood are likely to attempt to assist their group mates is by engaging in informal task-focused and social-focused leadership behaviors intended to help direct group activities and maintain a cohesive social climate (Van Vugt, 2006). Thus, while hierarchical differentiation should tend to inhibit informal leadership behavior, this influence should be less pronounced in groups that have extremely cohesive and committed members as a result of a high level of positive mood.

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Similarly, an extremely positive group mood will encourage group members to be more open and responsive to each other's informal leadership behavior. The routinely high levels of positive affect experienced in groups with a positive mood will increase members' openness to new ideas and possibilities and reduce their reliance on conventional patterns of thought and behavior (Fredrickson, 2001). Because leadership frequently involves attempts to convince others to abandon or modify existing routines, strategies and mindsets in favor of new approaches, the increased openness to exploring new possibilities displayed by members of hierarchical groups with positive moods will cause these individuals to be more receptive to each others' leadership behavior. The feelings of mutual obligation and unity created by a positive mood will also encourage group members to support each other by providing relevant responses to each other's leadership behavior (Lawler, 2001). In contrast, members groups that do not experience positive affect as frequently will be more likely to view each other's leadership attempts with disapproval and cynicism and feel less connected and obligated to each other. As such, leadership behaviors by members of these groups are more likely to be unnoticed, rejected, or ignored, and fewer leadership interactions are likely to proceed to completion.

By increasing group cohesion and commitment, a positive group mood should promote informal leadership in subordinate group members and make group members more responsive to each others' informal leadership. As a result hierarchical groups with a positive mood should develop patterns of dyadic leadership relationships that are denser, more dispersed throughout the group, and more reciprocal.

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Hypothesis 4. Positive group mood moderates the relationship between hierarchical differentiation and the development of shared leadership structures such that hierarchical groups with a more positive mood will develop leadership structures that are more a) dense b) decentralized and c) reciprocal than hierarchical groups with a less positive mood.

Consequences of Group Leadership Structures

Research on the consequences of shared leadership has established that groups in which there is more overall leadership (in other words, groups that have denser leadership networks) tend to perform better in situations involving ambiguity, complexity, and high interdependence than groups with less dense leadership structures (e.g. Pearce & Sims, 2002; Hiller et al., 2006; Ensley et al., 2006; Carson et al., 2007). Similarly, the network literature has established that dense informal social networks in groups can improve group performance (Sparrowe, Liden, Wayne, & Kraimer, 2001; Coleman, 1988). While this research has been instrumental in encouraging researchers to move beyond the restrictive assumptions of the vertical leadership model, there are many reasons why it is important to investigate the consequences of group leadership structures in more detail. First, I have identified three features (density, centralization, and reciprocity) that can be used to differentiate between shared and vertical leadership structures, but existing research has primarily investigated the consequences of only one of these features (density). As a result, the relationship between the centralization and reciprocity of leadership structures and group and individual outcomes is in need of additional research attention. Second, the opportunity exists to enrich shared leadership models by more fully

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articulating the mechanisms, or "the theoretical cogs and wheels that explain how and why" (Anderson et al., 2004, pg. 1) shared leadership structures relate to group outcomes (Hedstrom & Swedberg, 1998; Elster, 1998). Third, shared leadership theory has virtually ignored the possibility that shared leadership structures may produce harmful as well as helpful outcomes for groups. However, if members of groups with shared leadership structures struggle to successfully integrate their disparate perspectives and opinions into a unified leadership effort, receiving leadership from multiple sources may be detrimental to groups. Thus, it is important to investigate the potential for negative consequences or drawbacks associated with shared leadership structures. Finally, because existing research has tended to focus on the group-level consequences of shared leadership structures, little is known about how shared leadership structures impact individual group members.

In this section, I provide a more comprehensive consideration of the consequences to groups and their members of the emergence of more shared, as compared to more vertical, group leadership structures. First, I identify absorptive capacity, a group's ability to "identify, assimilate, and exploit knowledge from the environment" (Cohen & Levinthal, 1990, pg. 569) as an important mechanism through which shared leadership structures can improve group performance. Second, I consider the relationship between shared leadership structures and various forms of intra-group conflict (Jehn, 1995; 1997; Jehn et al., 1999), which represent potentially undesirable group outcomes. Third, I propose in addition to increasing absorptive capacity and performance at the group level, shared leadership structures also can be important drivers of satisfaction and growth at

the individual level. Finally, to enable a more precise understanding of the consequences of different aspects of shared leadership structures, I develop distinct predictions about the relationships between each of the three differentiating properties of group leadership structures I have identified (density, centralization, and reciprocity) and my outcomes of interest.

Group Absorptive Capacity

To date, absorptive capacity has primarily been studied at the firm level of analysis as a predictor of organizational learning (Mowery, Oxley, & Silverman, 1996; Zahra & George, 2002). In their initial exposition of the absorptive capacity construct, however, Cohen and Levinthal (1990) suggested that absorptive capacity is likely to play a critical role in determining the innovation and adaptability of units at multiple levels of analysis, including the group level. In this section, I propose that increasing group-level absorptive capacity is one important means by which shared leadership structures improve the performance of groups operating in complex and ambiguous environments. In so arguing, I challenge a central assumption in the absorptive capacity literature: that the ability of a group or organization to evaluate and utilize external knowledge is primarily a function of members' prior related knowledge (e.g. Cohen & Levinthal, 1990; Zahra & George, 2002; Lane, Koka, & Pathak, 2006). I propose that simply having group members who possess knowledge that is relevant to environmental information is not sufficient to ensure that this information will be attended to and ultimately incorporated into a group's ongoing functioning. Internal group processes and structures, and particularly leadership processes and structures, should also play a role in determining

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absorptive capacity. In the remainder of this section, I explain why groups with leadership structures that are more shared should possess a greater capacity to identify, assimilate, and exploit external knowledge than groups with knowledge structures that are more vertical.

Leadership structures that are dense – that is, which contain a high number of dyadic leadership relationships – should increase groups' absorptive capacity. Because a greater number of leadership relationships exist in denser structures, the overall level of leadership activity in these structures is higher. Members of groups receiving more overall leadership should have a clearer sense of their group's objectives and be more motivated to take actions to help the group reach those objectives (Burns, 1978). They will therefore be more likely to seek out external sources of information that are related to problems or issues the group might be facing (Ancona & Caldwell, 1992). Similarly, an important aspect of the task-focused component of leadership involves facilitating information exchange and the evaluation, analysis and integration of this information (Lord, 1977; DeRue et al., 2011). Groups whose members engage in more leadership should be more likely to share the knowledge they receive from external sources with each other (Tsai, 2002) and incorporate external knowledge into their processes and routines (Nonaka, 1994).

Decentralized leadership structures, in which a large number of group members serve as agents in dyadic leadership relationships, should also enhance groups' absorptive capacity. In groups with centralized leadership structures, a small number of individuals are responsible for initiating the majority of the groups' leadership interactions. Other

group members rely on these individuals for direction and may even isolate themselves from outside sources of information, preferring to rely on the information provided by the designated manager (McCauley, 1989). Because fewer group members engage in leadership behavior in groups with centralized leadership structures, communication and decision making in these groups is likely to be dominated by the opinions and perspectives of a few individuals, resulting in an incomplete survey of alternatives, a failure to examine the risks of preferred choices, and a reluctance to re-examine previously rejected alternatives (Janis, 1982). In contrast, in decentralized leadership structures multiple group members, each of whom possesses a unique knowledge base and network of external relationships (Mehra et al., 2006), play an active role in directing the group's activities and establishing its social climate. As a result, the group is likely to utilize a larger, more diverse knowledge base when making decisions, which should improve its ability to generate creative and innovative outcomes (Austin, 1997; McLeod, Lobel & Cox, 1996; Milliken, Bartel, & Kurtzberg, 2003).

Groups with more reciprocal leadership structures, which are characterized by dyadic leadership relationships in which both members frequently engage in leadership and are responsive and supportive of each others' leadership attempts, should also have a greater absorptive capacity than groups with less reciprocal structures. Leadership structures that are less reciprocal contain primarily unidirectional dyadic leadership relationships. These relationships are characterized by unidirectional leadership interactions in which the individual who emerges as a follower does not attempt to improve upon the suggestions of the individual who emerges as a leader. Individuals

adopting a follower role in unidirectional relationships see their job as passively responding to the leader (Collins, 2004). As such, they will be less inclined to advocate on behalf of their own opinions when interacting with the leader, inhibiting the extent to which their external knowledge or diverging perspectives are incorporated in the strategies and routines adopted by the group (Morrison & Milliken, 2000; De Dreu & West, 2001). In contrast, groups with reciprocal leadership structures are characterized by predominantly reciprocal leadership relationships. The more complex leadership interactions that occur in these kinds of relationships will allow both partners in the relationship to build upon and learn from each others' ideas. This free exchange of leadership influence should foster absorptive capacity by enabling group members to synchronize and combine their leadership efforts (Gittell, 2003; Mehra et al., 2006).

Hypothesis 5. The a) density, b) decentralization, and c) reciprocity of group leadership structures is positively related to the group's absorptive capacity.

Group Performance

I further propose that the absorptive capacity enabled by the development of shared leadership structures is a key mechanism through which shared leadership improves group performance. For modern groups, which frequently must navigate tasks that are highly complex and require high levels of creativity, successful performance often depends upon the creation, distribution, or application of ideas or information (Pearce, 2004; Blatt, 2008). Absorptive capacity is likely to improve groups' ability to perform these functions by increasing the extent to which they are able to benefit from relevant knowledge in their external environments (Morgeson et al., 2010; Pearce &

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Conger, 2003; Uhl-Bien et al., 2007). The ability to locate and utilize knowledge from external sources has been shown to increase groups' ability to develop innovative solutions to complex business issues (Ancona & Caldwell, 1992; Myers & Marquis, 1969; von Hippel, 1988; Cohen & Levinthal, 1990). Indeed, research suggests that the seeds of most performance-improving innovations are borrowed from prior adopters rather than being cultivated completely in-house (March & Simon, 1958). Thus, the increased absorptive capacity shared leadership structures produce in groups should improve group performance by making the groups more likely to share information and to develop and implement innovative processes and technologies.

> *Hypothesis 6. The a) density, b) decentralization, and c) reciprocity of group leadership structures is positively related to group performance.*
>
> *Hypothesis 7. The positive relationship between the a) density, b) decentralization, and c) reciprocity of group leadership structures and group performance is mediated by absorptive capacity.*

Group Task, Process, and Relationship Conflict

Studies adopting shared leadership models have tended to focused exclusively on the benefits of shared leadership structures. These studies have assumed that members of groups with shared leadership structures necessarily merge their different opinions, values, and personalities into a single unified leadership effort (e.g. Pearce & Sims, 2002; Pearce & Conger, 2003; Hiller et al., 2006; Carson et al., 2007). Little research has empirically examined this assumption, however, or explored the possibility that there might be drawbacks associated with shared leadership structures. In this study, I broaden

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our understanding of the types of outcomes associated with shared leadership by exploring conflict as one potential negative outcome of shared leadership structures.

Conflict is broadly defined as perceived discrepant views or interpersonal incompatibilities among members of a group (Geutzkow & Gyr, 1954). Most discussions of organizational conflict tend to differentiate between three forms of conflict: task conflict, disagreements about the content of the task being performed (e.g. different viewpoints about what sequence of activities would best accomplish the task; Jehn, 1995); process conflict, conflict related to how task accomplishment should proceed (e.g. who is responsible for what, how resources should be distributed; Jehn et al.,1999); and relationship conflict, interpersonal incompatibility among group members (e.g. tension, animosity, and annoyance; Jehn, 1995). While moderate levels of task conflict may have some benefits for group performance, both relationship and process conflict have exhibited consistently negative relationships with both group and individual outcomes (e.g. Baron, 1991; Pelled, 1996; Jehn et al., 1999). In this section, I argue that shared leadership structures should have a positive relationship with task and process conflict and a negative relationship with relationship conflict.

Shared leadership structures should produce higher levels of task and process conflict in groups. Voicing ideas and opinions about what the group's mission and purpose should be, which group members should work on which tasks, and how task accomplishment should proceed are all central leadership functions (Stogdill, 1963; Yukl, 2006; Morgeson et al., 2010). When more group members are involved in the performance of these functions, divergent opinions and perspectives about what the group

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should be doing and how it doing it are more likely to surface (Bass, 2008). Similarly, since members of reciprocal leadership relationships are less likely to passively accept their partner's leadership attempts and more likely to respond to leadership behaviors by offering counterproposals and amendments, more task-and process-related disagreements are likely to arise. As a result, group leadership structures that are dense, decentralized, and reciprocal should produce more task and process conflict than leadership structures that are sparse, unidirectional, and dominated by a single individual.

> *Hypothesis 8. The a) density, b) decentralization, and c) reciprocity of a group's leadership structure is positively related to the level of task conflict in the group.*
>
> *Hypothesis 9. The a) density, b) decentralization, and c) reciprocity of a group's leadership structure is positively related to the level of process conflict in the group.*

While offering task-related ideas and suggestions is one key dimension of leadership behavior, another dimension involves promoting strong interpersonal relationships between group members and settling interpersonal disagreements (Stogdill, 1963). Members of groups with denser leadership structures are more likely to be exposed to more of this type of supportive leadership behavior than members of groups with less dense leadership structures, which should suppress relationship conflict within the group. In groups with decentralized leadership structures, multiple members typically enact social-focused leadership activity. Since members of these groups are more likely to have immediate access to interpersonal support and conflict management, the group should be able to more quickly resolve interpersonal issues that arise. Moreover,

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members of groups with reciprocal leadership structures should be more likely to give voice to any interpersonal discomfort they may experience with other group members, and also more likely to receive a supportive response, reducing the likelihood that interpersonal conflict will fester between group members. For these reasons, I expect members of shared leadership structures will experience reduced levels of relationship conflict.

> *Hypothesis 10. The a) density, b) decentralization, and c) reciprocity of group leadership structures is negatively related to the level of relationship conflict in the group.*

Group Member Psychological Growth

To fully understand the implications of shared leadership structures it is important to consider the individual as well as the group-level consequences of these structures. One individual outcome which is becoming increasingly important for employees is psychological growth (Kolb, 1984). Psychological growth is the process through which individuals expand their capacity to engage with their environments effectively (Piaget, 1951; McCauley, Moxley, & Van Velsor, 1998). This definition acknowledges that growth may involve more than simply the acquisition of skills or experience: it can also involve changes in the way that individuals experience, interact with, and come to know their environments (Kohlberg, 1958). Due to the turbulent nature of today's corporate environment, lifelong growth and development is becoming increasingly important for all members of organizations (Kolb, 1984). To stay competitive in the internal and external job market, and to help their group or organization perform at a high level, individuals

must stay abreast of rapidly changing circumstances and keep their skills sets up to date. However, despite ample evidence that the workplace is a fertile environment for psychological growth (e.g. Dewey, 1938; Marsick & Watkins, 1990; DeRue & Wellman, 2009; Dragoni, Tesluk, Russell, & Oh, 2009), research has only recently begun to examine the features of work environments that influence growth, and to my knowledge no studies have focused on leadership structures as a predictor of growth.

Although little research or theory directly addresses the relationship between group leadership structures and psychological growth, evidence from several different literatures hints that shared leadership structures are more likely than vertical leadership structures to enable group members to grow psychologically from their work experiences. In this section, I draw on theories of experiential learning, leadership development, and high quality connections to argue that members of groups with shared leadership structures should experience more psychological growth than members of groups with vertical leadership structures.

The experiential learning literature (e.g. Dewey, 1938; Piaget, 1951; Kolb, 1984; Argyris & Schon, 1978; Marsick & Watkins, 1990) views learning and development as a lifelong process and suggests that everyday experiences, including workplace experiences, can be a powerful source of psychological growth. The literature also identifies certain types of experiences as particularly rich sources of personal development. A central tenet of many experiential learning theories is that growth is most likely to occur during experiences when individuals interact with, challenge, and stimulate each other in an open environment (Lewin, 1947; Lewin & Lippitt, 1938;

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Freire, 1973). Another recurring theme is the importance of active, goal-directed experimentation in creating psychological growth (Piaget, 1951; Kolb, 1984; Marsick & Watkins, 1990).

Theories of leadership development focus on a particular type of psychological growth: namely, the development of leadership skills and competencies (e.g. Day, 2000; DeRue & Wellman, 2009; Dragoni et al., 2009). This literature has identified challenging work experiences as an important source of leadership development (McCall, Lombardo, & Morrison, 1988). Engaging in experiences that cannot easily be negotiated using existing skills or approaches encourages individuals to experiment with new behaviors and to reframe their current ways of thinking and acting. By exposing gaps between individual's abilities and the demands of their environment, challenging work experiences also can serve as a powerful motivator for psychological growth; encouraging individuals to seek out opportunities for growth as a means of reducing the gaps. Finally, the leadership development literature suggests that individuals will benefit most from challenging experiences that occur in environments that offer access to plentiful feedback (DeRue & Wellman, 2009). Receiving immediate, concrete signals about the success or failure of their work activities enables individuals to quickly and efficiently target the areas in which they are most in need of growth and improvement (Kluger & DeNisi, 1996).

Finally, research on high quality workplace connections (Dutton & Heaphy, 2003; Dutton, 2003; Stephens, Heaphy, & Dutton, 2011; Jordan, 2004; Fedele, 2004; Fletcher & Kauffer, 2004) suggests that interpersonal relationships can be powerful catalysts for

individual psychological growth. While most theories of psychological growth assumes individuals grow by increasing the degree of control they can exert over their environments, the high quality connections literature emphasizes that supportive interpersonal relationships, in which parties are open to mutual influence, can also be a powerful source of growth (Dutton & Heaphy, 2003; Jordan, 2004; Fedele; 2004; Fletcher & Kauffer, 2003; Surrey, 1991). When both members of a relationship are sensitive to each other's needs and responsive to each other, the relationship is more likely to become a source of joy and support (Reis, Collins, & Berscheid, 2000). Members of mutually responsive relationships can then use the relationship as a secure base from which to explore their social worlds, drawing on the relationship to support their psychological growth (Bowlby, 1969).

Taken together, the literature on experiential learning, leadership development, and high quality connections suggest that members of groups with shared leadership structures should experience greater personal psychological growth than members of groups with vertical leadership structures. Because members of groups with denser leadership structures are exposed to more overall leadership, they are likely to be more informed about the larger goals of the group. Moreover, because they will receive more motivational messages and social support from their coworkers, they will be more likely to exert and challenge themselves in an attempt to help the group achieve these goals (Yukl, 2006). As individuals reflect on the results of the challenging experiences they create for themselves as a result of dense group leadership structures, they should tend to grow and develop psychologically. Similarly, since decentralized leadership structures

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involve more members in the process of setting group goals and deciding how these goals can best be attained, leadership interactions in groups with decentralized structures are likely to feature a free exchange of ideas among members, which should produce growth by exposing members to alternative viewpoints and new ideas. Finally, scholars have suggested that members of reciprocal relationships will tend to be more attentive to each other and their surroundings than members of unidirectional relationships (Follett, 1942; Gittell & Douglass, 2012). Receiving this sort of attentiveness from other group members should energize members of reciprocal leadership structures, creating the cognitive resources necessary for growth (Feidler, 2000; DeRue & Wellman, 2009), and also provide members with immediate feedback in response to their leadership attempts (Gittell, 2003), furnishing individuals with a stable base that will allow them to experience maximum psychological growth as a result of their workplace experiences (Bowlby, 1969; Dutton & Heaphy, 2003).

Hypothesis 11. The a) density, b) decentralization, and c) reciprocity of group leadership structures is positively related to the psychological growth of group members.

Group Member Satisfaction

In addition to influencing the extent to which individuals grow psychologically as the result of their group experiences, group leadership structures should also affect how satisfied group members are with their work. Work satisfaction, the pleasurable or positive affective state resulting from an appraisal of one's job or task, is one of the most important and widely researched variables in organizational psychology (Doormann &

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Zapf, 2001). In addition to improving group member well-being (Judge & Wantanabe, 1993; Diener, Suh, Lucas, & Smith, 1999), high levels of work satisfaction are likely to cause individuals to make fewer errors on tasks (Petty & Bruning, 1980) and to be more persistent in the face of job- or task-related challenges (Locke & Latham, 2004).

Each of the three distinguishing properties of shared leadership structures should increase the extent to which group members feel satisfied with their work. One component of task-focused leadership is to determine the overall goals of a group and divide up task activities among members to accomplish these goals (Lord, 1977; Bass, 2008). This type of leadership behavior helps orient group members to the larger purpose of their work and help them feel their jobs or tasks are meaningful and important (Pfeffer, 1981; Podolny, Khurana, & Hill-Popper, 2005). In addition, being exposed to a higher level of social-focused behavior should help to increase satisfaction by ensuring group members feel they are respected and appreciated (Deci & Ryan, 2000). Since members of groups with denser leadership structures should be exposed to higher levels of task and social leadership behavior, they should be more likely to view their work activities as valuable and therefore should feel more satisfied with what they are doing. Decentralized leadership structures should also increase member satisfaction by allowing more group members to feel as though they are able to participate in the process of making group decisions (Bavelas et al., 1965; Spector, 1986). This should endow the members with a greater sense of volition and choice in determining their work activities, which should cause them to experience more intrinsic enjoyment as a result of these activities (Gagne & Deci, 2005). Finally, leadership structures which are more reciprocal should increase

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work satisfaction by increasing members' perceptions that they are connected and related to other group members (Deci & Ryan, 1985; 2000). In contrast, NDLs in groups with more unidirectional leadership structures will be less likely to receive affirming and generative responses to their leadership attempts. These individuals should therefore tend to feel disconnected from the group, which should reduce the satisfaction they derive from their work (Davis & Perkowitz, 1979; Baumeister & Leary, 1995; Collins, 2004).

> *Hypothesis 12. The a) density, b) decentralization, and c) reciprocity of a group leadership structures is positively related to the work satisfaction of group members.*

CHAPTER IV

Study 1: Leadership Construction in Clinical Nursing Shifts

Overview

To explore the causes and consequences of leadership structure emergence in a hierarchical organizational context, I conducted a survey-based field study of clinical nursing shifts in five mid-sized hospitals in the Midwestern United States. Clinical units in hospitals are those units that are directly responsible for treating patients (e.g. Intensive Care, Radiology, Maternity). Nursing shifts in clinical units are an ideal for testing my conceptual model because they are charged with executing a complex, interdependent, and ambiguous task in a rapidly changing environment. The central purpose of nursing shifts is to provide high-quality care to their patients, but the recipe for high-quality care is highly variable from patient to patient (Williams, 2011, personal communication). Furthermore, steadily increasing health care costs and recently enacted health care legislation have introduced significant volatility into the operating environment of many clinical units, presenting challenges for shifts seeking to deliver high-quality care (Aiken, Clarke, & Sloan, 2002). Thus, although clinical nursing shifts have strict formal

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hierarchies, they are also the type of groups that should most benefit from encouraging distributed, informal leadership (Day et al., 2009).

All of the hospitals in my sample were not-for-profit, they ranged in size from 60-300 beds, and two of the five were teaching hospitals. Because patients in many of these units require round-the clock observation and care, work is organized into shifts; typically either two (Day: 7 am – 7 pm; night: 7 pm – 7 am) or three (Day: 7 am – 3 pm; Afternoon: 3 pm -11 pm; Night: 11 pm – 7am) shifts per unit. In the hospitals in this study, shift membership was fixed, such that individuals typically did not rotate between units, or between day and night shifts within units. Instead, each shift operated as a relatively independent and autonomous work team.

The formal organizational structure of most of the clinical nursing shifts in this study was hierarchical. Each shift had its own designated manager(s), although the formal rank of these individuals varied depending upon the shift. These designated managers tended to be highly educated and also possessed a good deal of legitimate authority as a result of their position in the formal organizational structure. Below the designated managers were staff members whose primary responsibility was patient care (e.g. nurses, social workers, physical therapists), and below these individuals were support staff (e.g. nursing assistants, administrative assistants, techs, clerks) who assisted the primary caregivers in working with patients or performed administrative tasks.

This study provided a comprehensive test of the conceptual model developed in Chapter 3. I assessed the naturally occurring differences in formal hierarchical differentiation between participating clinical nursing shifts, and examined the relationship

between formal hierarchy, the shifts' emergent leadership structures, and the outcomes included in my conceptual model.

<p align="center">*Methods*</p>

Sample

In keeping with the recommendations of Kozlowski and Klein (2000), I maximized group-level variance and reduce the possibility of range restriction by studying clinical nursing shifts in five different hospitals. Significant variation existed in the degree to which formal hierarchical differences were present in the shifts. For example, the formal managers of some shifts were charge nurses, while others were directors or vice presidents. Similarly, clinical shifts differed in the nature of the work they performed. Work in some units (e.g. Emergency Rooms, Intensive Care Units) tended to be fast-paced and variable, while work in other units (e.g. Long-Term Care Units) was typically slower and more repetitive. The time of day the shift was scheduled also influenced the pace and nature of its work, with day shifts tending to be called upon to provide higher volume, and more active, care than night shifts. Thus, the sampling strategy used in this study produced significant variation between participating shifts with respect to many of my constructs of interest.

To ensure this study had adequate statistical power, I conducted a power analysis following the procedure recommended by Cohen (1988). I conservatively assuming a medium effect size of $R^2 = 0.15$ (see R^2 values reported in Carson et al., 2007), 5 control variables, a maximum of two independent variables, and 2-tailed significance testing with at alpha level of 0.05. The results revealed that a sample of 70 groups would achieve the

<p align="center">69</p>

recommended 0.80 level of statistical power. To guard against potential non-response and attrition, I initially recruited a sample of 2,259 individuals organized into 147 shifts across the five hospitals. To ensure all participants had a high level of involvement in their shifts' work activities, contingent employees or employees who did not work at least 16 hours a week were not included in the study.

Due to the nature of survey research, and particularly the approach I developed to measure group leadership structures (which I describe in more detail below), it was important to ensure a high response rate to the two online surveys in this study, and particularly the first survey. I therefore excluded all shifts that fell below a 70% response rate on the first survey (which assessed group leadership structures) and a 50% response rate on the second survey from subsequent analyses. I also excluded all shifts that did not have at least four members. Eliminating shifts that were extremely small or that did not meet the response-rate cutoffs resulted in a final sample of 87 shifts and 1,390 individuals, for an effective response rate of 62%. To assess whether the missing and excluded data were missing completely at random or differed systematically from included data (Allison, 2002; Schafer & Graham, 2002), I compared the available descriptive statistics for included and excluded shifts. There was no difference between included and excluded shifts in terms of size $t(145) = .75$, $p =. 45$. However, included shifts differed from excluded shifts with respect to formal hierarchical differentiation $t(145) = 1.98$, $p <. 05$ and hospital membership [Hospital 1: 8/18 shifts (44%) included, Hospital 2: 21/28 shifts (75%) included, Hospital 3: 16/16 shifts (100%) included, Hospital 4: 35/48 shifts (73%) included, Hospital 5: 7/37 shifts (19%) included] $\chi^2(4, N =$

147) = 44.13, $p < .001$. Further investigation revealed that both differences were driven by an extremely low response rate at one of the five hospitals (Hospital 5), which tended to have less formal hierarchical differentiation in its shifts than the other hospitals. A more detailed consideration of the causes and consequences of this hospitals' lack of responsiveness, as well as a series of robustness checks, is presented in the discussion section for this study.

Among included shifts, participants had an average age of 41.63 years, (SD = 12.92) an average organizational tenure of 9.69 years (SD = 8.13), and an average shift tenure of 7.51 years (SD = 7.15). Eighty-seven percent of participants were female, 90% were Caucasian, and the median level of education was a Bachelors' degree.

Procedure

This study involved four waves of data collection. In the first wave, I conducted informational interviews with stakeholders at each hospital. In the interviews I determined which shifts would participate in the study, learned more about the shifts' formal structures and the nature of the work they performed, and tested whether my survey instruments were easily interpretable. I also obtained the names and formal job titles of the members of each participating shift from contacts in the hospitals' Human Resource departments, which I used to assess the shifts' level of formal hierarchical differentiation. The second wave of data collection was an online survey distributed to members of participating shifts one to two months after the initial site visits. Participants responded to a series of items assessing the emergent leadership structures in their shift, as well as empowering managerial behavior, positive group mood, task variety, and basic

demographic information. The third wave of data collection was another online survey,

which was distributed three to four months after the conclusion of the first survey. Two

different versions of this survey were distributed: one to staff and one to supervisors.

Staff members rated their shifts' absorptive capacity, patient care, and task, process, and

relationship conflict, as well as their individual psychological growth and job satisfaction.

Supervisors rated their shifts' absorptive capacity, patient care, and task, process, and

relationship conflict. Finally, in the fourth wave of data collection I obtained responses to

patient satisfaction surveys administered by a third-party survey vendor for the two-

month time period in which the second online survey was open. Table 1 summarizes this

study's research design. A complete version of the online surveys is included in

Appendix 2.

Table 1. *Study 1: Research Design*

Wave 1 (Oct. 2011)	Wave 2 (Nov. – Dec. 2011)	Wave 3 (Feb.-Mar. 2012)		Wave 4 (Feb.-Mar. 2012)
Interviews (Key stakeholders in management)	Online Survey 1 (Supervisors and Staff) • Leadership Structure • Empowering Managerial Behavior • Leadership Structure Schema • Positive Group Mood • Control Variables • Demographics	Online Survey 2 (Staff) • Absorptive Capacity • Patient Care • Task Conflict • Process Conflict • Relationship Conflict • Growth • Job Satisfaction	Online Survey 2 (Supervisors) • Absorptive Capacity • Patient Care • Task Conflict • Process Conflict • Relationship Conflict	Archival (3rd party patient satisfaction surveys) • Patient Care
Archival (HR depts.) • Participant names and job titles (Hierarchy)				

I employed several strategies to increase the likelihood of an acceptable response rate to the online surveys in this study. First, I kept the length of the surveys short enough that participants could complete them in 15 minutes or less, in keeping with Bednar and Westphal's (2006) suggestion that shorter survey instruments tend to generate higher

response rates. Second, I asked key stakeholders within the each hospital to distribute the links to the surveys, along with a personalized email explaining the importance of the study and encouraging shift members to participate. Third, I visited each hospital early in the time period that both the first and the second surveys were open. I visited each participating shift, introduced myself and the study, and distributed candy and fliers explaining the study in more detail and providing instructions for accessing the online surveys. Fourth, units that achieved a response rate of 80% or better for the first online survey were rewarded with a pizza party. Fifth, while data collection was in progress I sent frequent emails (every two to three days) to key stakeholders at each hospital, informing them of each unit's response rate and encouraging them to follow up with employees and unit managers to encourage participation. Finally, at each hospital individuals who completed the survey were entered into a random drawing for gift cards ($10-$20 value).

Measures

Hierarchical differentiation. In this study I operationally defined hierarchical differentiation as formally sanctioned differences in authority within groups. In other words, hierarchy in this study referred to the extent that a one or a few members of a group possessed significantly more formal authority than other members. Consistent with the approach adopted by previous research assessing formal hierarchy (e.g. Battilana & Casciaro, 2012), I developed an index to assess the degree of formal hierarchical differentiation present in each nursing shift. In my initial interviews, I worked with stakeholders at each hospital to create a five-tier classification system for participants'

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formal job titles. Job titles were grouped according to the degree of formal authority

afforded to them, such that jobs at lower levels of the hierarchy reported to higher-tier

jobs. Table 2 below displays the resulting classification system.

Table 2. *Study 1: Levels of Formal Organizational Hierarchy*

Level of Formal Hierarchy	Representative Jobs
5	Director, Vice President
4	Office Manager, Nurse Manager, Unit Supervisor
3	Patient Care Coordinator, Office Coordinator
2	Nurse, Social Worker, Physical Therapist
1	Nursing Assistant, LPN, Clerk, Tech

Every participant was assigned a number corresponding to the level of the

classification system in which their job fell (e.g. nurses were assigned twos, and nurse

managers were assigned fours). I then calculated an index representing the level of formal

hierarchical differentiation in each participating shift by subtracting the mean value of all

the jobs in the shift from the highest-level job value in the shift. This index captured the

difference in formal rank between the highest-ranking member(s) of the group and the

other group members.

Group leadership structure. I used social network analysis to assess the density,

centralization, and reciprocity of group leadership structures. Existing network-based

leadership measures have focused on group members' high-level perceptions that they

are led by others in the group (e.g. Mehra et al., 2006; Carson et. al, 2007). However, in

my theoretical development I emphasized that both leadership behavior from agents and committed responses from targets were necessary for leadership relationships to develop. Moreover, I highlighted that leadership theory suggests leadership behavior consists of both a task and a social dimension. Existing network-based leadership measures do not capture all of these distinctions.

To ensure consistency between theory and measurement, I included network items measuring both outgoing and incoming leadership, as well as task-focused and social-focused leadership. I measured shifts' incoming leadership structures using the one-item measure developed by Carson and colleagues (2007), "To what degree do you rely on this person for leadership?" I used a modified version of this item as my measure of outgoing leadership structures. The item was, "To what degree do you engage in leadership towards this person?" To develop network measures for task-focused and social-focused leadership structures I followed the deductive, theory-driven approach described by Hinkin (1995; 1998). As a point of reference, I used Yukl's (2006) conceptual definition of leadership, which is the definition underlying my theoretical development, as well as one of the more frequently relied-upon definitions of leadership in the literature. Yukl defines leadership as an influence process that involves three types of activities: 1) determining group goals 2) motivating task behavior in pursuit of those goals, and 3) influencing group maintenance and culture. After consulting this definition, I searched existing leadership measures (e.g. Podsakoff, MacKenzie, Moorman, & Fetter, 1990; Morgeson et al., 2010; Stogdill, 1963), for items I felt measured one of the three leadership functions Yukl's definition describes. The search produced a list of 23 items. I

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assessed the content validity of these items using the sorting procedure recommended by Hinkin (1995), in which four independent coders assigned each item to one of the three functions described in Yukl's definition of leadership, or to an "other" category if they did not feel it matched any of the functions well. Items were retained if they were assigned to the same, non-"other" category by at least 3 of the 4 coders, resulting in a reduced list of 16 items.

I then asked 200 participants recruited from Amazon Mechanical Turk (Paolacci, Chandler, & Ipeirotis, 2010; Burhmester, Kwang, & Gosling, 2011) to use these 16 items to rate the behavior of their current leader, and subjected their responses to an exploratory factor analysis. I retained all factors with an Eigenvalue greater than 1, and all items that loaded at least .70 on their primary factor and no more than .30 on any other factor. Two factors emerged, corresponding to the task-focused and social-focused dimensions of leadership behavior and collectively accounting for 64 percent of the variance in leadership ratings. A complete list of the items measuring each factor is provided in Appendix 1. To keep survey length manageable, I followed the convention in the social networks literature of using one-item measures to capture network ties. I therefore retained the highest-loading item from each factor to serve as my measures of task and social-focused leadership structures. The two items were "To what degree does this person let you know what is expected of you?" (task-focused leadership), and "To what degree does this person demonstrate respect and concern for you?" (social-focused leadership).

I adopted a whole-network approach to measuring group leadership structures, as this approach enabled me to obtain the most accurate and comprehensive possible representation of the patterns of leadership activity in clinical nursing shifts (Wasserman & Faust, 1994; Kilduff & Tsai, 1994). Participants were given the following prompt "The next few items ask about leadership within your shift. In responding to the items, please keep in mind that the individuals you perceive to be leaders may or may not be officially designated as leaders by your organization's management." Participants were then presented with rosters containing the names of every other individual in their shift, and then asked to use a five-point, Likert-type scale (1 = Not at all, 5 = A very large degree) to rate each individual with respect to the four leadership items described above and presented in the table below.

1	To what degree do you engage in leadership towards this person? (outgoing leadership)
2	To what degree do you rely on this person for leadership? (incoming leadership)
3	To what degree does this person demonstrate respect and concern for you? (social-focused leadership)
4	To what degree does this person let you know what is expected of you? (task-focused leadership)

The four leadership structure items produced a matrix of data for each shift with respect to each of the four leadership questions. Each row in the matrix represented a shift member, and the each column represented that individuals' rating of each other member of the shift. These matrices were entered into the UCINet software for social network analysis (Borgatti, Everett, & Freeman, 2002) and used to calculate the density, centralization, and reciprocity of the shifts' leadership structures.

Density. The density metric was calculated as the ratio of the sum of all the actual leadership scores from a given matrix to the maximum possible sum of the scores (Wasserman & Faust, 1994). A higher ratio indicated a denser leadership structure. In a sense, the density statistic captured the "average" amount of leadership performed by each member of a particular shift.

Centralization. I used UCINet's in-degree and out-degree centralization procedures to assess the centralization of the leadership structures in the clinical nursing shifts in this study. I used in-degree centralization to calculate the centralization of incoming, task-focused, and social-focused activity. These leadership measures assessed the degree to which shift members reported they were led by others, and in-degree centralization was high to the extent a single individual was repeatedly named by his or her shift-mates as being a particularly influential leader. I used out-degree centralization to calculate the centralization of outgoing leadership activity. The outgoing leadership measure assessed the extent to which shift members reported they attempted to lead others, and out-degree centralization was high to the extent a single member of a shift reported initiating a disproportionately high level of leadership towards the other members. The centralization metric was calculated by dividing the actual sum of the differences in in-degree or out-degree centrality between the shift member with the highest centrality score and all other group members by the maximum possible sum of such differences (Freeman, 1977; 1979, Wasserman & Faust, 1994).

Reciprocity. I calculated reciprocity in this study as the sum of the differences of relationship partners' ratings of each other with respect to the network-based leadership

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items. For instance, if shift member A indicated he or she relied on shift member B for leadership to "a very large degree" (a score of 5), while shift member B indicated he or she relied on shift member A for leadership "not at all" (a score of 1), this would result in a difference of 4 between these individuals, describing a unidirectional leadership relationship. On the other hand, if both members indicated they relied on each other for leadership "to a large degree" (a score of 4), this would result in a difference of 0, describing a reciprocal leadership relationship. To summarize the level of reciprocity present in across all of a shifts' dyadic leadership relationships, I calculated the mean of the difference scores for each of the dyadic leadership relationships in the shift, and then multiplied this value by negative one so that higher values represented shifts with a higher overall level of leadership reciprocity. This approach is conceptually similar to the mutuality index proposed by Achuthan, Rao, and Rao (1982), but modified for use with valued network data.

Empowering managerial behavior. I assessed empowering managerial behavior using the 14-item scale developed by Kirkman and Rosen (1997; 1999). This scale measured shift members' perceptions that their designated manager exhibited empowering behaviors such as giving the shift many responsibilities, asking the shift for advice when making decisions, staying out of the way when the shift worked on its performance problems, telling the shift to expect a lot from itself, and trusting the shift. Participants used a five-point Likert-type scale to indicate the extent they disagreed or

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agreed that the designated manager of their shift engaged in the following behaviors (1 =

Strongly disagree, 5 = Strongly agree).[3] The Cronbach's alpha for this measure was .88.

1	Gives my shift many responsibilities.
2	Makes my shift responsible for what it does.
3	Asks the shift for advice when making decisions.
4	Uses shift advice and suggestions when making decisions.
5	Controls much of the activity of the shift.*
6	Encourages my shift to take control of its work.
7	Allows my shift to set its own goals.
8	Encourages my shift to come up with its own goals.
9	Stays out of the way when the shift works on its performance problems.
10	Encourages my shift to figure out the causes/solutions to its problems.
11	Tells the shift to expect a lot from itself.
12	Encourages my shift to go for high performance.
13	Trusts my shift.
14	Is confident in what my shift can do.

Leadership structure schema. Participants' leadership structure schemas were

measured using the five-item measure developed and validated by Wellman and

colleagues (2013). The scale assessed whether participants held a shared or hierarchical

belief about how leadership should be structured within a group, with higher scores

representing a more shared LSS. Participants responded to a five-point Likert-type scale

indicating the extent to which they disagreed or agreed with the following statements (1 =

Strongly disagree, 5 = Strongly agree).[4] The Cronbach's alpha for this scale was .77.

1	Groups work best when leadership is shared among multiple group members.
2	Groups work best when there is a single leader in the group.*
3	Leadership in groups is most effective when one person takes charge of the group. *

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[3] * = Item is reverse-coded.
[4] * = Item is reverse-coded.

4	Groups are often led by multiple individuals.
5	Groups perform best when all members of the group take responsibility for leading the group.

Positive group mood. I assessed positive group mood using a 6-item measure adapted from Bartel and Saavedra (2000) and consistent with the approach used by Herrbach (2006) to measure group affect in a longitudinal survey. The measure assessed the extent to which members of a shift experienced various positive affective states in the month before the survey. Participants used a five-point Likert-type scale to respond to the following items: "In the past month, to what extent have members of your workgroup experienced the following emotions?" (1 = Not at all, 5 = A very large amount). The Cronbach's alpha for this measure was .95.

1	Happy
2	Delighted
3	Glad
4	Cheerful
5	Pleased
6	Warmhearted

Group absorptive capacity. To my knowledge, no prior studies have assessed absorptive capacity at the group level. At the organization level, R&D spending is the most commonly used measure of absorptive capacity, but since the clinical nursing shifts in this study did not have R&D budgets I constructed an alternative measure drawing on previously validated scales. Absorptive capacity is defined as a group's ability to identify, assimilate, and exploit external knowledge (Cohen & Levinthal, 1990). I identified three short measures from the groups literature that each tapped one of the three dimensions of

absorptive capacity. Because the measures were not developed for use in a hospital context, I worked with stakeholders during my initial interviews to modify the items so that they were appropriate for clinical nursing shifts.

I measured shifts' ability to identify external knowledge using a modified version of Ancona and Caldwell's (1992) scale of group information seeking activities. These items describe the extent to which a group scans its external environment for ideas about how to improve performance. Participants were asked to indicate, using a five-point Likert-type scale, the extent to which members of their group performed the following activities (1 = Not at all, 5 = A very large amount). The Cronbach's alpha for the four-item information seeking measure was .91 for staff and .86 for supervisors.

1	Find out what other shifts are doing to manage patients?
2	Scan the environment inside or outside the shift for ideas about how to improve?
3	Collect information and/or ideas from individuals outside the shift about ways to effectively use technology?
4	Scan the environment outside the shift for ways to improve the patient experience?

I measured shifts' ability to assimilate external knowledge using Drach-Zahavy and Somech's (2001) four-item information sharing scale, which assesses the ease with which knowledge and information flows throughout a group. Participants were asked to indicate, using a five-point Likert-type scale the extent to which they disagreed or agreed with the following statements (1 = Strongly disagree, 5 = Strongly agree). The Cronbach's alpha for the four-item information sharing measure was .82 for staff and .73 for supervisors.

1	Members of this shift usually share information and do not keep information to themselves.
2	Members of this shift inform each other on different work issues.
3	Members of this shift really try to exchange information and knowledge.
4	Members of this shift always look for different interpretations and perspectives to confront a problem.

Finally, I assessed groups' ability to exploit external knowledge using three items from Drach-Zahavy and Somech's (2001) group innovation scale, which measures the introduction or application of new processes, products, or procedures. Participants were asked to indicate, using a five-point Likert-type scale, the extent to which their shift had implemented the following innovations (1 = Not at all, 5 = A very large amount). The Cronbach's alpha for the three innovation items was .93 for staff and .88 for supervisors.

1	Initiated new procedures or methods of working.
2	Developed innovative ways of accomplishing its work targets and objectives.
3	Developed new skills in order to foster innovations.

Although the scales assessing the three components of absorptive capacity were highly reliable, this study was the first to propose the three scales could be used together to assess absorptive capacity. To ensure my proposed approach was reasonable, I conducted a confirmatory factor analysis on the absorptive capacity items. The results, which are displayed in Table 3, suggested that a three-factor model best fit the data, with the underlying information seeking, information sharing, and innovation dimensions of absorptive capacity each loading onto their own factor, and then these three factors together loading onto a second order absorptive capacity factor. All of the factor loadings for this three-factor model (3 Factor Model A in Table 3) were positive and significant at

$p < .01$, and the model fit statistics exceeded conventional thresholds (Hu & Bentler, 1999). Thus, I elected to report results for each of the three dimensions of absorptive capacity independently, as well as results for a composite absorptive capacity measure created by aggregating the three dimensions. The coefficient alpha of the composite absorptive capacity measure was .87 for staff and .84 for supervisors.

Table 3. *Study 1: Confirmatory Factor Analysis of Group Absorptive Capacity Items*

Model	Model Fit Indices			
	χ^2	RMSEA	NNFI	CFI
1 Factor Model All items loading onto a single first-order absorptive capacity factor.	6660.93	.33	.65	.66
2 Factor Model A Information seeking and information sharing loading onto a single seeking/sharing factor, innovation loading onto its own factor, both factors loading onto a 2rd order absorptive capacity factor.	2790.25	.22	.79	.84
2 Factor Model B Information seeking and innovation loading onto a single seeking/innovation factor, information sharing loading onto its own factor, both factors loading onto a 2rd order absorptive capacity factor.	3437.62	.24	.72	.78
2 Factor Model C Information sharing and innovation loading onto a single sharing/innovation factor, information seeking loading onto its own factor, both factors loading onto a 2rd order absorptive capacity factor.	2268.32	.19	.83	.87
3 Factor Model A Information seeking, information sharing, and innovation as separate first-order factors, all loading onto 2nd order absorptive capacity factor.	269.87	.06	.98	.98
3 Factor Model B Task, relationship, and process conflict as separate first-order factors, no higher-order factor.	866.65	.12	.93	.94

Note. $n = 1390$ individuals.

Group performance. Group performance was operationalized in terms of the quality of patient care the clinical nursing shifts provided. Because providing high quality care is a central goal of all clinical shifts, this measure of performance was relevant to all shifts and enabled a meaningful comparison across shifts with very different core activities. For each shift, I collected both staff and supervisor ratings of care, as well as patient assessments of care from third party patient satisfaction surveys. Staff and supervisors impressions of care were assessed using five items adapted from the SERVQUAL measure of perceived service quality (Parasuraman, Zeithaml, & Berry, 1988). During my initial interviews, I worked with senior stakeholders at my research sites to customize the items for use in clinical nursing shifts. Participants used a 5-point Likert-type scale to indicate the extent to which they disagreed or agreed with the following statements about their shift (1 = Strongly disagree, 5 = Strongly agree). The Cronbach's alpha for this measure was .85 for staff and .78 for supervisors.[5]

1	Overall, this shift provides outstanding care to its patients.
2	This shift is responsive to the needs of individual patients.
3	This shift provides its patients with service in a timely manner.
4	This shift makes many errors in treating its patients.[*]
5	This shift's patients are typically satisfied with the quality of the care they receive.

For three of the five hospitals, I also collected patient-reported care data. These three hospitals all employed the same third-party vendor to survey patients upon their release. Several identical survey items capturing patients' perceptions of the quality of

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[5] [*] = Item is reverse-coded.

care received were therefore administered across the three hospitals, and I was able to obtain these data for the two-month period that the second online survey was being administered. Patients used a five-point, Likert-type scale (1 = Very poor, 5 = Very good) to respond to the following three items. The Cronbach's alpha for the scale created by aggregating these items was .94.

1	Degree to which the staff worked together to care for you.
2	Overall rating of care given at this hospital.
3	Likelihood of your recommending this hospital to others.

Task, process, and relationship conflict. I measured the degree of task, relationship, and process conflict in participating shifts using measures developed by Jehn and colleagues (1995; Shah & Jehn, 1993). Participants used a five-point, Likert-type scale to respond to the following items (1 = Not at all, 5 = A very large amount). Items 1-4 assessed relationship conflict, items 5-8 assessed task conflict, and items 9-11 assessed process conflict. The Cronbach's alpha for the relationship conflict items was .94 for staff and .89 for supervisors, the Cronbach's alpha for the task conflict items was .85 for staff and .80 for supervisors, and the Cronbach's alpha for the process conflict items was .88 for staff and .84 for supervisors.

1	How much friction is there among members of your shift?
2	How much are personality conflicts evident in your shift?
3	How much tension is there among members of your shift?
4	How much emotional conflict is there among members of your shift?
5	How often do people in your shift disagree about the work being done?
6	How frequently are there conflicts about ideas in your shift?
7	How much conflict about the work you do is there in your shift?
8	To what extent are there differences of opinion in your shift?
9	How often do members of your shift disagree about who should do what?
10	How frequently do members of your shift disagree about the way to complete

	a task?
11	How much conflict is there about the delegation of tasks within your shift?

To test whether participants differentiated between relationship, task, and process conflict, I conducted a confirmatory factor analysis on the staff-reported conflict items. The results of this analysis, which are displayed in Table 4, suggested that a 3-factor model best fit the data, with the task, relationship, and process conflict dimensions each loading onto their own factor, and then these three factors together loading onto a second order conflict factor. All of the factor loadings for this model (3 Factor Model A in Table 4) were positive and significant at $p < .01$, and the model fit statistics indicated the model was a good fit (Hu & Bentler, 1999). After considering these results, I elected to assess the impact of hierarchy on each of the conflict dimensions separately in this study, in keeping with my hypotheses.

Table 4. *Study 1: Confirmatory Factor Analysis of Group Conflict Items*

Model	Model Fit Indices			
	χ^2	RMSEA	NNFI	CFI
1 Factor Model All items loading onto a single first-order conflict factor.	2405.72	.20	.93	.94
2 Factor Model A Relationship and task conflict loading onto a single relationship/task factor, process conflict loading onto its own factor, both factors loading onto a 2rd order conflict factor.	1341.11	.15	.96	.97
2 Factor Model B Relationship and process conflict loading onto a single relationship/process factor, task conflict loading onto its own factor, both factors loading onto a 2rd order conflict factor.	1862.93	.17	.94	.95
2 Factor Model C Task and process conflict loading onto a single task/process factor, relationships conflict loading onto its own factor, both factors loading onto a 2rd order conflict factor.	540.48	.09	.98	.98
3 Factor Model A Task, relationship, and process conflict as separate first-order factors, all loading onto 2nd order conflict factor.	223.62	.06	.99	.99
3 Factor Model B Task, relationship, and process conflict as separate first-order factors, no higher-order factor.	2427.02	.20	.88	.91

Note. n = 1390 individuals.

Work satisfaction. I measured shift members' work satisfaction using Jehn and colleagues' (1995; 1999) two-item job satisfaction measure. In the first item, participants used a five-point Likert-type scale to respond to the question "How satisfied are you with your job?" (1 =Very dissatisfied, 5 = Very satisfied). In the second item, participants responded to a female version of the Kunin Faces Scale (Kunin, 1955; Dunham & Herman, 1975), which is presented below. Participants were asked to circle the face that best represents how satisfied they were with their jobs. The Chronbach's alpha for the two-item measure created by aggregating these two items was .94.
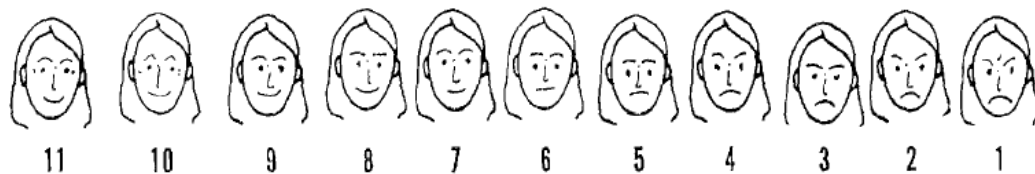
Member psychological growth. I measured shift members' psychological growth at work using a modified version of Ryff's (1989) seven-item personal growth scale. The original intent of the personal growth scale was to measure individuals' perceptions of their growth and development in life. In this study, I modified the wording of the items so that they pertained to growth in the work domain rather than life as a whole. Participants used a five-point Likert-type scale to indicate the extent to which they disagreed or agreed with each of the following statements (1 = Strongly Disagree, 5 = Strongly Agree). [6]

| 1 | I am not interested in work activities that will expand my horizons.* |
| 2 | I think it is important to have work experiences that challenge how you think |

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	about yourself and the world.
3	When I think about it, I haven't really improved much as an employee over the years.*
4	For me, work has been a continuous process of learning, changing, and growth.
5	I have given up trying to make improvements or changes at work.*
6	I do not enjoy being in new situations that require me to change my old familiar ways of doing things.*
7	I have the sense that I have developed a lot as an employee over time.

The Chronbach's alpha for the seven-item growth measure was .66. Although this reliability was below the conventional .70 threshold, subsequent analyses revealed that eliminating any one item, or combination of items, did not increase the reliability of the measure to a point that would exceed the threshold. Moreover, an exploratory factor analysis revealed that, with the exception of two items (item 4 and item 5), which loaded together, each item in the measure loaded on a unique factor. Thus, I used the complete version of the previously validated seven-item personal growth scale in my analyses.

Control Variables

In order to reduce the probability that my observed results could be explained by exogenous variables, I included several control variables in this study. I controlled for *shift size*, given that the size of a group is likely to influence the degree of formal hierarchy present as well as the structure of the leadership activity that emerges (Anderson & Brown, 2010). I also controlled for the *age diversity, gender diversity, shift tenure diversity,* and *educational diversity* of participating shifts. Demographic diversity is related the nature of the interpersonal relationships that develop in groups, as well as groups' innovative output (Pelled, 1996; Lau & Murnighan, 1998). Functional

background diversity, shift tenure diversity and educational diversity have been used in prior research as proxies for the prior knowledge possessed by group members, which is thought to be an important predictor of absorptive capacity (Reagans & McEvily, 2003). Including these control variables allowed me to test whether shared leadership structures predicted absorptive capacity in this study even after controlling for the effect of shift members' prior knowledge.

I controlled for gender diversity using the percentage of employees in a given shift that were female. I controlled for age, shift tenure, and educational diversity using the standard deviation of these variables. Participants self-reported their age, race, gender, and shift tenure using a series of drop-down menus. I worked with stakeholders at the five hospitals to develop a measure of formal education that was appropriate for clinical nursing shifts. During my initial interviews, I asked the stakeholders to list the most common educational backgrounds of members of their clinical unit. I used this information to develop an item measuring participants' education, and then checked with selected stakeholders to verify my categories were accurate and comprehensive. The six categories in my measure of education were: 1) High school graduate, 2) Vocational/certification program (e.g. Medical assistant, nursing assistant), 3) Some college, 4) College degree (includes LPN, ASN, BSN), 5) Masters degree (includes NP), 6) MD/PhD.

Evidence also suggests that the relationship between group leadership structures and group performance may differ depending on whether the work a group performs is repetitive or unpredictable (Anderson & Brown, 2010). To allow me to describe the

effect of hierarchy on group leadership structures independent of the nature of the work

performed by the nursing shifts in this study, I controlled for *task variety*. I measured task

variety using the three item skill variety subscale from the Job Diagnostic Survey

(Hackman & Oldham, 1980). I adapted the items so that they asked about the nature of

the tasks performed by the shift as a whole. Participants used a five-point, Likert-type

scale to indicate the extent to which they disagreed or agreed with the following items (1

= Strongly Disagree, 5 = Strongly Agree). The Cronbach's alpha for this scale was .62.[7]

1	There is a great deal of variety in the work performed by this shift.
2	Members of this shift must use a number of complex or sophisticated skills to complete their work.
3	The work in this shift is quite simple and repetitive.*

I also controlled for shifts' *Survey 1 response rate*, to ensure that any inaccuracies

in my social network metrics due to the procedure I used to impute missing network data

did not influence my results. Finally, to account for hospital-level variance, I controlled

for *hospital membership* by including four dummy-coded variables per the procedure

described by Cohen, Cohen, West, and Aiken (2003).

Data Analysis Approach

I tested my hypotheses by fitting a series of hierarchical OLS regressions using

SPSS. I entered my control variables in the first step of the regression and added my

independent variables in subsequent steps. I used UCINet to calculate density,

centralization, and reciprocity metrics for each shift, and then entered these values into

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[7] * = Item is reverse-coded.

SPSS for hypothesis testing. I used moderated OLS regression (Cohen et al., 2003) and path analysis (Edwards and Lambert, 2007; Preacher, Rucker, & Hayes, 2007) to test for moderation and mediation, respectively. Path analysis has been found to offer improved statistical power (MacKinnon et al., 2002) compared to the traditional, causal steps approach for testing mediation (e.g. Baron & Kenny, 1986).

Aggregation. The observations for this study consisted of individuals nested within shifts, nested within units, nested within hospitals. Before beginning my analyses, I tested whether significant variation existed at the shift level with respect to the variables in my conceptual model. Because the number of shifts per unit in this study was too low to model unit-level variation ($M = 1.75$ shifts, $SD = .76$), I followed the recommendation of West, Welch and Galecki (2007) and collapsed the data across this level. I then conducted a series of one-way ANOVAs and calculated the *ICC(1), ICC(2),* and mean $r_{wg(j)}$ values for each variable. I tested whether shift membership explained a significant portion of the variance in individual responses to survey items, and also whether hospital membership explained a significant portion of the variance in the shift-level constructs in my conceptual model. The results of these analyses are presented in Table 5.

Table 5. *Study 1: Non-Independence Test Results*

Variable	Shift Level				Hospital Level		
	ANOVA F-test	ICC (1)	ICC (2)	*M* $r_{wg(j)}$	ANOVA F-test	ICC (1)	ICC (2)
Hierarchical Differentiation	n/a	n/a	n/a	n/a	8.01**	.21	.88
Outgoing Density	n/a	n/a	n/a	n/a	1.71	.03	.41
Outgoing Centralization	n/a	n/a	n/a	n/a	2.27†	.05	.56
Outgoing Reciprocity	n/a	n/a	n/a	n/a	.34	-.03	-1.94
Incoming Density	n/a	n/a	n/a	n/a	1.9	.03	.48
Incoming Centralization	n/a	n/a	n/a	n/a	3.27*	.08	.69
Incoming Reciprocity	n/a	n/a	n/a	n/a	.33	-.03	-2.00
Task Density	n/a	n/a	n/a	n/a	6.34**	.17	.84
Task Centralization	n/a	n/a	n/a	n/a	10.48**	.26	.90
Task Reciprocity	n/a	n/a	n/a	n/a	.51	-.02	-.95
Social Density	n/a	n/a	n/a	n/a	5.09**	.13	.80
Social Centralization	n/a	n/a	n/a	n/a	3.17*	.07	.68
Social Reciprocity	n/a	n/a	n/a	n/a	1.85	.03	.46
Empowering Managerial Behavior	2.42*	.15	.59	.95	2.47†	.09	.59
Leadership Structure Schema	1.14	.02	.12	.83	4.03*	.17	.75
Positive Group Mood	2.05*	.12	.51	.86	4.15*	.17	.76
Information Seeking - Staff	1.39*	.05	.28	.79	2.40†	.09	.58
Information Sharing - Staff	2.27*	.14	.56	.85	3.35*	.14	.70

	Shift Level				Hospital Level		
Variable	**ANOVA F-test**	**ICC (1)**	**ICC (2)**	**M $r_{wg(j)}$**	**ANOVA F-test**	**ICC (1)**	**ICC (2)**
Innovation – Staff	1.24†	.03	.19	.75	1.06	.00	.05
Absorptive Capacity - Staff	1.62*	.07	.38	.93	2.41†	.09	.59
Patient Care - Staff	2.07*	.12	.52	.90	2.02	.06	.50
Task Conflict - Staff	2.03*	.11	.51	.92	.31	-.04	-2.25
Process Conflict - Staff	2.26*	.14	.56	.87	.43	-.04	-1.32
Relationship Conflict - Staff	2.90*	.19	.65	.89	.49	-.04	-1.06
Psychological Growth	1.11	.01	.10	.89	.71	-.02	-.40
Job Satisfaction	1.52*	.06	.34	.77	3.25*	.13	.69
Information Seeking - Supervisor	n/a	n/a	n/a	n/a	2.83*	.06	.65
Information Sharing - Supervisor	n/a	n/a	n/a	n/a	1.86*	.03	.46
Innovation - Supervisor	n/a	n/a	n/a	n/a	.79	-.01	-.26
Absorptive Capacity - Supervisor	n/a	n/a	n/a	n/a	1.26	.01	.20
Patient Care - Supervisor	n/a	n/a	n/a	n/a	4.31**	.11	.77
Task Conflict - Supervisor	n/a	n/a	n/a	n/a	1.35	.01	.26
Process Conflict - Supervisor	n/a	n/a	n/a	n/a	2.24†	.04	.55
Relationship Conflict - Supervisor	n/a	n/a	n/a	n/a	.90	-.00	-.11

Note. n = 1390 individuals, 87 shifts, 5 hospitals.
† $p < .10$, two-tailed , * $p < .05$, two-tailed, ** $p < .01$, two-tailed

The results of the non-independence tests revealed that members of the same shift tended to converge in their responses to the survey items. With the exception of LSS and psychological growth, shift membership was a significant predictor of participants' responses to the survey measures. Based on the thresholds outlined by LeBreton and Senter (2008), the *ICC(1)* values associated with most of the constructs in this study described medium effect sizes, and the $r_{wg(j)}$ values described strong to very strong agreement between raters in the same shift. Thus, I proceeded with my proposed analysis approach and aggregated individual responses to items assessing shared group constructs to the shift level (Kozlowski & Klein, 2000; Bliese, 2000). Because the non-independence tests also revealed that hospital membership accounted for a significant proportion of the variability in several variables in this study, I controlled for hospital membership in all analyses.

For certain shifts (33 out of 44 shifts), the patient-reported care data obtained in this study was only available at the unit level of analysis. To ensure consistency with the other variables in this study, I de-aggregated this data by assigning each shift the patient-reported patient care score associated with the unit to which it belonged.

Missing data. Missing data are particularly problematic for social network surveys (Burt, 1987; Huisman, 2009). To minimize biases in my network metrics resulting from missing data, I excluded any shifts with a network response rate of less than 70% from my analyses. For shifts with a response rate over 70%, I followed the convention in the social network literature and imputed missing network data using the median response of the group (Sparrowe at al., 2001; Oh et al., 2004). To ensure this

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imputation procedure did not impact my analyses, I controlled for Survey 1 response rate in all analyses. I did not impute missing data for the non-network variables in my model, as my theoretical development suggested that shift members' responses to the scales measuring these variables should tend to converge.

Results

Table 6 displays the descriptive statistics and correlations for this study. Examining the mean density, centralization, and reciprocity values for outgoing, incoming, task-focused, and social-focused leadership activity in clinical nursing shifts revealed several differences. The density values for each shift describe the strength of the "average" leadership tie that formed between members of the shift. The density of shift's social-focused leadership structures tended to be greater ($M = 3.61$) than the density of task-focused ($M = 2.86$), incoming ($M = 2.54$) and outgoing ($M = 2.53$) structures. The centralization values for each shift are expressed on a scale of 0-100, with 100 representing a shift in which leadership is completely dominated by a single individual, and 0 representing a shift in which leadership is shared completely equally by all members. Social-focused leadership structures also tended to be more decentralized ($M = 13.65$) than incoming ($M = 40.07$), task-focused ($M = 28.66$) and outgoing ($M = 29.58$) structures. The reciprocity values for each shift describe the average difference between shift members' ratings of each other for a particular leadership item. Social-focused leadership structures were the most reciprocal type of structure ($M = -.89$), with members tending to differ by less than 1 scale point in their ratings of each others' social

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leadership. Outgoing ($M = -1.15$), task-focused ($M = -1.24$) and incoming ($M = -1.33$) structures all tended to be less reciprocal.

There were many significant correlations between the density, centralization, and reciprocity of the leadership structures in clinical nursing shifts, both within and across a given type of structure. Leadership structure density tended to be negatively correlated with both centralization ($M\ r = -.40$) and reciprocity ($M\ r = -.07$) – except for social leadership structures, where density was positively correlated with reciprocity ($M\ r = .25$). Leadership structure centralization was also negatively correlated with reciprocity ($M\ r = -.26$). There were large positive correlations between the densities of the different types of leadership structures ($M\ r = .56$). There also tended to be positive correlations between the centralizations ($M\ r = .22$) and reciprocities ($M\ r = .26$) of the various types of leadership structures, but in these correlations were smaller in magnitude.

The pattern of correlations between study variables also provided preliminary support for many of my hypotheses. Specifically, hierarchical differentiation was significantly negatively correlated with the density of outgoing ($r = -.38$), incoming ($r = -.38$), task-focused ($r = -.34$), and social-focused ($r = -.32$) leadership structures. Differentiation was also positively correlated with the centralization of incoming ($r = .26$) and task-focused ($r = .28$) structures. The density of outgoing leadership structures was significantly positively correlated with staff-reported information sharing ($r = .36$), and negatively correlated with staff-reported process conflict ($r = -.30$) and relationship conflict ($r = -.37$), as well as supervisor-reported process conflict ($r = -.26$). The density of incoming leadership structures was negatively correlated with staff-reported process

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conflict ($r = -.28$). The density of task-focused leadership structures was positively correlated with staff-reported information sharing ($r = .31$) and absorptive capacity ($r = .22$), and negatively correlated with staff-reported process conflict ($r = -.24$). The density of social-focused leadership structures was positively correlated with staff reported information sharing ($r = .25$), and negatively correlated with staff reported task ($r = -.33$), process ($r = -.45$) and relationship conflict ($r = -.35$). The centralization of task-focused leadership structures was negatively correlated with staff-rated patient care ($r = -.28$), and the centralization of social-focused leadership structures was negatively associated with staff-rated information sharing ($r = -.27$). With respect to reciprocity, outgoing reciprocity was positively correlated with supervisor-rated information seeking ($r = .22$), innovation ($r = .24$) and absorptive capacity ($r = .24$). The reciprocity of incoming leadership structures was positively associated with supervisor-rated innovation ($r = .27$), while the reciprocity of task-focused leadership structures was also positively correlated with supervisor-rated innovation ($r = .22$), as well as shift member psychological growth ($r = .22$).

Table 6. *Study 1: Descriptive Statistics*

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Hierarchical Differentiation	1.99	.64																
2. Outgoing Density	2.53	.53	-.38															
3. Outgoing Centralization	29.58	12.99	.18	-.19														
4. Outgoing Reciprocity	-1.15	.31	.06	-.23	-.12													
5. Incoming Density	2.54	.42	-.38	.58	-.20	-.33												
6. Incoming Centralization	40.07	9.91	.26	-.28	.15	.08	-.50											
7. Incoming Reciprocity	-1.33	.30	.00	-.29	.06	.53	-.28	-.11										
8. Task Density	2.86	.53	-.34	.47	-.17	-.17	.71	-.42	-.17									
9. Task Centralization	28.66	11.04	.28	-.23	.12	-.01	-.22	.54	-.14	-.53								
10. Task Reciprocity	-1.24	.36	.17	-.07	-.04	.41	-.22	.05	.35	-.02	-.24							
11. Social Density	3.61	.39	-.32	.39	-.22	-.20	.58	-.14	-.35	.61	-.24	-.21						
12. Social Centralization	13.65	5.45	.08	-.26	.02	-.05	-.18	.25	.11	-.21	.26	-.03	-.37					
13. Social Reciprocity	-.89	.28	-.15	.29	-.08	.15	.15	-.03	-.06	.32	-.30	.16	.25	-.58				
14. Empowering Managerial Behavior	3.68	.31	.03	.13	.20	.26	.20	.13	-.04	.17	.03	-.02	.25	-.05	-.06			
15. Leadership Structure Schema	3.09	.29	.09	-.07	.14	.17	.07	-.02	.26	.05	-.05	.19	-.02	.06	-.09	.37		
16. Positive Group Mood	3.34	.44	-.22	.34	-.15	-.19	.29	-.02	-.16	.30	-.09	-.13	.54	-.21	.12	.30	-.02	
17. Information Seeking- Staff	2.64	.43	.13	-.10	.05	.25	.11	-.01	.00	.07	.00	.06	-.17	.03	.01	.13	.14	-.01

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18. Information Sharing - Staff	3.79	.38	-.11	.36	-.01	.12	.18	-.07	-.20	.31	-.09	.01	.25	-.27	.12	.23	.17	.25
19. Innovation - Staff	3.08	.35	-.22	.11	-.08	.12	.06	.02	-.08	.11	-.10	.03	-.00	-.10	.14	.20	.26	.13
20. Absorptive Capacity - Staff	3.20	.33	-.03	.09	-.05	.16	.16	-.05	-.09	.22	-.11	.05	.03	-.11	.14	.29	.27	.07
21. Patient Care – Staff	4.33	.31	-.16	-.01	.14	.18	.00	-.05	-.19	.16	-.28	.04	.16	-.21	.10	.18	-.22	.27
22. Task Conflict – Staff	2.06	.31	.06	-.13	-.06	.22	-.15	-.15	.06	-.12	-.10	.02	-.33	.05	-.01	-.23	.08	-.25
23. Process Conflict – Staff	1.94	.39	.27	-.30	.12	.12	-.28	-.14	.14	-.24	-.08	.06	-.45	.07	-.06	-.37	-.10	-.39
24. Relationship Conflict - Staff	2.10	.47	.06	-.37	.05	.12	-.14	-.24	.26	-.11	-.23	.10	-.35	.08	-.04	-.26	-.10	-.33
25. Psychological Growth – Staff	4.25	.30	.08	-.19	-.00	.16	-.01	-.05	.04	.10	-.18	.22	-.13	.02	.08	-.12	.09	-.09
26. Job Satisfaction – Staff	6.12	.92	-.20	.17	-.03	.18	-.01	.04	.02	.06	-.06	.14	.14	-.14	-.01	.23	.02	.37
27. Information Seeking- Supervisor	2.35	.67	.11	-.21	.07	.22	-.20	.14	.13	-.20	.09	-.10	-.20	-.03	-.07	.10	.11	-.01
28. Information Sharing - Supervisor	3.93	.53	-.01	.08	.01	.02	.14	.01	-.21	.06	-.01	-.17	.21	-.16	.13	.38	.16	.12
29. Innovation - Supervisor	2.82	.81	.03	-.15	.11	.24	-.21	.18	.27	-.20	.15	.22	-.23	-.15	.06	.15	.12	-.14
30. Absorptive Capacity - Supervisor	3.05	.47	.06	-.15	-.15	.24	-.14	.16	.11	-.17	.11	-.02	-.12	-.14	.04	.28	.18	.02
31. Patient Care – Supervisor	4.46	.42	.03	-.06	-.06	.19	-.07	.03	.11	.02	-.12	.05	-.08	-.11	.05	.31	.37	-.07
32. Task Conflict – Supervisor	2.13	.53	-.15	-.13	-.13	-.15	-.11	-.03	.03	.02	-.10	-.03	-.10	.13	-.06	-.47	-.20	-.13
33. Process Conflict – Supervisor	1.99	.56	-.07	-.26	.26	-.04	.24	-.01	.10	-.10	-.10	.08	-.18	.18	-.11	-.29	-.07	-.19
34. Relationship Conflict – Supervisor	2.18	.67	-.13	-.14	-.14	.18	-.06	-.05	.06	.02	-.12	.06	-.19	.25	-.17	-.29	-.05	-.16
35. Patient Care - Patient	92.50	3.16	-.25	.01	.01	.17	-.03	-.15	.05	-.11	-.05	-.06	.03	-.03	.08	-.16	-.16	.12

Variable	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
18. Information Sharing - Staff	.09																	
19. Innovation - Staff	.38	.37																
20. Absorptive Capacity - Staff	.82	.43	.65															
21. Patient Care – Staff	.27	.30	.02	.28														
22. Task Conflict – Staff	-.02	-.33	.10	-.11	-.20													
23. Process Conflict – Staff	-.00	.46	-.15	-.21	-.18	.76												
24. Relationship Conflict - Staff	-.02	-.41	-.11	-.22	-.04	.73	.79											
25. Psychological Growth – Staff	.50	-.20	.21	.53	.31	.10	.14	.15										
26. Job Satisfaction – Staff	-.28	.38	.10	-.24	.18	-.07	-.17	-.11	-.32									
27. Information Seeking-Supervisor	.33	.09	.24	.25	-.04	.15	.10	-.04	-.01	.09								
28. Information Sharing - Supervisor	.14	.30	.24	.25	.05	-.05	-.12	-.08	.04	.05	.07							
29. Innovation - Supervisor	.27	.10	.21	.24	.05	.07	.00	.03	.03	-.08	.44	.27						
30. Absorptive Capacity - Supervisor	.36	.22	.33	.35	.02	.09	.00	-.04	-.01	.03	.75	.58	.80					
31. Patient Care – Staff	.39	.16	.23	.40	.05	.02	-.02	-.01	.06	-.12	.42	.36	.48	.60				
32. Task Conflict – Supervisor	-.04	-.33	-.15	-.17	-.04	.19	.31	.26	.14	-.19	-.03	-.32	-.11	-.20	-.29			
33. Process Conflict – Supervisor	-.13	.37	-.21	-.25	-.08	.26	.42	.32	.06	-.08	-.08	-.31	-.22	-.27	-.29	.70		
34. Relationship Conflict – Supervisor	-.07	-.30	-.08	-.16	-.09	.31	.36	.39	.07	-.21	-.12	-.38	-.05	-.24	-.24	.77	.65	
35. Patient Care - Patient	.08	.08	-.05	.01	.30	.26	.26	.31	-.05	.08	.25	-.13	-.00	.06	.19	.02	-.06	.08

Note. n = 48-87 shifts due to missing data. Correlations .22 or greater are significant at $p < .05$

Hypothesis 1 predicted that hierarchical differentiation restricts the development of shared leadership structures in clinical nursing shifts. To test this hypothesis, I regressed the density, centralization, and reciprocity of the four types of leadership structures I measured in this study on my control variables and formal hierarchical differentiation. The results of these analyses are presented in Tables 7-10. Hypothesis 1a predicted formal hierarchical differentiation is negatively associated with the density of group leadership structures. Hierarchy was significantly negatively associated with the density of the outgoing (β = -.43, $p < .01$) and task-focused (β = -.27, $p < .05$) leadership structures that formed in clinical nursing shifts. However, hierarchy was not significantly associated with the density of incoming (β = -.20, $p = .12$) and social-focused (β = -.13, $p = .32$) leadership structures, so Hypothesis 1a was partially supported.

Hypothesis 1b predicted that hierarchical differentiation is positively associated with the centralization of group leadership activity. Hierarchy was positively associated with the centralization of task-focused leadership structures, but this relationship was only marginally significant (β = .25, $p < .07$). Formal hierarchical differentiation was not significantly associated with the centralization of outgoing (β = .18, $p = .19$), incoming (β = .22, $p = .11$), or social-focused (β = .06, $p = .70$) leadership structures in clinical nursing shifts, so Hypothesis 1b received only very weak support. Finally, Hypothesis 1c predicted hierarchical differentiation is negatively associated with the reciprocity of group leadership structures. Differentiation was significantly negatively associated with the reciprocity of social-focused leadership structures (β = -.32 $p < .04$), but not the

reciprocity of outgoing ($\beta = .05$, $p = .77$), incoming ($\beta = -.09$, $p = .58$), or task-focused ($\beta = .12$, $p = .46$) structures. Thus, Hypothesis 1c was partially supported.

Hypotheses 2-4 predicted that the negative association between formal hierarchical differentiation and shared leadership structures (that is, leadership structures that are dense, decentralized, and reciprocal) is weaker in groups that receive high levels of empowering behavior from their designated managers, adopt a shared leadership structure schema, and have a high level of positive mood. The results of the analyses testing these hypotheses are also summarized in Tables 7-10. Hypothesis 2, which predicted that empowering managerial behavior would reduce the negative association between hierarchy and shared leadership structures, was generally not supported. With respect to density (Hypothesis 2a), the interaction between hierarchy and empowering managerial behavior was a marginally significant predictor of the density of outgoing leadership structures ($\beta = .21$, $p < .10$). To interpret this interaction, I plotted the simple slopes of the regression of outgoing density on hierarchical differentiation at high and low levels of empowering managerial behavior (one standard deviation above and below the mean), per the counsel of Aiken and West (1991). As shown in Figure 4, as predicted the negative relationship between hierarchical differentiation and the density of outgoing leadership structures was marginally stronger at low levels of empowering managerial behavior than at high levels of empowering managerial behavior. The interaction between hierarchy and empowering managerial behavior was not a significant predictor of the density of incoming ($\beta = -.04$, $p = .72$), task-focused ($\beta = .07$, $p = .59$), or social-focused ($\beta = -.15$, $p = .19$) leadership structures, although there was a significant direct effect of

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empowering managerial behavior on the density of task-focused leadership structures (β = .27, p < .03).

The results also did not support my predictions with respect to centralization (Hypothesis 2b). The interaction between hierarchy and empowering managerial behavior was a significant predictor of the centralization of incoming (β = .26, p < .04) and task-focused (β = .24, p < .05) leadership structures, but, as shown in Figure 5, the pattern of this relationship was not as predicted. For both incoming and task-focused leadership structures, the positive relationship between hierarchy and the centralization of leadership activity was significantly *stronger* (rather than weaker) in nursing shifts whose designated managers engaged in a high (compared to a low) level of empowering behavior. The interaction of hierarchical differentiation and empowering managerial behavior was not a significant predictor of the centralization of outgoing (β = .15, p = .23) or social-focused (β = .06, p = .65) leadership structures, although there was a positive and significant direct effect of empowering managerial behavior on the centralization of outgoing leadership structures (β = .27, p < .03).

Finally, my predictions with respect to reciprocity (Hypothesis 2c) were not supported, as the interaction between hierarchy and empowering managerial behavior was not a significant predictor of the reciprocity of outgoing (β = -.20, p = .16), incoming (β = -.07, p = .61), task-focused (β = -.14, p = .34), or social-focused (β = -.16, p = .24) leadership structures.

Hypothesis 3a predicted that hierarchically differentiated groups that converge around a more shared leadership structure schema develop leadership structures that are

denser than hierarchical groups that converge around a more hierarchical leadership

structure schema. As shown in Tables 7-10, this Hypothesis was not supported. The

interaction between hierarchical differentiation and group LSS was a significant predictor

of the density of social-focused leadership structures (β = -.24, p < .03), but the pattern of

this relationship was not as predicted. As shown in Figure 6, hierarchical differentiation

had a significantly more negative effect on the density of social-focused leadership

activity in clinical nursing shifts that converged around a more shared LSS than in shifts

that converged around a more hierarchical LSS. The interaction between hierarchical

differentiation and LSS was not a significant predictor of the density of outgoing (β =

.07, p = .54), incoming (β = .05, p = .67), or task-focused (β = .08, p = .50) leadership

structures, although there was a marginally significant direct effect of a more shared LSS

on the density of task-focused leadership structures (β = .21, p < .06).

Hypothesis 3b predicted that hierarchical groups with a more shared LSS develop

leadership structures that are lower in centralization than hierarchical groups with a more

hierarchical LSS. This hypothesis was not supported with respect to outgoing (β = .05, p

= .72), incoming (β = -.09, p = .44), task-focused (β = .15, p = .19), or social-focused (β

= .11, p = .38) leadership structures.

Hypothesis 3c predicted that formal hierarchical differentiation and LSS interact

to predict the reciprocity of group leadership structures. This hypothesis was also not

supported with respect to any of the leadership structures I measured in this study

(outgoing β = .08, p = .56, incoming β = .12, p = .34, task-focused β = -.05, p = .71,

social focused β = -.02, p = .89), although there was a positive and significant direct

effect of a shared LSS on the reciprocity of outgoing (β = .40, p < .001) and incoming (β = .30, p < .02) leadership structures. Thus, Hypothesis 3c was not supported.

Hypothesis 4 predicted a positive group mood decreases the extent to which hierarchical differentiation impedes the development of shared leadership structures. There was a significant interaction between hierarchical differentiation and positive mood predicting the reciprocity of social-focused leadership structures (β = -.32, p < .02), but the pattern of this relationship was not as predicted. As shown in Figure 7, at high levels of positive mood, hierarchical differentiation decreased the reciprocity of social-focused leadership activity in nursing shifts. In contrast, in shifts with low levels of positive mood, hierarchical differentiation increased the reciprocity of social-focused leadership activity. Other than that one instance, the interaction between hierarchical differentiation and the level of positive mood within nursing shifts was not a significant predictor of the structure of outgoing (density β = .11, p = .36, centralization β = .01, p .96, reciprocity β = -.06, p = .67), incoming (density β = -.00, p = .97, centralization β = -.09, p = .47, reciprocity β = .01, p = .97), task-focused (density β = -.04, p = .75, centralization β = -.05, p = .68, reciprocity β = .03, p .82), or social-focused (density β = -.07, p = .51, centralization β = .03, p = .79) shifts' leadership activity. Thus, Hypothesis 4 was not supported. However, there was a positive and significant direct effect of a more positive group mood on the density of all 4 types of leadership structures (outgoing β = .30, p < .02, incoming β = .26, p < .02, task-focused β = .32, p < .01, social-focused β = .38, p < .001), and a negative and significant direct effect of positive mood on the centralization of social-focused leadership structures (β = -.29, p < .03).

Table 7. *Study 1: Summary of Regression Results: Hierarchy Predicting Outgoing Leadership Structures*

	DV Outgoing Leadership Density				DV Outgoing Leadership Centralization				DV Outgoing Leadership Reciprocity			
	β	β	β	β	β	β	β	β	β	β	β	β
Hierarchical Differentiation (HD)	-.43**	-.43**	-.37*	-.46**	.18	.14	.21	.18	.05	.04	.04	.07
Empowering Managerial Behavior (EMB)		.16				.27*				-.13		
HD x EMB		.21†				.15				-.20		
Leadership Structure Schema (LSS)			-.12				-.00				.40**	
HD x LSS			.07				.05				.08	
Positive Group Mood (PM)				.30*				-.02				-.06
HD x PM				.11				.01				-.06

Note. n = 87 shifts.
† $p < .10$, two-tailed , * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 8. *Study 1: Summary of Regression Results: Hierarchy Predicting Incoming Leadership Structures*

	DV Incoming Leadership Density				DV Incoming Leadership Centralization				DV Incoming Leadership Reciprocity			
	β	β	β	β	β	β	β	β	β	β	β	β
Hierarchical Differentiation (HD)	-.20	-.23†	-.18	-.18	.22	.22	.18	.25†	-.09	-.10	-.06	-.10
Empowering Managerial Behavior (EMB)		.09				.19				.01		
HD x EMB		-.04				.26*				-.07		
Leadership Structure Schema (LSS)			.10				-.05				.30*	
HD x LSS			.05				-.09				.12	
Positive Group Mood (PM)				.26*				-.05				-.18
HD x PM				-.00				-.09				.01

Note. $n = 87$ shifts.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 9. *Study 1: Summary of Regression Results: Hierarchy Predicting Task-Focused Leadership Structures*

	DV Task-Focused Leadership Density				DV Task-Focused Leadership Centralization				DV Task-Focused Leadership Reciprocity			
	β	β	β	β	β	β	β	β	β	β	β	β
Hierarchical Differentiation (HD)	-.27*	-.33*	-.25†	-.23	.25†	.30*	.34*	.26†	.12	.10	.07	.10
Empowering Managerial Behavior (EMB)		.27*				.01				-.03		
HD x EMB		.07				.24*				-.14		
Leadership Structure Schema (LSS)			.21†				-.11				.20	
HD x LSS			.08				.15				-.05	
Positive Group Mood (PM)				.32**				-.17				-.03
HD x PM				-.04				-.05				.03

Note. n = 87 shifts.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 10. *Study 1: Summary of Regression Results: Hierarchy Predicting Social-Focused Leadership Structures*

	DV Social-Focused Leadership Density				DV Social-Focused Leadership Centralization				DV Social-Focused Leadership Reciprocity			
	β	β	β	β	β	β	β	β	β	β	β	β
Hierarchical Differentiation (HD)	-.13	-.21	-.26[†]	-.07	.06	.09	.11	.02	-.32[*]	-.34[*]	-.33[†]	-.17
Empowering Managerial Behavior (EMB)		.18				-.08				-.05		
HD x EMB		-.15				.06				-.16		
Leadership Structure Schema (LSS)			.06				.07				-.05	
HD x LSS			-.24[*]				.11				-.02	
Positive Group Mood (PM)				.38[**]				-.29[*]				.15
HD x PM				-.07				.03				-.32[*]

Note. n = 87 shifts.
[†] *p* < .10, two-tailed, [*] *p* < .05, two-tailed, [**] *p* < .01, two-tailed.

Figure 4. Study 1: Hierarchy and empowering managerial behavior predicting outgoing leadership density.
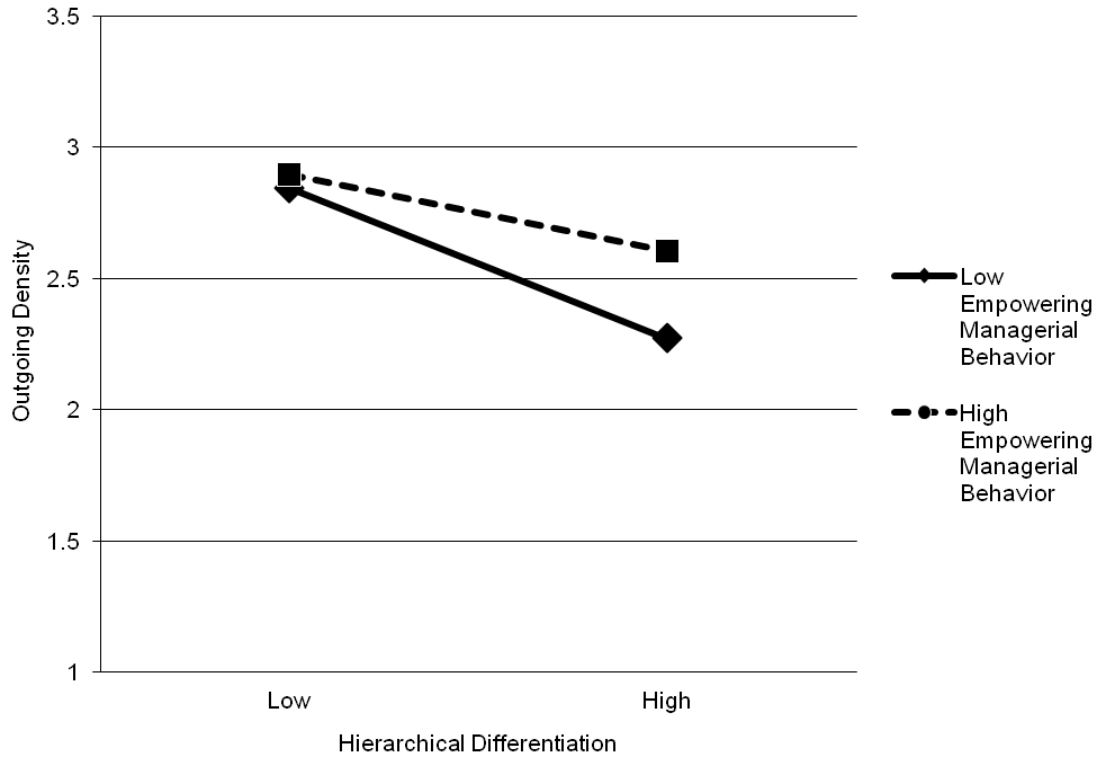
Figure 5. Study 1: Hierarchy and empowering managerial behavior predicting incoming and task-focused leadership centralization.

A. Incoming leadership
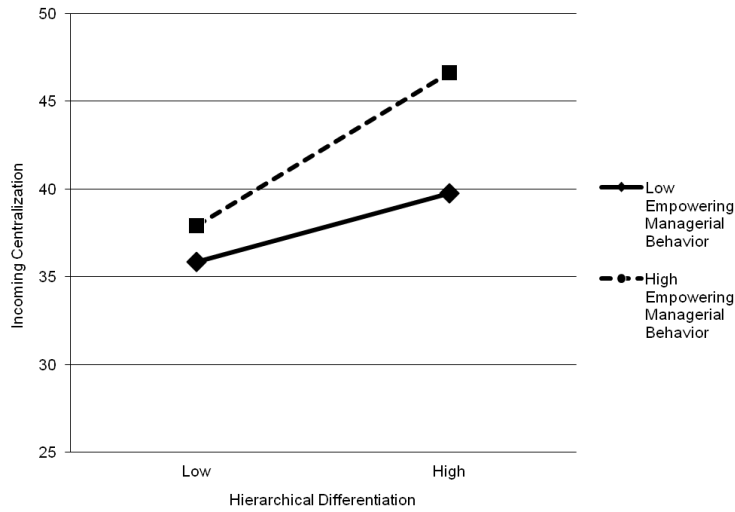
B. Task-focused leadership
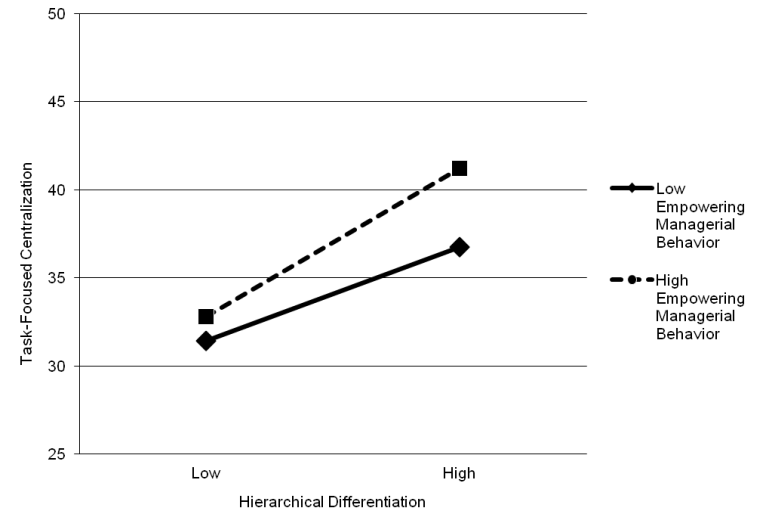
Figure 6. Study 1: Hierarchy and shared LSS predicting social-focused leadership density.
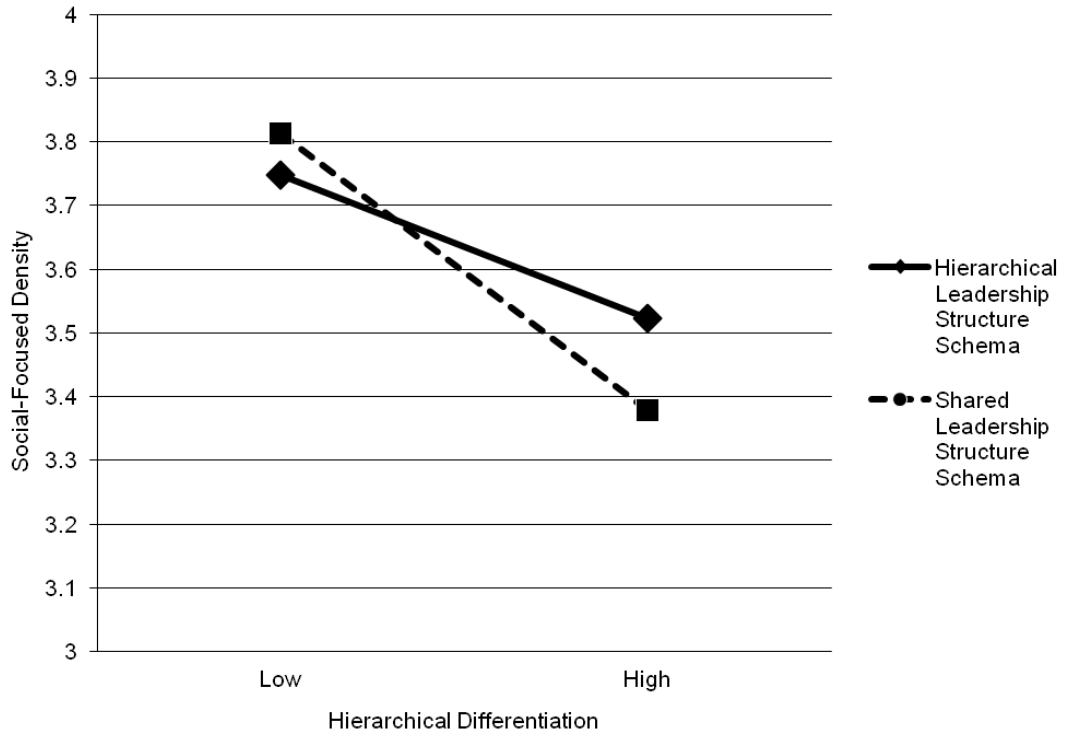
Figure 7. Study 1: Hierarchy and positive group mood predicting social-focused leadership reciprocity.
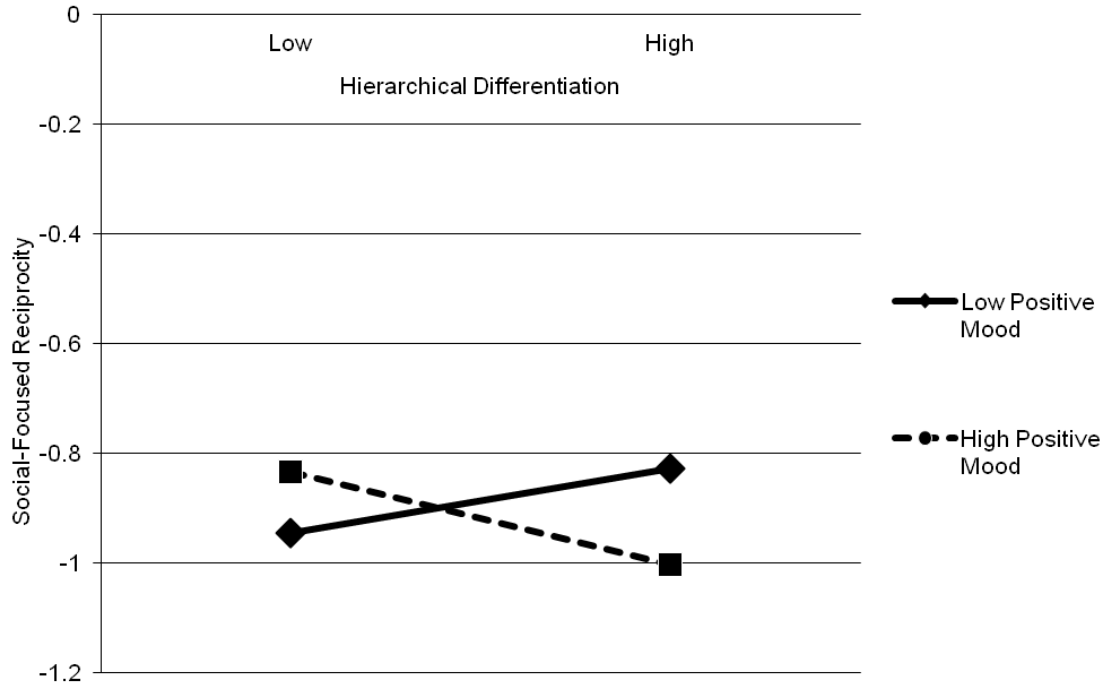
Hypothesis 5 predicted that shared leadership structures are positively associated with absorptive capacity. The results of the analyses testing this hypothesis are displayed in Tables 11-14. Although I did not formally hypothesize interactions between the density, centralization, and reciprocity of group leadership structures, I tested all possible two- and three-way interactions and these results are reported in the Tables. Hypothesis 5 was not supported with respect to outgoing leadership structures. The density (self-report $\beta = .17$, $p = .18$, supervisor-report $\beta = -.13$, $p = .31$) centralization (self-report $\beta = -.03$, $p = .85$, supervisor-report $\beta = .05$, $p = .74$), and reciprocity (self-report $\beta = .13$, $p = .27$, supervisor-report $\beta = .17$, $p = .15$) of outgoing leadership structures was not significantly related to absorptive capacity as assessed by either staff or supervisors. However, the density of outgoing leadership was positively associated with staff-reported information sharing ($\beta = .41$, $p < .01$) and the reciprocity of outgoing leadership was positively associated with staff-reported innovation ($\beta = .24$, $p < .05$). There was also one significant two-way interaction, with the density and reciprocity of outgoing leadership predicting supervisor-reported information sharing ($\beta = .32$, $p < .03$). As shown in Figure 8, at low levels of outgoing reciprocity, outgoing leadership density had a negative relationship with supervisor-reported information sharing, while at high levels of outgoing reciprocity, the relationship between outgoing density and supervisor-reported information sharing was positive.

Hypothesis 5 was also not reported with respect to incoming leadership structures. There were marginally significant relationships between the density ($\beta = -.24$, $p < .09$) and centralization ($\beta = .25$, $p < .08$) of incoming leadership structures and supervisor-

reported absorptive capacity, but these relationships were in the opposite direction than predicted. The density and centralization of incoming leadership structures were not significantly related to staff-rated absorptive capacity (density β = .17, p = .28, centralization β = .06, p = .43), and the reciprocity of incoming leadership structures was not significantly related to either staff-reported (β = -.14, p = .23), or supervisor-reported (β = .04, p = .76) absorptive capacity. The density of incoming leadership structures was significantly negatively related to the innovation component of supervisor-rated absorptive capacity, but this effect was in the opposite direction as predicted, with denser incoming leadership structures tending to reduce supervisor-reported innovation (β = -.29, p < .05). There was one significant two-way interaction, with the density and centralization of incoming leadership structures interacting to predict staff-reported information sharing (β = .32, p < .01). As shown in Figure 9a, when incoming leadership activity was relatively decentralized, incoming leadership density did not have a significant relationship with staff-reported information sharing. However, when incoming leadership activity was relatively centralized, denser leadership activity tended to increase staff-reported information sharing.

Hypothesis 5 was partially supported with respect to task-focused leadership. The density of task-focused leadership activity in nursing shifts had a significant positive relationship with staff-rated absorptive capacity (β = .29, p < .03), supporting Hypothesis 5a. The results displayed in Table 13 suggest that this effect was largely driven by the strong positive association between task-focused density and staff-reported information sharing (β = .45, p < .001). However, the centralization (staff-reported β = -.05, p = .73,

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supervisor-reported β = .18, p = .22) and reciprocity (staff-reported β = .03, p = .82,

supervisor-reported β = -.06, p = .60) of shifts' task-focused leadership structures was not

significantly associated with absorptive capacity. There was one significant two-way

interaction, with the density and centralization of task-focused leadership interacting to

predict staff-rated information sharing (β = .26, p < .05). Figure 9b shows that, similar to

incoming leadership, the density of task-focused leadership activity in nursing shifts had

a significantly more positive relationship with staff-reported information sharing when

task focused centralization was high (rather than low).

Hypothesis 5 was not supported with respect to social-focused leadership

(density: staff-reported absorptive capacity β = .19, p = .20, supervisor-reported

absorptive capacity β = -.02, p = .88, centralization: staff-reported absorptive capacity β

= -.17, p = .20, supervisor-reported absorptive capacity β = -.09, p = .48, reciprocity:

staff-reported absorptive capacity β = .13, p = .29, supervisor-reported absorptive

capacity β = .04, p = .71). However, the density of social-focused leadership (β = .48, p <

.01) was positively associated with the staff-reported information sharing component of

absorptive capacity, and the centralization of social-focused leadership was negatively

associated with staff-reported information sharing (β = -.32, p < .02). There was also one

significant two-way interaction. As shown in Figure 10, the density and reciprocity of

social focused leadership interacted to predict supervisor-rated information seeking (β =

.29, p < .03), such that there was a significant negative relationship between the density

of social-focused leadership activity and supervisor-reported information seeking when

social-focused leadership was low in reciprocity, but not when social-focused leadership was high in reciprocity.

Table 11. *Study 1: Summary of Regression Results: Outgoing Leadership Structures Predicting Absorptive Capacity*

	Staff Report				Supervisor Report			
Variable	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β
Density (D)	-.05	.41**	.02	.17	-.14	.00	-.11	-.13
Centralization (C)	.11	-.05	-.14	-.03	.02	-.14	.03	.05
Reciprocity (R)	.03	.07	.24*	.13	.18	.01	.16	.17
D x C	-.05	-.022†	-.07	-.14	-.15	.23	-.13	-.04
D x R	-.05	-.04	-.01	-.05	-.03	.32*	-.01	.11
C x R	-.14	.08	-.01	-.04	.01	-.11	.11	.01
D x C x R	-.09	-.22	-.14	-.21	.36†	-.16	.13	.17

Note. n = 80 shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed , * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 12. *Study 1: Summary of Regression Results: Incoming Leadership Structures Predicting Absorptive Capacity*

	Staff Report				Supervisor Report			
Variable	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β
Density (D)	.10	.24	.02	.17	-.20	-.02	-.29*	-.24†
Centralization (C)	.14	-.09	.09	.06	.15	.12	.26†	.25†
Reciprocity (R)	-.04	-.20	-.09	-.14	.05	-.23†	.22†	.04
D x C	-.03	.32**	.19	.20†	.10	.10	-.01	.09
D x R	-.08	.06	-.07	-.05	.05	.05	.07	.08
C x R	-.02	-.10	.07	-.03	-.13	-.04	.02	-.07
D x C x R	.11	-.14	.01	-.01	-.04	-.24	-.11	-.17

Note. n = 80 shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed , * $p < .05$, two-tailed , ** $p < .01$, two-tailed.

Table 13. *Study 1: Summary of Regression Results: Task-Focused Leadership Structures Predicting Absorptive Capacity*

	Staff Report				Supervisor Report			
Variable	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β
Density (D)	.04	.45**	.19	.29*	-.03	.00	-.15	-.09
Centralization (C)	.14	-.19	-.10	-.05	.07	.08	.24†	.18
Reciprocity (R)	-.01	.02	.07	.03	-.17	-.15	.18	-.06
D x C	-.01	.26*	.19†	.19	.12	.14	.07	.15
D x R	-01	.06	-.14	-.04	-.04	.14	-.11	-.01
C x R	-.10	-.15	-.08	-.15	.01	-.04	.16	.06
D x C x R	.13	.02	.00	.07	-.11	.10	-.08	-.05

Note. $n = 80$ shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 14. *Study 1: Summary of Regression Results: Social-Focused Leadership Structures Predicting Absorptive Capacity*

	Staff Report				Supervisor Report			
Variable	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β	DV Information Seeking β	DV Information Sharing β	DV Innovation β	DV Absorptive Capacity β
Density (D)	-.09	.48**	.05	.19	-.07	.20	-.15	-.02
Centralization (C)	.02	-.32*	-.08	-.17	.03	-.16	-.09	-.09
Reciprocity (R)	-.03	.16	.18	.13	-.06	.15	.03	.04
D x C	-.07	.04	-.18	-.08	-.15	-.16	-.04	-.17
D x R	.22†	-.24†	.14	.05	.29*	-.02	.09	.19
C x R	-.04	.09	-.16	-.02	.18	.00	.09	.13
D x C x R	-.01	-.05	-.09	-.08	.01	-.08	-.09	-.07

Note. n = 80 shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed , * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Figure 8. Study 1: Density and reciprocity of outgoing leadership structures predicting supervisor-reported information sharing.
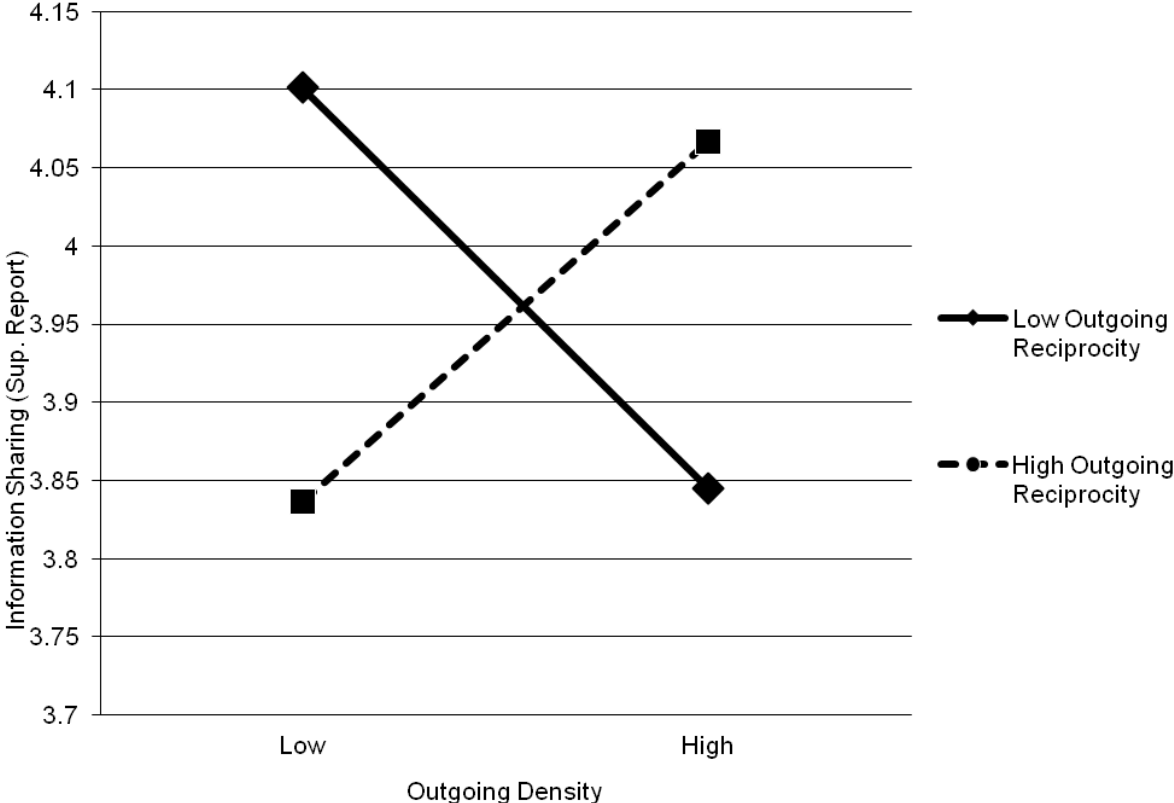
Figure 9. Study 1: Density and centralization of incoming and task-focused leadership structures predicting staff-reported information sharing.

A. Incoming Leadership
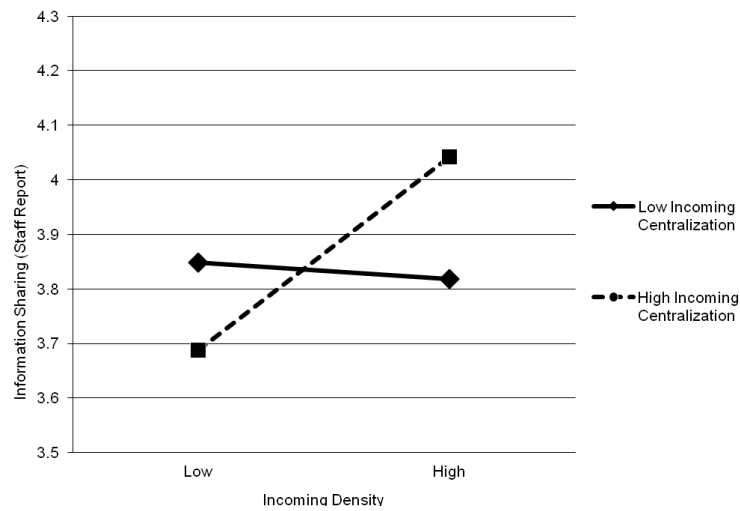
B. Task-Focused Leadership
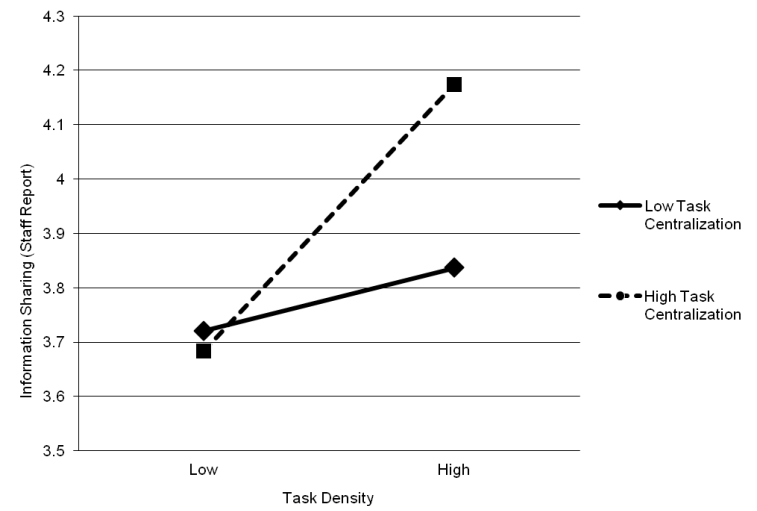
Figure 10. Study 1: Density and reciprocity of social-focused leadership structures predicting supervisor-reported information seeking.
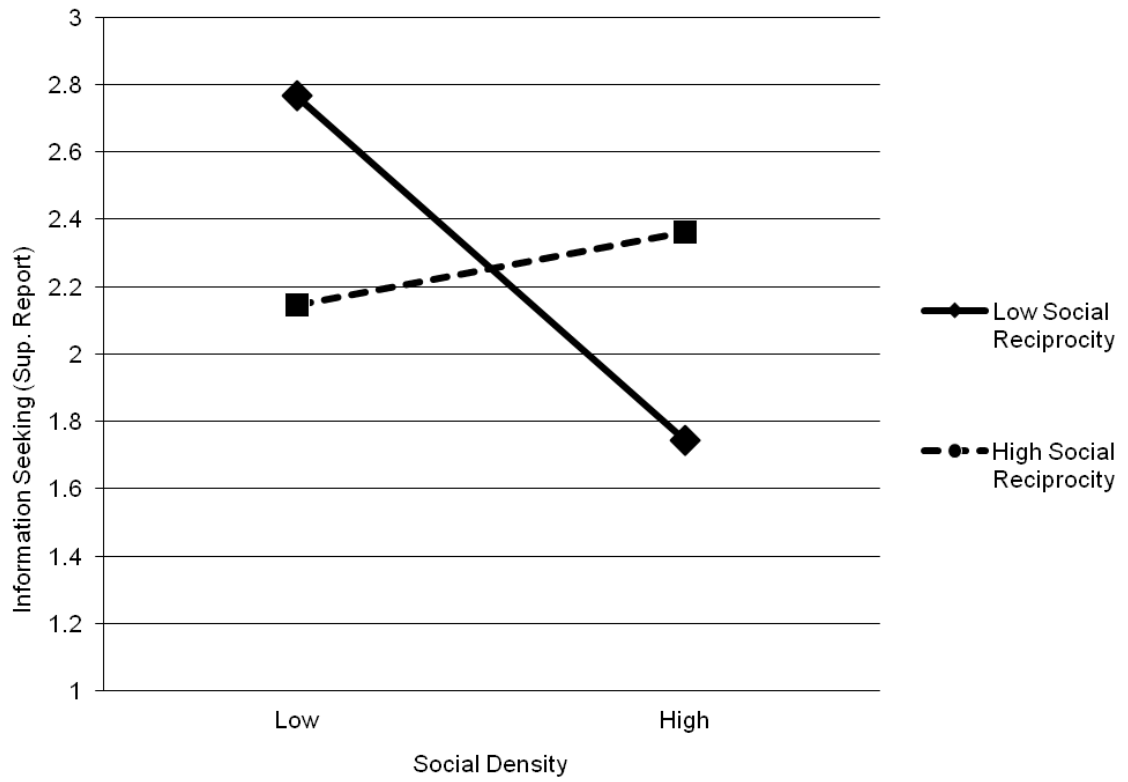
Hypothesis 6a predicted that denser leadership structures improve group performance. The results of the analyses testing this hypothesis are displayed in Tables 15-18. The density of outgoing leadership structures was not significantly related to staff-reported ($\beta = .11$, $p = .34$), supervisor-reported ($\beta = -.02$, $p = .88$), or patient-reported ($\beta = -.07$, $p = .73$) patient care in clinical nursing shifts. Similarly, the density of incoming leadership structures was not associated with patient care (staff-reported $\beta = -.04$, $p = .80$, supervisor-reported $\beta = .05$, $p = .71$, patient-reported $\beta = -.08$, $p = .71$). The density of task-focused leadership structures was positively associated with supervisor-reported patient care ($\beta = .27$, $p < .05$), but not staff-reported ($\beta = .04$, $p = .77$) or patient-reported ($\beta = -.08$, $p = .69$) care, and the density of social-focused leadership structures was positively associated with staff-reported patient care ($\beta = .29$, $p < .04$), but not supervisor-reported ($\beta = .13$, $p = .33$), or patient-reported ($\beta = .07$, $p = .72$) care. Thus, Hypothesis 6a received mixed support.

Hypothesis 6b predicted that the centralization of group leadership structures is negatively associated with group performance. As shown in Tables 15-18, the centralization of social-focused leadership structures was marginally negatively associated with staff-reported patient care ($\beta = -.20$, $p < .10$). The centralization of outgoing leadership structures was also marginally related to supervisor-reported patient care ($\beta = .22$, $p < .10$), but the direction of the relationship was opposite that predicted. Apart from those two effects, the centralization of outgoing (staff-reported $\beta = .19$, $p = .13$, patient-reported $\beta = -.01$, $p = .95$), incoming (staff-reported $\beta = .14$, $p = .28$, supervisor-reported $\beta = -.03$, $p = .86$, patient-reported $\beta = .00$, $p = 1.00$), task-focused

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(staff-reported β = -.09, p = .52, supervisor-reported β = -.16, p = .26, patient-reported β = -.01, p = .96), and social-focused (supervisor-reported β = -.13, p = .30, patient-reported β = .12, p = .50) leadership activity was not a significant predictor of patient care. Thus, Hypothesis 6b received only minimal support.

Hypothesis 6c predicted that the reciprocity of group leadership structures is positively associated with patient care. This hypothesis was not supported. As shown in Tables 15-18, the reciprocity of incoming leadership activity was significantly negatively associated with staff-reported patient care (β = -.28, p < .01), and there was also a marginally significant negative association between the reciprocity of outgoing leadership activity in nursing shifts and staff-reported care (β = -.21, p < .07). However, these relationships were in the opposite direction as predicted, and none of the other hypothesized relationships between the reciprocity of outgoing (supervisor-reported β = .08, p = .52, patient-reported β = .15, p = .40), incoming (supervisor-reported β = -.02, p = .90, patient-reported β = .00, p = 1.00), task-focused (staff-reported β = -.01, p = .96, supervisor-reported β = -.04, p = .75, patient-reported β = -.10, p = .58), or social-focused (staff-reported β = .05, p = .64 supervisor-reported β = .05, p = .69, patient-reported β = .05, p = .78) leadership activity in clinical nursing shifts and patient care was significant.

There were several significant two- and three-way interactions between the density, centralization, and reciprocity of group leadership structures and patient care. First, the density and centralization of incoming (β = -.43, p < .03) and social-focused (β = -.40, p < .02) leadership interacted to predict patient-reported care. As shown in Figure

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11, when these two types of leadership structures were high in centralization, increases in density tended to decrease patient care, whereas when incoming and social-focused structures were low in centralization, increases in density were positively associated with care quality. The density and centralization of task-focused leadership activity in nursing shifts also interacted in a similar way to predict patient-reported patient care, but this effect was only marginally significant (β = -.37, p < .09). Second, the centralization and reciprocity of incoming leadership activity interacted to predict staff-reported patient care (β = .24, p < .03). As shown in Figure 12, when the reciprocity of incoming leadership was low, more centralized incoming leadership activity tended to decrease the quality of patient care (as reported by staff), whereas when the reciprocity of incoming leadership was high, there was not a significant relationship between the centralization of incoming leadership activity and staff-reported patient care. Third, the density and reciprocity of task-focused leadership activity interacted to predict supervisor-reported patient care (β = -.26, p < .04). As shown in Figure 13, at low levels of reciprocity, increases in the density of task-focused leadership activity tended to improve patient care (as reported by supervisors), while at high levels of reciprocity increased density was associated with lower levels of supervisor-reported patient care. Fourth, there was a three-way interaction with the density, centralization, and reciprocity of social-focused leadership activity predicting staff-reported patient care (β = .33, p < .04). To interpret this interaction, I followed the recommendation of Cohen and colleagues (2003) and plotted the two-way interaction between social-focused density and centralization at high and low levels of social-focused reciprocity. As shown in Figure 14b, at high levels of social-focused

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reciprocity, social-focused density was positively associated with staff-reported patient care when social-focused centralization was high, but not when social-focused centralization was low. In contrast, as shown in Figure 14a, there was not a significant interaction between the density and centralization of social-focused leadership with respect to staff-reported patient care at low levels of social-focused reciprocity.

Table 15. *Study 1: Summary of Regression Results: Outgoing Leadership Structures Predicting Patient Care*

Variable	Staff Report DV Patient Care β	Supervisor Report DV Patient Care β	Patient Report DV Patient Care β
Density (D)	.11	-.02	-.07
Centralization (C)	.19	.22[†]	.-.01
Reciprocity (R)	-.21[†]	.08	.15
D x C	-.18	-.07	-.19
D x R	.10	-.05	-.01
C x R	.11	-.02	.28
D x C x R	.25[†]	-.24	-.09

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report.
[†] p < .10, two-tailed, [*] p < .05, two-tailed, [**] p < .01, two-tailed.

Table 16. *Study 1: Summary of Regression Results: Incoming Leadership Structures Predicting Patient Care*

Variable	Staff Report DV Patient Care β	Supervisor Report DV Patient Care β	Patient Report DV Patient Care β
Density (D)	-.04	.05	-.08
Centralization (C)	.14	-.03	.00
Reciprocity (R)	-.28**	-.02	.00
D x C	-.14	-.07	-.43*
D x R	-.09	-.16	.08
C x R	.24*	.12	.10
D x C x R	.21	-.09	-.10

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 17. *Study 1: Summary of Regression Results: Task-Focused Leadership Structures Predicting Patient Care*

Variable	Staff Report **DV** Patient Care β	Supervisor Report **DV** Patient Care β	Patient Report **DV** Patient Care β
Density (D)	.04	$.27^{*}$	-.08
Centralization (C)	-.09	-.16	-.01
Reciprocity (R)	-.01	-.04	-.10
D x C	-.11	.13	$-.37^{\dagger}$
D x R	.01	$-.27^{*}$	-.12
C x R	.14	.17	.17
D x C x R	-.02	.09	.02

Note. $n = 80$ shifts staff report, 72 shifts supervisor report, 44 shifts patient report.
$^{\dagger} p < .10$, two-tailed, $^{*} p < .05$, two-tailed, $^{**} p < .01$, two-tailed.

Table 18. *Study 1: Summary of Regression Results: Social-Focused Leadership Structures Predicting Patient Care*

Variable	Staff Report DV Patient Care β	Supervisor Report DV Patient Care β	Patient Report DV Patient Care β
Density (D)	.29[*]	.13	.07
Centralization (C)	-.20[†]	-.13	.12
Reciprocity (R)	.05	.05	.05
D x C	-.03	-.21[†]	-.40[*]
D x R	.07	.06	.40[†]
C x R	-.14	-.05	-.25
D x C x R	.33[*]	-.03	-.19

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report.
[†] p < .10, two-tailed, [*] p < .05, two-tailed, [**] p < .01, two-tailed.

Figure 11. Study 1: Density and centralization of incoming and social-focused leadership structures predicting patient-reported patient care.

A. Incoming Leadership
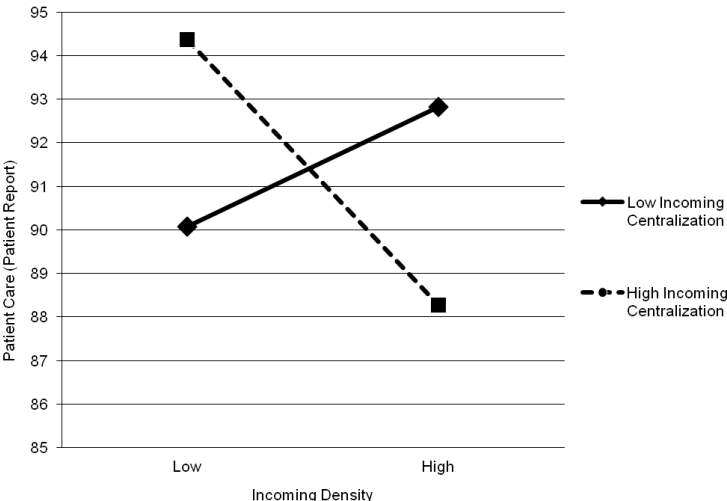
B. Social-Focused Leadership
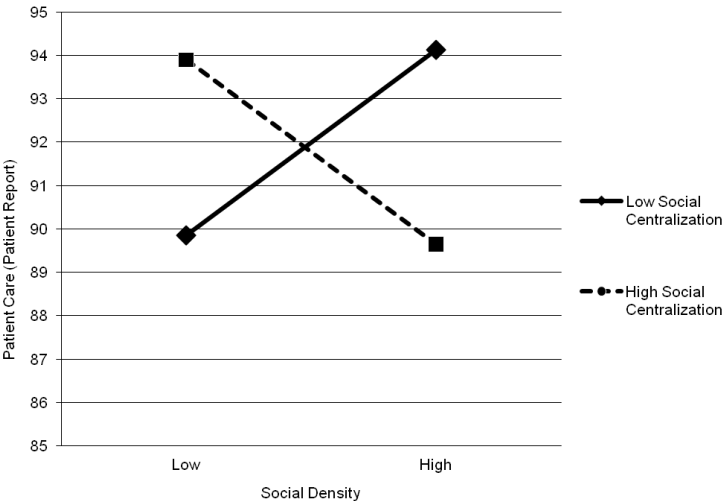
Figure 12. Study 1: Centralization and reciprocity of incoming leadership structures predicting staff-reported patient care.
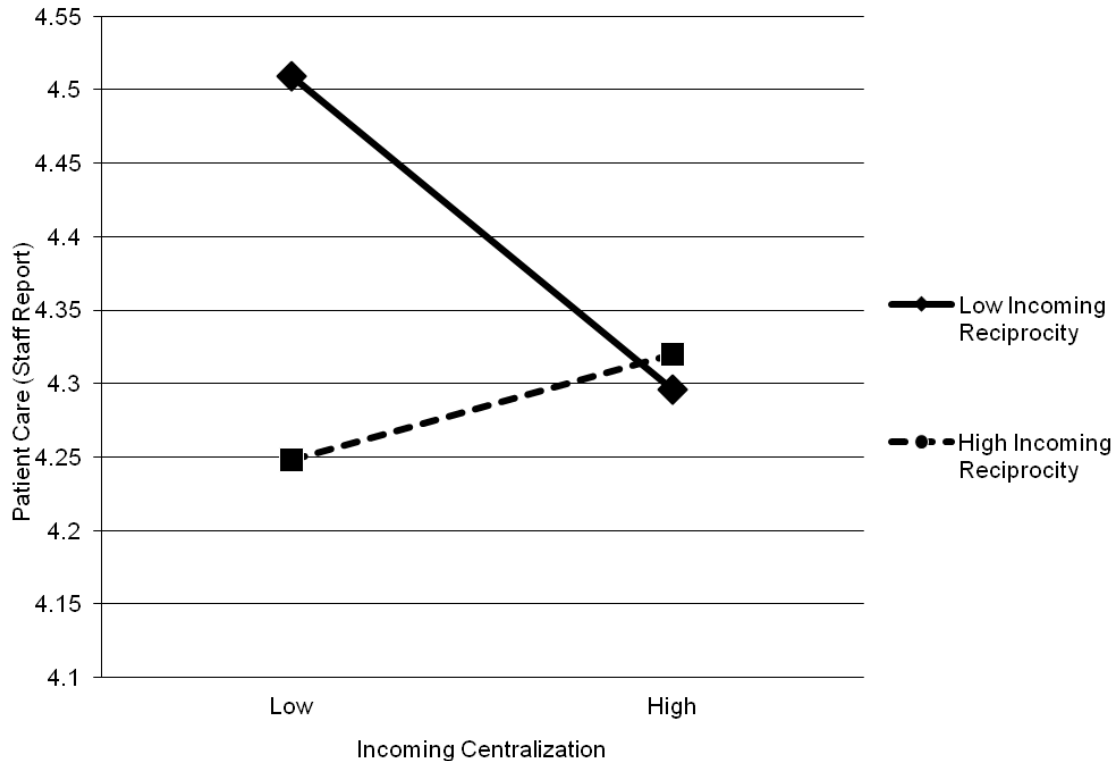
Figure 13. Study 1: Density and reciprocity of task-focused leadership structures predicting supervisor-reported patient care.
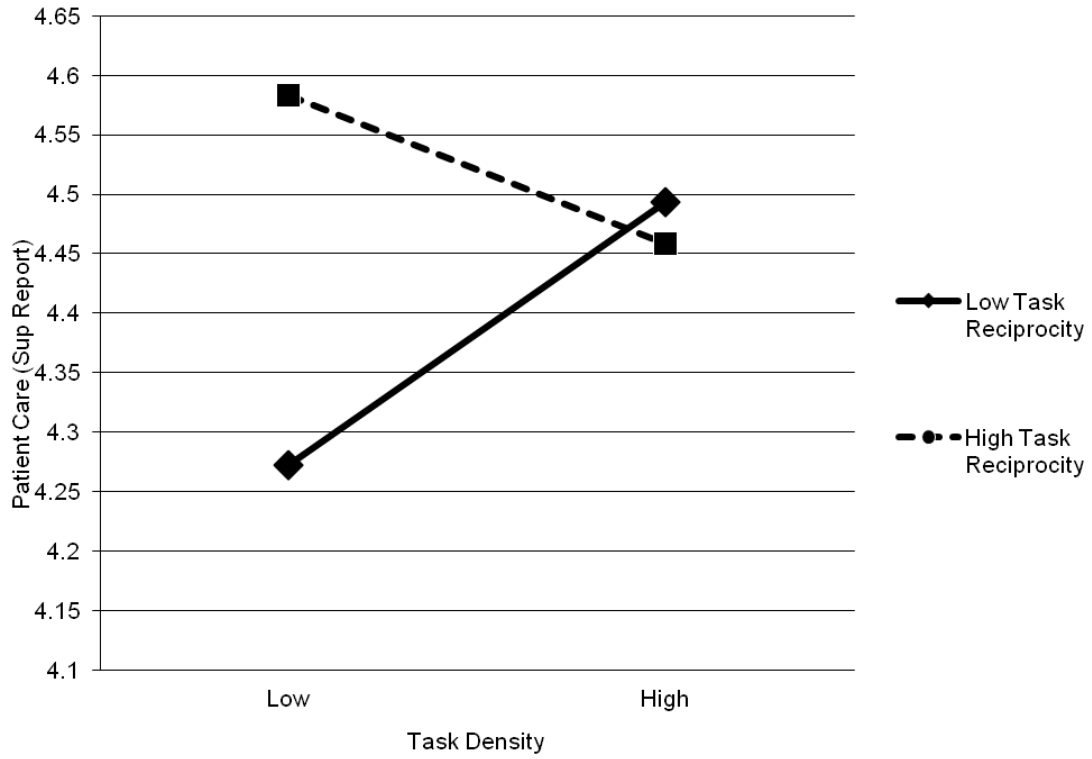
Figure 14. Study 1: Density, centralization, and reciprocity of social-focused leadership structures predicting staff-reported patient care.

A. Low Social Reciprocity
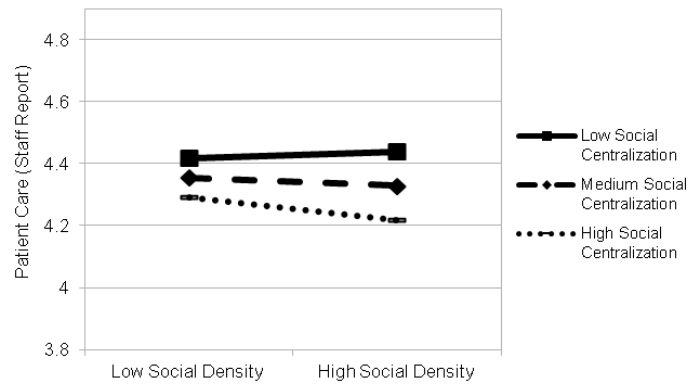
B. High Social Reciprocity
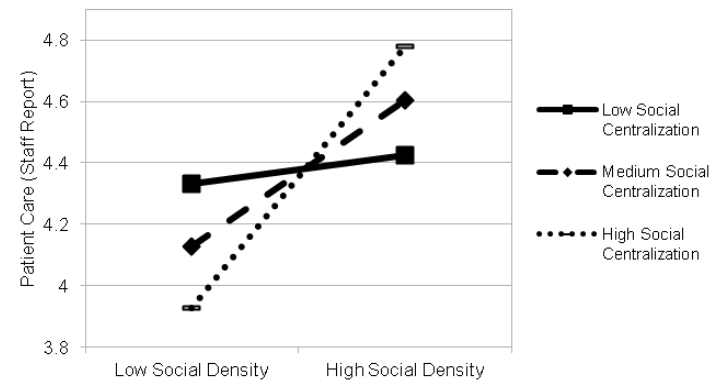
Hypothesis 7 predicted absorptive capacity mediates the positive relationship between shared leadership structures and group performance. Tables 19-26 display the results of the analyses testing this hypothesis. I tested for mediation using the path-analysis approach outlined by Edwards and Lambert (2007) and Preacher, Rucker, and Hayes (2007). This approach involved fitting two regression models. In Model 1, I regressed absorptive capacity on the control variables and the leadership structural property of interest. In Model 2, I regressed patient care on the control variables, absorptive capacity and the structural property of interest. I then calculated the indirect effect of the structural property on patient care via absorptive capacity by multiplying the coefficient describing the relationship between the structural property and absorptive capacity from Model 1 by the coefficient describing the relationship between absorptive capacity and patient care from Model 2. Because the indirect effect in this method is the product of coefficients from two different regression equations, I tested the significance of the indirect effect coefficient by using 5,000 bootstrapped samples to create bias-corrected 95% confidence intervals.

As shown in Table 19, Hypothesis 7 was not supported with respect to staff-reported absorptive capacity and outgoing leadership. Staff-reported absorptive capacity did not mediate the relationship between outgoing leadership density (staff-reported care b= .03, *95% CI* -.02, .09, supervisor-reported care b = .03, *95% CI* -.05, .14, patient-reported care b = -.00, *95% CI* -.77, .68), centralization (staff-reported care b = -.00, *95% CI* -.00, .00, supervisor-reported care b = .00, *95% CI* -.00, .00, patient-reported care b = .00, *95% CI* -.04, .05), or reciprocity (staff-reported care b = .03, *95% CI* -.03, .15,

supervisor- reported care $b = .02$, *95% CI* .00, .04, patient-reported care $b = -.06$, *95% CI* -1.99, .89) and patient care as reported by either staff, supervisors, or patients. As shown in Table 20, Hypothesis 7 received only minimal support with respect to supervisor-reported absorptive capacity and outgoing leadership. The indirect effect of outgoing leadership reciprocity on supervisor-reported patient care via supervisor-reported absorptive capacity was positive and marginally significant ($b = .15$, *95% CI* -.01, .35). Although the indirect effect of outgoing leadership density on supervisor-reported care via supervisor-reported absorptive capacity was also marginally significant ($b = -.09$, *95% CI* -.23, .02), this relationship was in the opposite direction as predicted. None of the other indirect effects of the density (staff-reported care $b = -.00$, *95% CI* -.06, .02 patient-reported care $b = -.12$, *95% CI* -1.73, 1.74), centralization (staff-reported care $b = .00$, *95% CI* -.00, .00, supervisor-reported care $b = .00$, *95% CI* -.00, .01, patient- reported care $b = -.00$, *95% CI* -.04, .03), or reciprocity (staff-reported care $b = .01$, *95% CI* -.03, .10, patient-reported care $b = -.00$, *95% CI* -2.65, 1.80), of outgoing leadership on patient care through supervisor-reported absorptive capacity was significant.

Table 21 displays the results of the analyses testing whether staff-reported absorptive capacity mediated the relationship between the density, centralization, and reciprocity of incoming leadership structures and patient care. Staff-reported absorptive capacity was a marginally significant mediator of the relationship between incoming leadership density and staff-reported patient care ($b = .05$, *95% CI* -.06, .02). However, none of the other indirect effects of the density (supervisor-reported care $b = .06$, *95% CI* -.03, .21, patient-reported care $b = -.00$, *95% CI* -.73, 1.00), centralization (staff-reported

care b = -.00, *95% CI* -.00, .00, supervisor-reported care b = -.00, *95% CI* -.01, .00,

patient-reported care b = -.00, *95% CI* -.03, .05) and reciprocity (staff-reported care b = -

.04, *95% CI* -.16, .02, supervisor-reported care b = .01, *95% CI* -.12, .15, patient-reported

care b = -.00, *95% CI* -.84, .95) of incoming leadership activity in clinical nursing shifts

on patient care via staff-reported absorptive capacity was significant. Table 22 displays

the results of the analyses testing whether supervisor-reported absorptive capacity

mediated the relationship between incoming leadership activity and patient care.

Hypothesis 7 was not supported with respect to incoming leadership activity and

supervisor-reported absorptive capacity, as supervisor rated capacity did not mediate the

relationship between the density (staff-reported care b = -.00, *95% CI* -.06, .04,

supervisor-reported care b = -.11, *95% CI* -.29, .04, patient-reported care b = .13, *95% CI*

-2.46, 1.50), centralization (staff-reported care b = .00, *95% CI* -.00, .00, supervisor-

reported care b = .00, *95% CI* -.00, .01, patient-reported care b = .01, *95% CI* -.05, .11),

or reciprocity (staff-reported care b = .00, *95% CI* -.04, .05, supervisor-reported care b =

.08, *95% CI* -.09, .29, patient-reported care b = .13, *95% CI* -2.46, 2.16) of incoming

leadership structures in clinical nursing shifts and patient care.

The results of the analyses testing Hypothesis 7 with respect to task-focused

leadership are displayed in Tables 23 and 23. As shown in Table 23, Hypothesis 7a was

partially supported with respect to task-focused leadership and staff-reported absorptive

capacity. The indirect effect of task-focused leadership density on patient care via staff-

reported absorptive capacity was positive and significant for both staff-reported (b = .05,

95% CI .01, .13) and supervisor-reported (b = .09, *95% CI* .02, .21) care, but not for

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patient-reported care ($b = .00$, *95% CI* -.55, .81). Staff-reported absorptive capacity did

not mediate the relationship between the centralization (staff-reported care $b = -.00$, *95%*

CI -.00, .00, supervisor-reported care $b = -.00$, *95% CI* -.01, .00, patient-reported care $b =$

-.00, *95% CI* -.05, .04) and reciprocity (staff-reported care $b = .02$, *95% CI* .00, .06,

supervisor-reported care $b = .01$, *95% CI* -.11, .15, patient-reported care $b = .01$, *95% CI*

-1.18, 1.28) of task-focused leadership and patient care, so Hypotheses 7b and 7c were

not supported with respect to task-focused leadership and staff-rated absorptive capacity.

Hypothesis 7 was also not supported with respect to task-focused leadership and

supervisor-reported absorptive capacity. Supervisor-reported absorptive capacity did not

mediate the relationship between the density (staff-reported care $b = -.00$, *95% CI* -.04,

.02, supervisor-reported care $b = -.05$, *95% CI* -.19, .06, patient-rated care $b = -.06$, *95%*

CI -1.38, .82), centralization (staff-reported care $b = .00$, *95% CI* -.00, .00, supervisor-

reported care $b = .00$, *95% CI* -.00, .01, patient-reported care $b = .01$, *95% CI* -.05, .11),

and reciprocity (staff-reported care $b = .00$, *95% CI* -.03, .04, supervisor-reported care b

$= -.02$, *95% CI* -.16, .14, patient-reported care $b = .09$, *95% CI* -.80, 2.72) of task-

focused leadership structures in nursing shifts and patient care.

Finally, Hypothesis 7 was not supported with respect to social-focused leadership

activity. The indirect effects of the density (staff-reported care $b = .02$, *95% CI* -.05, .11,

supervisor-reported care $b = .04$, *95% CI* -.09, .18, patient-reported care $b = .00$, *95% CI*

-.85, 1.22) centralization (staff-reported care $b = -.00$, *95% CI* -.01, .00, supervisor-

reported care $b = -.00$, *95% CI* -.02, .00, patient-reported care $b = -.00$, *95% CI* -.10, .05)

and reciprocity (staff-reported care $b = .03$, *95% CI* -.06, .15, supervisor-reported care b

= .03, *95% CI* -.14, .21, patient-reported care *b* = -.01, *95% CI* -1.50, 2.80) of social-

focused leadership structures on patient care through staff-reported absorptive capacity

were not significant. Similarly, supervisor-reported absorptive capacity did not mediate

the relationship between the density (staff-reported care *b* = -.00, *95% CI* -.08, .03,

supervisor-reported care *b* = -.07, *95% CI* -.29, .07, patient-reported care *b* = -.05, *95%*

CI -1.89, .80), centralization (staff-reported care *b* = .00, *95% CI* -.00, .00, supervisor-

reported care *b* = -.00, *95% CI* -.01, .01, patient-reported care *b* = .01, *95% CI* -.14, .04),

or reciprocity (staff-reported care *b* = -.00, *95% CI* -.05, .05, supervisor-reported care *b* =

.02, *95% CI* -.22, .22, patient-reported care *b* = .01, *95% CI* -1.65, 2.37) of social-focused

leadership activity and patient care.

Table 19. *Study 1: Summary of Mediation Analysis: Outgoing Leadership Structures, Staff-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	**Model 2**		
	Structure → Absorptive Capacity	**Absorptive Capacity → Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Outgoing Density	.08 (.07)	.32[*] (.12)	.03 (.03)	-.02, .09
Outgoing Centralization	-.00 (.00)	.33[**] (.12)	-.00 (.00)	-.00, .00
Outgoing Reciprocity	.10 (.11)	.35[**] (.12)	.03 (.04)	-.03, .15
	Supervisor-Reported Care			
	Model 1	**Model 2**		
	Structure → Absorptive Capacity	**Absorptive Capacity → Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Outgoing Density	.05 (.07)	.58[**] (.18)	.03 (.05)	-.05, .14
Outgoing Centralization	-.00 (.01)	.56[**] (.18)	.00 (.00)	-.00, .00
Outgoing Reciprocity	.01 (.01)	1.18[**] (.25)	.02 (.01)	.00, .04
	Patient-Reported Care			
	Model 1	**Model 2**		
	Structure → Absorptive Capacity	**Absorptive Capacity → Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Outgoing Density	.01 (.14)	-.03 (1.91)	-.00 (.37)	-.77, .68
Outgoing Centralization	-.01[†] (.00)	-.03 (2.01)	.00 (.02)	-.04, .05
Outgoing Reciprocity	.21 (.22)	-.29 (1.93)	-.06 (.62)	-1.99, .89

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.
[†] p < .10, two-tailed, [*] p < .05, two-tailed, [**] p < .01, two-tailed

Table 20. *Study 1: Summary of Mediation Analysis: Outgoing Leadership Structures, Supervisor-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Outgoing Density	-.14	.02	-.00	
	(.13)	(.08)	(.02)	-.06, .02
Outgoing Centralization	.00	.00	.00	
	(.00)	(.08)	(.00)	-.00, .00
Outgoing Reciprocity	.25	.03	.01	
	(.19)	(.08)	(.03)	-.03, .10
	Supervisor-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Outgoing Density	-.18	.49	-.09[†]	
	(.12)	(.09)	(.06)	-.23, .02
Outgoing Centralization	.00	.48[**]	.00	
	(.00)	(.09)	(.00)	-.00, .01
Outgoing Reciprocity	.30	.49[**]	.15[†]	
	(.18)	(.09)	(.09)	-.01, .35
	Patient-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Outgoing Density	-.51[*]	.23	-.12	-1.73, 1.74
	(.22)	(1.26)	(.84)	
Outgoing Centralization	-.00	.27	-.00	-.04, .03
	(.01)	(1.18)	(.02)	
Outgoing Reciprocity	.59	-.00	-.00	-2.65, 1.80
	(.37)	(1.20)	(1.02)	

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed

Table 21. *Study 1: Summary of Mediation Analysis: Incoming Leadership Structures, Staff-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	Model 2		
	Structure → Absorptive Capacity	Absorptive Capacity → Patient Care	Indirect Effect	
	b	b	b	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Incoming Density	.15 (.10)	.33** (.12)	.05† (.04)	-.01, .14
Incoming Centralization	-.00 (.01)	.32* (.12)	-.00 (.00)	-.00, .00
Incoming Reciprocity	-.14 (.11)	.30* (.12)	-.04 (.05)	-.16, .02
	Supervisor-Reported Care			
	Model 1	Model 2		
	Structure → Absorptive Capacity	Absorptive Capacity → Patient Care	Indirect Effect	
	b	b	b	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Incoming Density	.12 (.10)	.55** (.19)	.06 (.06)	-.03, .21
Incoming Centralization	-.00 (.00)	.56** (.18)	-.00 (.00)	-.01, .00
Incoming Reciprocity	.02 (.12)	.56** (.18)	.01 (.06)	-.12, .15
	Patient-Reported Care			
	Model 1	Model 2		
	Structure → Absorptive Capacity	Absorptive Capacity → Patient Care	Indirect Effect	
	b	b	b	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Incoming Density	.03 (.16)	-.00 (1.91)	-.00 (.41)	-.73, 1.00
Incoming Centralization	.00 (.01)	-.03 (1.94)	-.00 (.02)	-.03, .05
Incoming Reciprocity	.03 (.19)	-.04 (1.92)	-.00 (.45)	-.84, .95

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.
† p < .10, two-tailed, * p < .05, two-tailed, ** p < .01, two-tailed

Table 22. *Study 1: Summary of Mediation Analysis: Incoming Leadership Structures, Supervisor-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	Model 2		
	Structure → Absorptive Capacity	Absorptive Capacity → Patient Care	Indirect Effect	
Variable	*b* *(SE)*	*b* *(SE)*	*b* *(SE)*	95% CI
Incoming Density	-.18 (.17)	.01 (.08)	-.00 (.02)	-.06, .04
Incoming Centralization	.01 (.01)	.01 (.08)	.00 (.01)	-.00, .00
Incoming Reciprocity	.07 (.20)	.01 (.08)	.00 (.02)	-.04, .05
	Supervisor-Reported Care			
	Model 1	Model 2		
	Structure → Absorptive Capacity	Absorptive Capacity → Patient Care	Indirect Effect	
Variable	*b* *(SE)*	*b* *(SE)*	*b* *(SE)*	95% CI
Incoming Density	-.21 (.16)	.52** (.09)	-.11 (.08)	-.29, .04
Incoming Centralization	.01 (.01)	.51** (.09)	.00 (.00)	-.00, .01
Incoming Reciprocity	.16 (.19)	.49** (.09)	.08 (.10)	-.09, .29
	Patient-Reported Care			
	Model 1	Model 2		
	Structure → Absorptive Capacity	Absorptive Capacity → Patient Care	Indirect Effect	
Variable	*b* *(SE)*	*b* *(SE)*	*b* *(SE)*	95% CI
Incoming Density	-.52* (.24)	.22 (1.26)	-.11 (.87)	-2.14, 1.50
Incoming Centralization	.02† (.01)	.63 (1.22)	.01 (.04)	-.05, .11
Incoming Reciprocity	.62† (.32)	.21 (1.24)	.13 (1.11)	-2.46, 2.16

Note. $n = 80$ shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.

† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed

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Table 23. *Study 1: Summary of Mediation Analysis: Task-Focused Leadership Structures, Staff-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
Variable	***b*** ***(SE)***	***b*** ***(SE)***	***b*** ***(SE)***	**95% CI**
Task Density	.17[*] (.07)	.30[*] (.13)	.05[*] (.03)	.01, .13
Task Centralization	-.00 (.01)	.31[*] (.12)	-.00 (.00)	-.00, .00
Task Reciprocity	.04 (.10)	1.19[*] (.55)	.02 (.01)	.00, .06
	Supervisor-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
Variable	***b*** ***(SE)***	***b*** ***(SE)***	***b*** ***(SE)***	**95% CI**
Task Density	.18[*] (.07)	.50[*] (.19)	.09[*] (.05)	.02, .21
Task Centralization	-.00 (.01)	.56[**] (.19)	-.00 (.00)	-.01, .00
Task Reciprocity	.01 (.10)	.56[**] (.18)	.01 (.06)	-.11, .15
	Patient-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
Variable	***b*** ***(SE)***	***b*** ***(SE)***	***b*** ***(SE)***	**95% CI**
Task Density	.05 (.13)	.03 (1.91)	.00 (.33)	-.55, .81
Task Centralization	.01 (.01)	-.04 (1.96)	-.00 (.02)	-.05, .04
Task Reciprocity	.16 (.19)	.06 (1.94)	.01 (.62)	-1.18, 1.28

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed

Table 24. *Study 1: Summary of Mediation Analysis: Task-Focused Leadership Structures, Supervisor-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Task Density	-.07 (.13)	.01 (.08)	-.00 (.01)	-.04, .02
Task Centralization	.01 (.01)	.04 (.08)	.00 (.00)	-.00, .00
Task Reciprocity	-.11 (.17)	-.00 (.08)	.00 (.02)	-.03, .04
	Supervisor-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Task Density	-.10 (.09)	.51** (.08)	-.05 (.06)	-.19, .06
Task Centralization	.01 (.01)	.52** (.09)	.00 (.00)	-.00, .01
Task Reciprocity	-.03 (.16)	.49** (.09)	-.02 (.08)	-.16, .14
	Patient-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	**95% CI**
Task Density	-.28 (.23)	.21 (1.20)	-.06 (.51)	-1.38, .82
Task Centralization	.02[†] (.01)	.45 (1.24)	.01 (.04)	-.05, .11
Task Reciprocity	.28 (.33)	.33 (1.19)	.09 (.91)	-.80, 2.72

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.

[†] $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed

Table 25. *Study 1: Summary of Mediation Analysis: Social-Focused Leadership Structures, Staff-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	**b**	**b**	
Variable	**(SE)**	**(SE)**	**(SE)**	**95% CI**
Social Density	.06 (.10)	.31* (.12)	.02 (.04)	-.05, .11
Social Centralization	-.01 (.01)	.29* (.12)	-.00 (.00)	-.01, .00
Social Reciprocity	.08 (.12)	.32* (.12)	.03 (.05)	-.06 .15
	Supervisor-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	**b**	**b**	
Variable	**(SE)**	**(SE)**	**(SE)**	**95% CI**
Social Density	.06 (.11)	.56** (.18)	.04 (.07)	-.09, .18
Social Centralization	-.01 (.01)	.57** (.19)	-.00 (.00)	-.02, .00
Social Reciprocity	.05 (.13)	.56** (.18)	.03 (.09)	-.14, .21
	Patient-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	**b**	**b**	
Variable	**(SE)**	**(SE)**	**(SE)**	**95% CI**
Social Density	-.06 (.18)	-.01 (1.92)	.00 (.12)	-.85, 1.22
Social Centralization	-.01 (.01)	.11 (1.93)	-.00 (.03)	-.10, .05
Social Reciprocity	.14 (.25)	-.06 (1.93)	-.01 (1.03)	-1.50, 2.80

Note. n = 80 shifts staff report, 72 shifts Supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.
† p < .10, two-tailed, * p < .05, two-tailed, ** p < .01, two-tailed

Table 26. *Study 1: Summary of Mediation Analysis: Social-Focused Leadership Structures, Supervisor-Reported Absorptive Capacity, and Patient Care*

	Staff-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	**b**	**b**	
Variable	**(SE)**	**(SE)**	**(SE)**	**95% CI**
Social Density	-.17 (.18)	.03 (.08)	-.00 (.02)	-.08, .03
Social Centralization	-.00 (.01)	-.00 (.08)	.00 (.00)	-.00, .00
Social Reciprocity	-.06 (.22)	.01 (.08)	-.00 (.02)	-.05, .05
	Supervisor-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	**b**	**b**	
Variable	**(SE)**	**(SE)**	**(SE)**	**95% CI**
Social Density	-.15 (.18)	.50** (.09)	-.07 (.09)	-.29, .07
Social Centralization	-.01 (.01)	.49** (.09)	-.00 (.00)	-.01, .01
Social Reciprocity	.03 (.20)	.49** (.09)	.02 (.11)	-.22, .22
	Patient-Reported Care			
	Model 1	**Model 2**		
	Structure → **Absorptive Capacity**	**Absorptive Capacity** **→ Patient Care**	**Indirect Effect**	
	b	**b**	**b**	
Variable	**(SE)**	**(SE)**	**(SE)**	**95% CI**
Social Density	-.21 (.33)	.25 (1.18)	-.05 (.66)	-1.89, .80
Social Centralization	-.02 (.02)	.56 (1.18)	-.01 (.04)	-.14, .04
Social Reciprocity	.02 (.45)	.29 (1.17)	.01 (1.09)	-1.65, 2.37

Note. n = 80 shifts staff report, 72 shifts supervisor report, 44 shifts patient report. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals for indirect effects constructed using 5,000 bootstrapped samples.

[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed

Hypothesis 8 predicted that task conflict is positively related to the density and reciprocity of group leadership structures, and negatively related to the centralization of group leadership structures. Tables 27 – 30 summarize the analyses testing Hypothesis 8. As shown in the Tables, the density of outgoing (staff-report β = -.12, p = .35, supervisor-report β = -.16, p = .20), incoming (staff-report β = -.16, p = .31, supervisor-report β = -.17, p = .26), task-focused (staff-report β = -.15, p = .28, supervisor-report β = -.19, p = .19), and social-focused (supervisor-report β = -.16, p = .25) was generally not related to the level of task conflict in clinical nursing shifts. The density of social leadership activity was negatively associated with staff-reported task conflict (β = -.41, p < .01), but this relationship was in the opposite direction as predicted. Thus, Hypothesis 8a was not supported.

Hypothesis 8b, which predicted the centralization of group leadership activity is negatively associated with task conflict, was also not supported. The centralization of outgoing (staff-report β = -.11, p = .43, supervisor-report β = -.08, p = .56), incoming (staff-report β = -.14, p = .31, supervisor-report β = .07, p = .63), task-focused (staff-report β = -.04, p = .77, supervisor-report β = .04, p = .80), and social-focused (staff-report β = .15, p = .25, supervisor-report β = .08, p = .55) leadership activity was not related to the level of task conflict in groups.

Hypothesis 8c predicted that the reciprocity of group leadership structures is positively associated with task conflict. Supporting this hypothesis, the reciprocity of outgoing leadership activity was positively associated with staff-reported task conflict (β = .26, p < .03). Apart from this relationship, the reciprocity of outgoing (supervisor-

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report β = -.06, p = .63), incoming (staff-report β = .03, p = .84, supervisor-report β = -.02, p = .86), task-focused (staff-report β = .03, p = .82, supervisor-report β = -.04, p = .75), or social-focused (staff-report β = -.03, p = .84, supervisor-report β = -.08, p = .50) leadership structures was not significantly related to task conflict in clinical nursing shifts. Thus, Hypothesis 8c was partially supported.

There were two significant two-way interactions between the density and centralization of group leadership structures and task conflict. The density and centralization of incoming (β = -.34, p < .01) and social-focused (β = -.28 p < .03) leadership structures interacted to predict staff-reported task conflict. As shown in Figure 15, when incoming and social-focused centralization was low, the density of these types of leadership structures in clinical nursing shifts was not related to staff-reported task conflict. However, when incoming and social-focused leadership centralization was high, density had a significant negative relationship with conflict. The density and centralization of task-focused leadership structures also interacted to predict staff-reported task conflict in a similar way (β = -.23, p < .09), but this relationship was only marginally significant.

Hypotheses 9 predicted that leadership structures that are dense, decentralized, and reciprocal increase the level of process conflict in groups. The results of the analyses testing this hypothesis are displayed in Table 27-30. As shown in the tables, this hypothesis was not supported. Contrary to what was predicted, the density of outgoing (staff-report β = -.20, p < .09, supervisor-report β = -.29, p < .02), incoming (staff-report β = -.19, p = .18, supervisor-report β = -.29, p < .04), task-focused (staff-report β = -.29,

$p < .02$, supervisor-report $\beta = -.33$, $p < .02$), and social-focused (staff-report $\beta = -.44$, $p <$ .001, supervisor-report $\beta = -.17$, $p = .20$) leadership activity in clinical nursing shifts was negatively associated with the shifts' level of process conflict, although some of these relationships only trended towards significance. There was not a significant relationship between the centralization of group leadership structures and either staff-reported (outgoing leadership $\beta = -.03$, $p = .80$, incoming leadership $\beta = -.10$, $p = .41$, task-focused leadership $\beta = .10$, $p = .42$, social-focused leadership $\beta = .17$, $p = .16$) or supervisor-reported (outgoing leadership $\beta = -.13$, $p = .33$, incoming leadership $\beta = .11$, $p = .41$, task-focused leadership $\beta = .10$, $p = .49$, social-focused leadership $\beta = .19$, $p = .12$) process conflict. Similarly, the reciprocity of group leadership structures was not a significant predictor of staff-reported (outgoing leadership $\beta = .14$, $p = .21$, incoming leadership $\beta = .04$, $p = .73$, task-focused leadership $\beta = -.02$, $p = .84$, social-focused leadership $\beta = -.15$, $p = .19$) or supervisor-reported (outgoing leadership $\beta = .03$, $p = .81$, incoming leadership $\beta = .04$, $p = .76$, task-focused leadership $\beta = .06$, $p = .60$, social-focused leadership $\beta = -.16$, $p = .15$) process conflict.

There were four significant two-way interactions between the properties of group leadership structures and process conflict. The density and centralization of outgoing leadership activity interacted to predict staff-reported process conflict ($\beta = .27$, $p < .03$). As shown in Figure 16a, at high levels of outgoing centralization, outgoing density did not have a significant relationship with staff-reported process conflict, while at low levels of outgoing centralization the relationship between density and staff-reported process conflict was negative and significant. As shown in Figure 16b and Figure 16c, the density

and centralization of incoming ($\beta = -.26, p < .02$) and task focused ($\beta = -.23, p < .05$) leadership activity also interacted to predict staff-reported process conflict. Unlike outgoing leadership (but similar to the pattern found for incoming and social-focused density and centralization with respect to task conflict), at low levels of centralization, incoming and task-focused density did not have a significant relationship with staff-reported process conflict, but at high levels of centralization incoming and social-focused density were negatively associated with conflict. As shown in Figure 17, the density and centralization of task-focused leadership activity interacted in a similar way to predict supervisor-reported process conflict ($\beta = -.33, p < .02$) process conflict. There were no significant interactions between the density, centralization, and reciprocity of social-focused leadership structures predicting process conflict.

Hypothesis 10 predicted that dense, decentralized, and reciprocal leadership structures reduce relationship conflict. As shown in Tables 27 – 30, this Hypothesis was partially supported. Partially supporting Hypothesis 10a, the density of outgoing leadership activity was negatively associated with staff-reported relationship conflict in clinical nursing shifts ($\beta = -.33, p < .01$), but not with supervisor-reported relationship conflict ($\beta = -.15, p = .24$). The density of incoming leadership activity was not significantly associated with either staff-reported ($\beta = -.22, p = .12$) or supervisor-reported ($\beta = -.17, p = .25$) relationship conflict. Task-focused leadership density was significantly negatively associated with staff-reported ($\beta = -.29, p < .02$), but not supervisor-reported ($\beta = -.22, p = .13$) relationship conflict, while social-focused leadership density was negatively associated with both staff-reported ($\beta = -.46, p < .001$),

and supervisor-reported (β = -.29, p < .05) relationship conflict. These results partially support Hypothesis 10a.

Hypothesis 10b, which predicted that the centralization of group leadership structures is positively associated with relationship conflict, was also partially supported. The centralization of social-focused leadership activity in nursing shifts was positively related to both staff-reported (β = .27, p < .03), and supervisor-reported (β = .29, p < .03) relationship conflict. However, the centralization of outgoing (staff-report β = -.01, p = .92, supervisor-report β = -.10, p = .48), incoming (staff-report β = -.11, p = .39, supervisor-report β = .10, p = .48), and task-focused (staff-report β = -.02, p = .85, supervisor-report β = .00, p = .99) leadership activity was not significantly associated with relationship conflict.

Hypothesis 10c predicted that the reciprocity of group leadership structures is negatively associated with relationship conflict. As shown in the tables, this Hypothesis was not supported. The reciprocity of outgoing leadership activity was not significantly associated with staff-reported (β = .15, p = .17) or supervisor-reported (β = -.09, p < .46) relationship conflict. The reciprocity of incoming leadership activity was positively associated with relationship conflict (β = .21, p < .05) but this relationship was in the opposite direction as predicted. The reciprocity of incoming leadership activity was not significantly associated with supervisor-reported relationship conflict (β = .02, p = .87). The reciprocity of task-focused leadership structures was not significantly associated with either staff-reported (β = .04, p = .71) or supervisor-reported (β = .07, p = .57) relationship conflict. The reciprocity of social-focused leadership was negatively related

to supervisor-reported relationship conflict ($\beta = -.21$, $p < .10$), but this relationship was only marginally significant. Social-focused reciprocity was not significantly related to staff-reported relationship conflict ($\beta = -.14$, $p = .21$).

Analyses revealed several significant two-way interactions between the density, centralization, and reciprocity of group leadership structures and relationship conflict. As shown in Figure 18, the density and centralization of outgoing ($\beta = .24$, $p < .05$), incoming ($\beta = -.44$, $p < .001$), and task-focused ($\beta = -.41$, $p < .001$) leadership activity interacted to predict staff-reported relationship conflict. The pattern of these relationships mirrored the pattern reported for task and process conflict, with outgoing density tending to reduce staff-reported relationship conflict at low, but not high, levels of centralization, while incoming and task-focused density were negatively associated with staff-reported relationship conflict at high, but not low, levels of centralization. The density and centralization of incoming leadership activity also interacted in a similar way to predict supervisor-reported relationship conflict ($\beta = -.22$, $p < .10$), but this effect was only marginally significant. Additionally, as depicted in Figure 19, the centralization and reciprocity of outgoing leadership activity interacted to predict staff-reported relationship conflict ($\beta = -.24$, $p < .04$). When outgoing reciprocity was high, outgoing centralization did not have a significant relationship with staff-reported relationship conflict. In contrast, when outgoing reciprocity was low, outgoing centralization was positively associated with relationship conflict.

Table 27. *Study 1: Summary of Regression Results: Outgoing Leadership Structures Predicting Conflict*

| Variable | Staff Report | | | Supervisor Report | | |
	DV Task Conflict β	DV Process Conflict β	DV Relationship Conflict β	DV Task Conflict β	DV Process Conflict β	DV Relationship Conflict β
Density (D)	-.12	-.20[†]	-.33[**]	-.16	-.29[*]	-.15
Centralization (C)	-.11	-.03	-.01	-.08	-.13	-.10
Reciprocity (R)	.26[*]	.14	.15	-.06	.03	-.09
D x C	.20	.27[*]	.24[*]	.03	.16	-.06
D x R	.14	.00	-.04	-.06	.09	-.15
C x R	-.15	-.23	-.24[*]	.01	-.13	.05
D x C x R	-.08	.06	.06	.28	.03	-.20

Note. n = 80 shifts staff report, 72 shifts supervisor report.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed.

Table 28. *Study 1: Summary of Regression Results: Incoming Leadership Structures Predicting Conflict*

Variable	Staff Report DV Task Conflict β	DV Process Conflict β	DV Relationship Conflict β	Supervisor Report DV Task Conflict β	DV Process Conflict β	DV Relationship Conflict β
Density (D)	-.16	-.19	-.22	-.17	-.29[*]	-.17
Centralization (C)	-.14	-.10	-.11	.07	.11	.10
Reciprocity (R)	.03	.04	.21[*]	-.02	.04	.02
D x C	-.34[**]	-.26[*]	-.44[**]	-.03	-.15	-.22[†]
D x R	-.02	.05	.04	.13	.17	.01
C x R	.15	-.00	.14	.01	-.12	.16
D x C x R	-.20	-.05	-.07	-.15	-.24[†]	-.13

Note. n = 80 shifts staff report, 72 shifts supervisor report.
[†] *p* < .10, two-tailed, [*] *p* < .05, two-tailed, [**] *p* < .01, two-tailed.

Table 29. *Study 1: Summary of Regression Results: Task-Focused Leadership Structures Predicting Conflict*

	Staff Report			Supervisor Report		
	DV Task Conflict	**DV Process Conflict**	**DV Relationship Conflict**	**DV Task Conflict**	**DV Process Conflict**	**DV Relationship Conflict**
Variable	β	β	β	β	β	β
Density (D)	-.15	-.29[*]	-.29[*]	-.19	-.33[*]	-.22
Centralization (C)	-.04	.10	-.02	.04	.10	.00
Reciprocity (R)	.03	-.02	.04	-.04	.06	.07
D x C	-.23[†]	-.23[**]	-.41[**]	-.06	-.33[*]	-.17
D x R	-.01	-.00	-.12	-.10	.08	-.12
C x R	.11	.07	.20[†]	.00	-.03	.12
D x C x R	-.11	.03	-.01	-.19	.00	-.08

Note. n = 80 shifts staff report, 72 shifts supervisor report.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed.

Table 30. *Study 1: Summary of Regression Results: Social-Focused Leadership Structures Predicting Conflict*

Variable	Staff Report			Supervisor Report		
	DV Task Conflict β	DV Process Conflict β	DV Relationship Conflict β	DV Task Conflict β	DV Process Conflict β	DV Relationship Conflict β
Density (D)	-.41**	-.44**	-.46**	-.16	-.17	-.29*
Centralization (C)	.15	.17	.27*	.08	.19	.29*
Reciprocity (R)	-.03	-.15	-.14	-.08	-.16	-.20†
D x C	-.28*	-.06	-.13	.04	.05	.02
D x R	.18	.06	.09	.05	.08	.07
C x R	.01	.11	.02	.30†	.26†	.24
D x C x R	.01	.11	.13	.10	.10	-.03

Note. n = 80 shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Figure 15. Study 1: Density and centralization of incoming and social focused leadership structures predicting staff-reported task conflict.
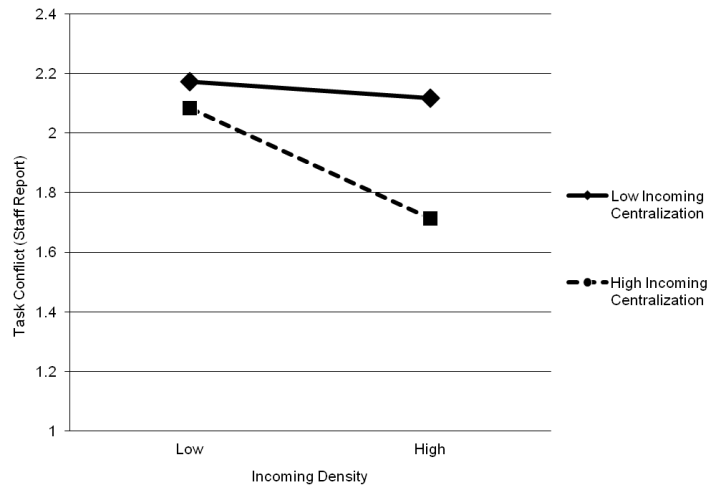
A. Incoming Leadership   B. Social-Focused Leadership
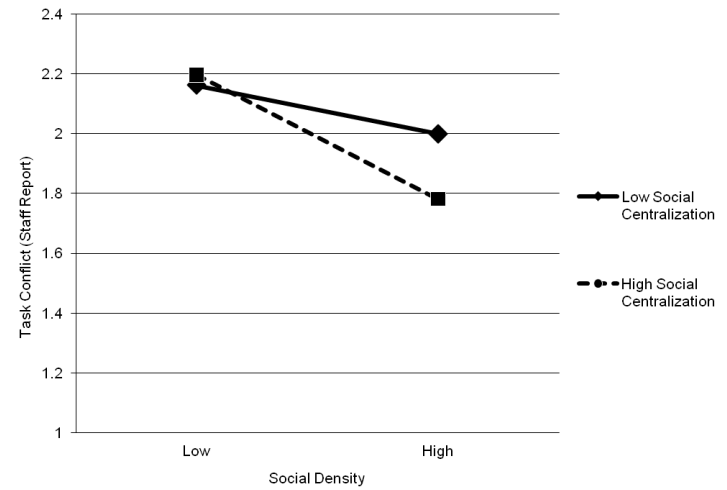
Figure 16. Study 1: Density and centralization of outgoing, incoming, and task-focused leadership structures predicting staff-reported process conflict.

A. Outgoing leadership

B. Incoming leadership

C. Task-focused leadership
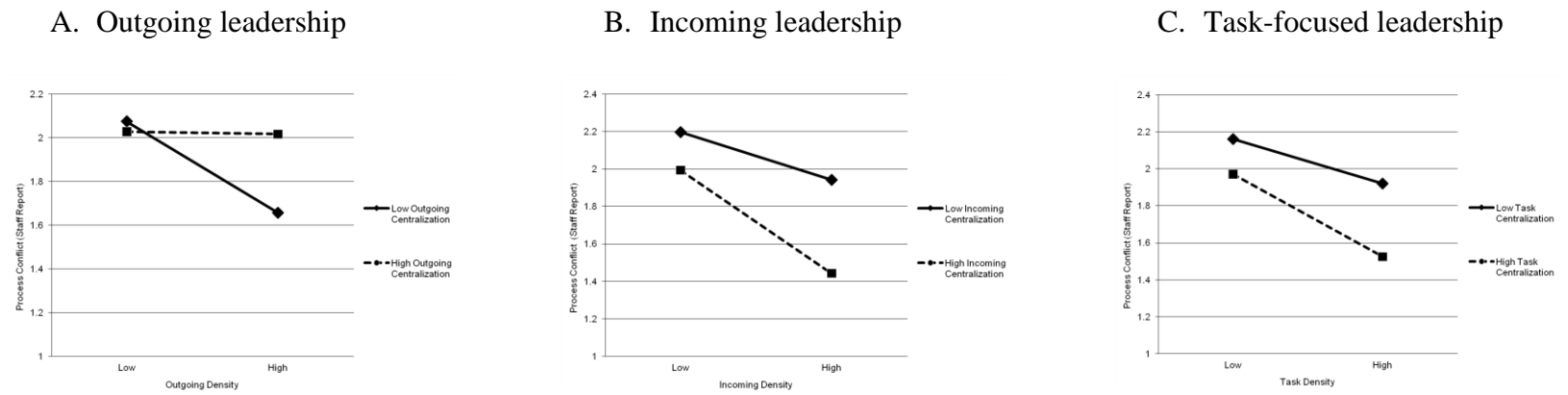
Figure 17. Study 1: Density and centralization of task-focused leadership structures predicting supervisor-reported process conflict.
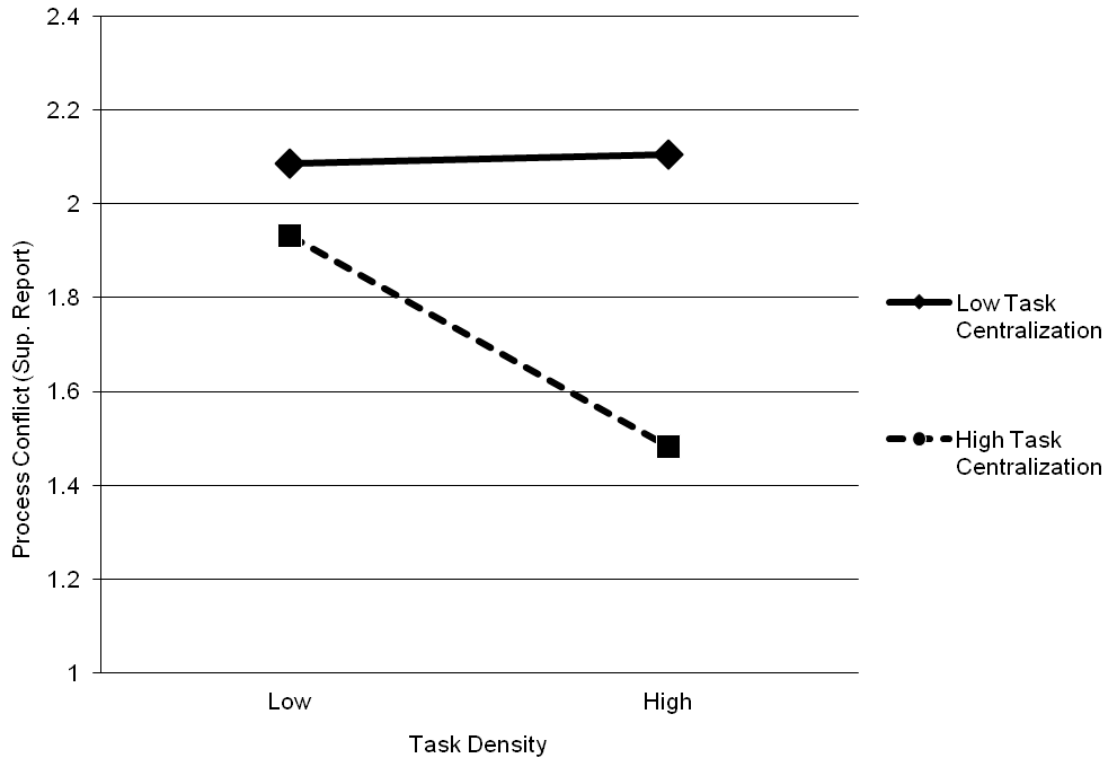
Figure 18. Study 1: Density and centralization of outgoing, incoming, and task-focused leadership structures predicting staff-reported relationship conflict.

A. Outgoing leadership   B. Incoming leadership   C. Task-focused leadership

Figure 19. Study 1: Centralization and reciprocity of outgoing leadership structures predicting staff-reported relationship conflict.
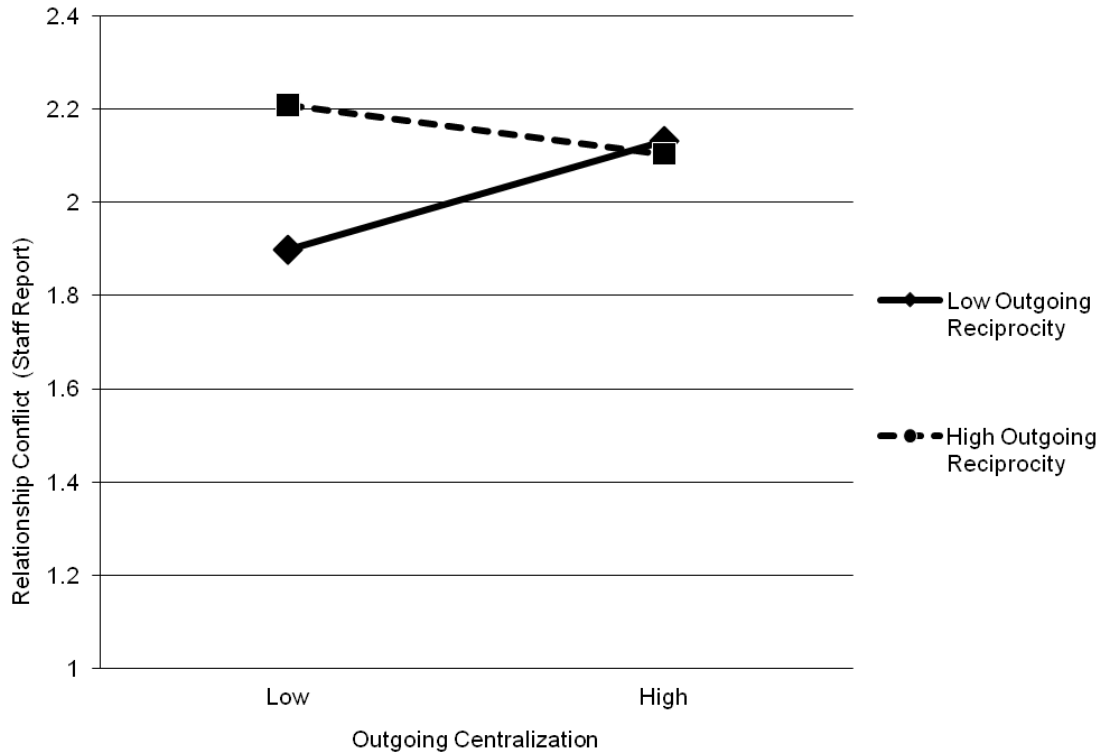
Hypothesis 11 predicted that leadership structures high in density, low in centralization, and high in reciprocity promote group member psychological growth. As shown in Tables 31-34, the density, centralization, and reciprocity of outgoing (density β = -.13, p = .30, centralization β = .14, p = .29, reciprocity β = .08, p = .51), incoming (density β = -.04, p = .81, centralization β = .00, p = .98, reciprocity β = .08, p = .52), task-focused (density β = -.02, p = .91, centralization β = -.04, p = .78, reciprocity β = .17, p = .15) and social-focused (density β = -.17, p = .26, centralization β = -.01, p = .93, reciprocity β = -.12, p = .33) leadership activity was not associated with the psychological growth of clinical nursing shift members. Moreover, none of the two- or three-way interactions between the density, centralization, and/or reciprocity of the leadership structures considered in this study was a significant predictor of psychological growth. Thus, Hypothesis 11 was not supported.

Finally, Hypothesis 12 predicted that denser, more decentralized, and more reciprocal leadership structures are associated with higher levels of group member work satisfaction. The analyses testing this hypothesis are summarized in Tables 31 – 34. The density and centralization of outgoing (density β = .15, p = .21, centralization β = -.02, p = .89), incoming (density β = -.08, p = .58, centralization β = -.01, p = .94), task-focused (density β = .11, p = .37, centralization β = -.14, p = .27), and social-focused (density β = -.01, p = .93, centralization β = -.17, p = .17) leadership structures were not significantly related to the job satisfaction of shift members. Thus, Hypothesis 12a, which predicted denser leadership structures enhance work satisfaction, and Hypothesis 12b, which predicted centralized leadership structures reduce work satisfaction, were not supported.

Hypothesis 12c, which predicted more reciprocal leadership structures increase work satisfaction, was partially supported. The reciprocity of outgoing ($\beta = .34$, $p < .001$) and task-focused ($\beta = .29$, $p < .01$) leadership structures was positively associated with shift members' level of job satisfaction, but there was no significant association between the reciprocity of incoming ($\beta = .06$, $p = .62$) and social-focused ($\beta = .09$, $p = .44$) leadership activity in clinical nursing shifts and work satisfaction.

There were significant two-way interactions between the density and centralization of outgoing ($\beta = -.26$, $p < .05$) and task-focused ($\beta = -.24$, $p < .05$) leadership structures and job satisfaction. As shown in Figure 20, when outgoing and task-focused leadership activity was relatively decentralized, denser leadership activity had a positive relationship with shift member job satisfaction. However, when outgoing and task-focused leadership activity was high in centralization, density had a negative relationship with job satisfaction. There was also one significant three-way interaction, with the density, centralization, and reciprocity of outgoing leadership activity interacting to predict job satisfaction ($\beta = .26$, $p < .04$). As shown in Figure 21, at low levels of outgoing reciprocity, density was positively associated with shift member job satisfaction when centralization was low, but negatively associated with satisfaction when centralization was high. However, this interaction was not significant at high levels of outgoing reciprocity. The density, centralization, and reciprocity of social-focused leadership activity also interacted in a similar way to predict job satisfaction, but this relationship was only marginally significant.

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Table 31. *Study 1: Summary of Regression Results: Outgoing Leadership Structures Predicting Psychological Growth and Job Satisfaction*

	Staff Report	
	DV **Psychological Growth**	**DV** **Job Satisfaction**
Variable	**β**	**β**
Density (D)	-.13	.15
Centralization (C)	.14	-.02
Reciprocity (R)	.08	.34**
D x C	.20	-.26*
D x R	.12	-.05
C x R	-.11	.12
D x C x R	.17	.26*

Note. n = 80 shifts.
[†] p < .10, two-tailed, [*] p < .05, two-tailed, [**] p < .01, two-tailed.

Table 32. *Study 1: Summary of Regression Results: Incoming Leadership Structures Predicting Psychological Growth and Job Satisfaction*

	Staff Report	
	DV **Psychological Growth**	**DV** **Job Satisfaction**
Variable	β	β
Density (D)	-.04	-.08
Centralization (C)	.00	-.01
Reciprocity (R)	.08	.06
D x C	-.02	.03
D x R	.15	.09
C x R	.12	-.06
D x C x R	.24	-.17

Note. n = 80 shifts.
[†] p < .10, two-tailed, [*] p < .05, two-tailed, [**] p < .01, two-tailed.

Table 33. *Study 1: Summary of Regression Results: Task-Focused Leadership Structures Predicting Psychological Growth and Job Satisfaction*

	Staff Report	
	DV Psychological Growth	**DV** Job Satisfaction
Variable	β	β
Density (D)	-.02	.11
Centralization (C)	-.04	-.14
Reciprocity (R)	.17	.29[**]
D x C	-.19	-.24[*]
D x R	.10	.04
C x R	-.02	-.05
D x C x R	.23	.07

Note. n = 80 shifts.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed.

Table 34. *Study 1: Summary of Regression Results: Social-Focused Leadership Structures Predicting Psychological Growth and Job Satisfaction*

	Staff Report	
	DV	**DV**
	Psychological Growth	**Job Satisfaction**
Variable	**β**	**β**
Density (D)	-.17	-.17
Centralization (C)	-.01	-.02
Reciprocity (R)	-.12	.09
D x C	.06	-.08
D x R	.21	.08
C x R	.07	.17
D x C x R	.01	.28[†]

Note. n = 80 shifts.
[†] p < .10, two-tailed, [*] p < .05, two-tailed, [**] p < .01, two-tailed.

Figure 20. Study 1: Density and centralization of outgoing and task-focused leadership structures predicting job satisfaction.

A. Outgoing Leadership
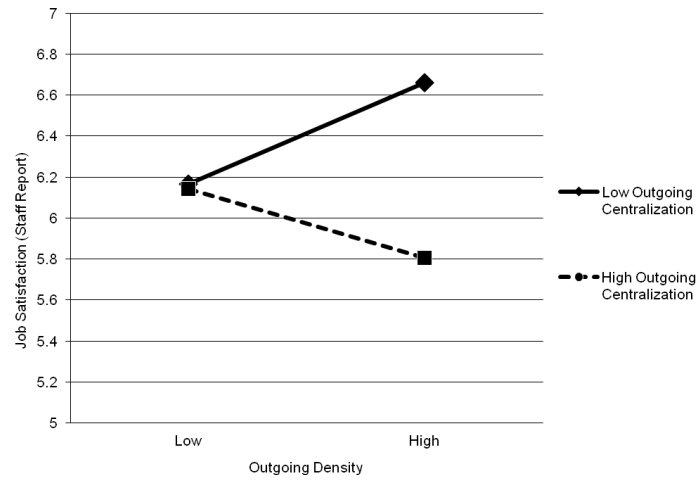
B. Task-Focused Leadership
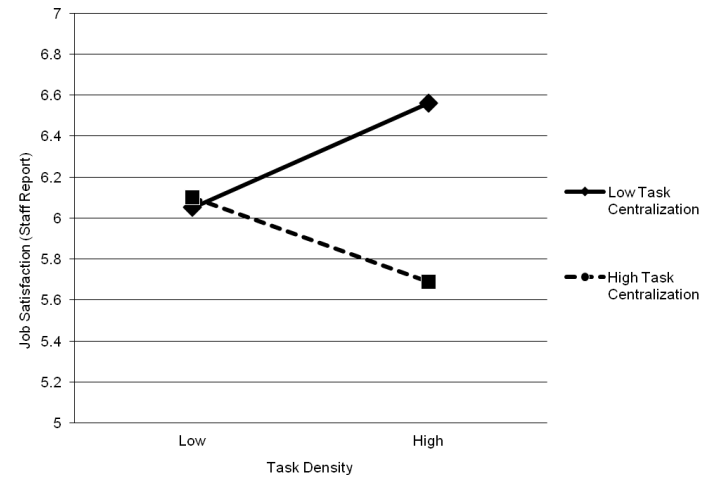
Figure 21. Study 1: Density, centralization, and reciprocity of outgoing leadership structures predicting job satisfaction.

A. Low Outgoing Reciprocity
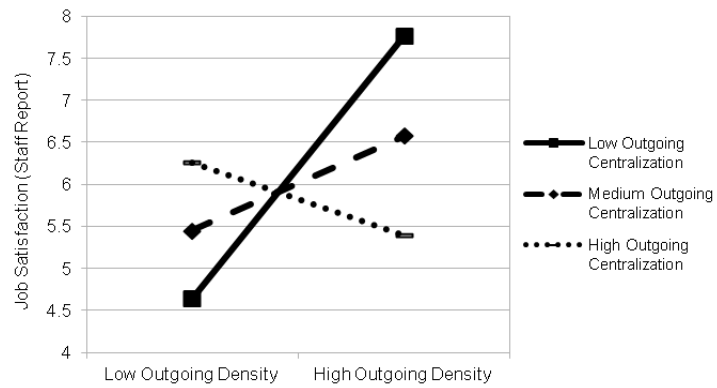
B. High Outgoing Reciprocity
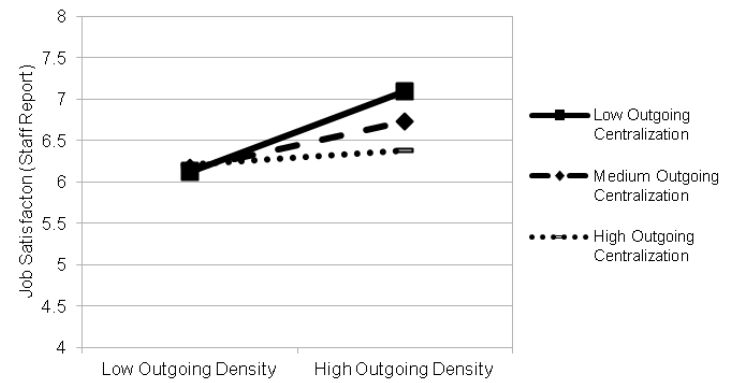
Supplemental Analysis: Curvilinear Relationships

In conducting my hypothesis tests, I followed the recommendations of Cohen and colleagues (2003) and created scatter plots of the associations between the variables in my conceptual model. Visual examination of these scatter plots suggested the potential for curvilinear relationships with respect to the centralization of incoming and task-focused leadership structures and certain outcomes, most extensively absorptive capacity and conflict. To follow up on this possibility, I conducted a supplemental analysis in which I added a curvilinear term to my regression models with incoming and task-focused leadership predicting absorptive capacity and conflict. The results confirmed the presence of several significant curvilinear relationships. The results of the supplemental analyses are presented in Tables 35-38 and the most consequential findings are briefly described below.

With respect to absorptive capacity, as shown in Table 35 there was a significant curvilinear relationship between the centralization of incoming leadership structures and staff-reported absorptive capacity ($\beta = -.30$, $p < .02$), and as shown in Table 36 there was a significant curvilinear relationship between the centralization of task-focused leadership structures and supervisor-reported absorptive capacity ($\beta = -.36$, $p < .01$). To interpret these relationships I plotted one representative relationship (in this case the curvilinear relationship between task-focused centralization and supervisor-reported absorptive capacity). As shown in Figure 22, this particular curvilinear relationship corresponded to a pattern of diminishing returns. Specifically, up to a certain point, greater leadership centralization enhanced shifts' absorptive capacity, but once a certain level of

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centralization was reached, further increases in centralization decreased absorptive capacity.

There was also a significant curvilinear relationship between the reciprocity of task-focused leadership structures and staff-reported absorptive capacity ($\beta = .29$, $p < .04$), but the pattern of this relationship was slightly different. As shown in Figure 23, there was very little effect of reciprocity on staff-reported absorptive capacity and low and medium values of reciprocity, but there was a strong positive relationship between reciprocity and staff-reported absorptive capacity at very high levels of reciprocity.

There were also significant curvilinear relationships between the centralization of incoming and task-focused leadership activity and task, process, and relationship conflict in clinical nursing shifts. As shown in Figures 24 and 25, these relationships all had a similar form. The centralization of incoming leadership activity had a significant curvilinear relationship with staff-reported task ($\beta = .35$, $p < .01$), process ($\beta = .39$, $p < .00$), and relationship ($\beta = .52$, $p < .05$) conflict, and the centralization of task-focused leadership activity had a significant curvilinear relationship with staff-reported relationship conflict ($\beta = .30$, $p < .02$). As shown in Figure 24, intermediate levels of leadership centralization were associated with the lowest levels of staff-reported conflict in clinical nursing shifts, with either very high or very low levels of centralization tending to be associated with elevated levels of conflict. As shown in Figure 25, there was a similar relationship between incoming and task-focused centralization and supervisor-reported conflict, although this effect was only significant for process conflict ($\beta = .28$, $p < .03$) and relationship conflict ($\beta = .27$, $p < .05$) with respect to incoming leadership

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centralization, and process conflict with respect to task-focused leadership ($\beta = .34$, $p < $

.01).

Table 35. *Study 1: Summary of Supplemental Analysis: Curvilinear Relationship Between Incoming Leadership Structures and Absorptive Capacity*

	Staff Report				Supervisor Report			
	DV Information Seeking	**DV Information Sharing**	**DV Innovation**	**DV Absorptive Capacity**	**DV Information Seeking**	**DV Information Sharing**	**DV Innovation**	**DV Absorptive Capacity**
Variable	β	β	β	β	β	β	β	β
Density	.12	.19	.00	.15	-.21	-.03	-.29[*]	-.26[†]
Density^2	.11	-.23[†]	-.08	-.08	-.21	-.22[†]	-.04	-.21[†]
Centralization	.14	-.11	.07	.04	.15	.11	.26[†]	.24[†]
Centralization^2	-.11	-.31[*]	-.28[*]	-.30[*]	-.10	-.09	-.03	-.10
Reciprocity	-.06	-.18	-.09	-.14	.05	-.17	.21[†]	.06
Reciprocity^2	-.12	.12	-.01	-.01	-.01	.25[†]	-.04	.08

Note. n = 80 shifts staff report, 72 shifts supervisor report.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed.

Table 36. *Study 1: Summary of Supplemental Analysis: Curvilinear Relationship Between Task-Focused Leadership Structures and Absorptive Capacity*

	Staff Report				Supervisor Report			
Variable	**DV Information Seeking** β	**DV Information Sharing** β	**DV Innovation** β	**DV Absorptive Capacity** β	**DV Information Seeking** β	**DV Information Sharing** β	**DV Innovation** β	**DV Absorptive Capacity** β
Density	.05	.42**	.18	.28*	-.04	-.01	-.15	-.10
Density^2	.06	-.27*	-.08	-.13	-.13	-.24†	-.04	-.19
Centralization	.11	-.13	-.06	-.02	.13	.11	.28†	.24†
Centralization^2	.10	-.22	-.14	-.10	-.35*	-.21	-.21	-.36**
Reciprocity	.05	.13	.08	.11	-.11	-.16	.15	-.05
Reciprocity^2	.19	.39**	.05	.29*	.20	-.02	-.12	.04

Note. n = 80 shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 37. *Study 1: Summary of Supplemental Analysis: Curvilinear Relationship Between Incoming Leadership Structures and Group Conflict*

	Staff Report			Supervisor Report		
Variable	**DV Task Conflict** β	**DV Process Conflict** β	**DV Relationship Conflict** β	**DV Task Conflict** β	**DV Process Conflict** β	**DV Relationship Conflict** β
Density	-.15	-.19	-.18	-.18	-.30*	-.17
Density^2	.07	.00	.20†	-.30*	-.22†	-.00
Centralization	-.12	-.08	-.08	.07	.12	.11
Centralization^2	.35**	.39**	.52**	.15	.28*	.27*
Reciprocity	.03	.05	.21†	-.05	.03	.04
Reciprocity^2	.07	.07	-.01	-.13	-.04	.06

Note. $n = 80$ shifts staff report, 72 shifts supervisor report.
† p < .10, two-tailed, * p < .05, two-tailed, ** p < .01, two-tailed.

Table 38. *Study 1: Summary of Supplemental Analysis: Curvilinear Relationship Between Task-Focused Leadership Structures and Group Conflict*

	Staff Report			Supervisor Report		
Variable	**DV** Task Conflict β	**DV** Process Conflict β	**DV** Relationship Conflict β	**DV** Task Conflict β	**DV** Process Conflict β	**DV** Relationship Conflict β
Density	-.14	-.28*	-.27*	-.19	-.33*	-.21
Density^2	.11	.08	.23*	-.07	.06	.09
Centralization	-.06	.06	-.10	.01	.04	-.03
Centralization^2	.07	.16	.30*	.18	.34*	.18
Reciprocity	-.00	-.07	-.02	-.07	-.00	.02
Reciprocity^2	-.11	-.19	-.22†	-.11	-.23†	-.20

Note. n = 80 shifts staff report, 72 shifts supervisor report.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Figure 22. Study 1: Curvilinear relationship between task-focused leadership centralization and supervisor-reported absorptive capacity.
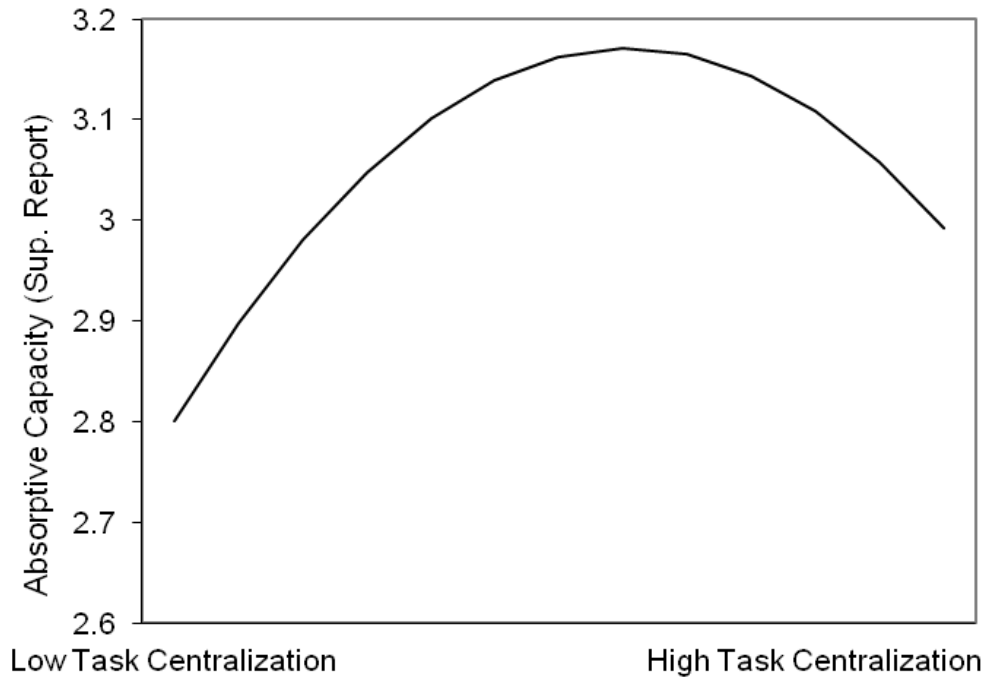
Figure 23. Study 1: Curvilinear relationship between task-focused leadership reciprocity and staff-reported absorptive capacity.
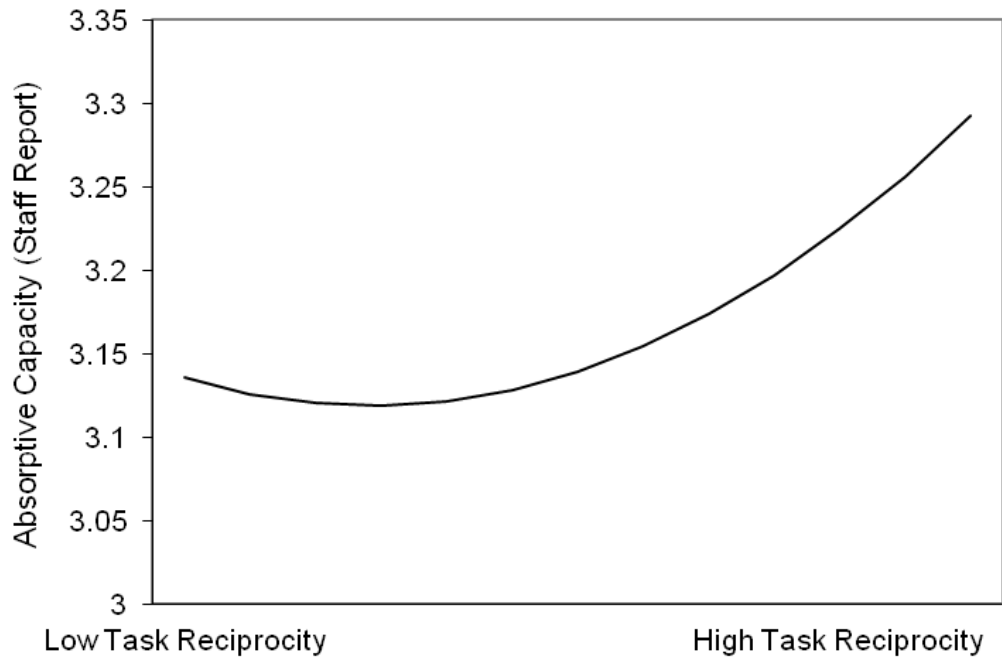
Figure 24. Study 1: Curvilinear relationship between incoming leadership centralization and staff-reported relationship conflict.
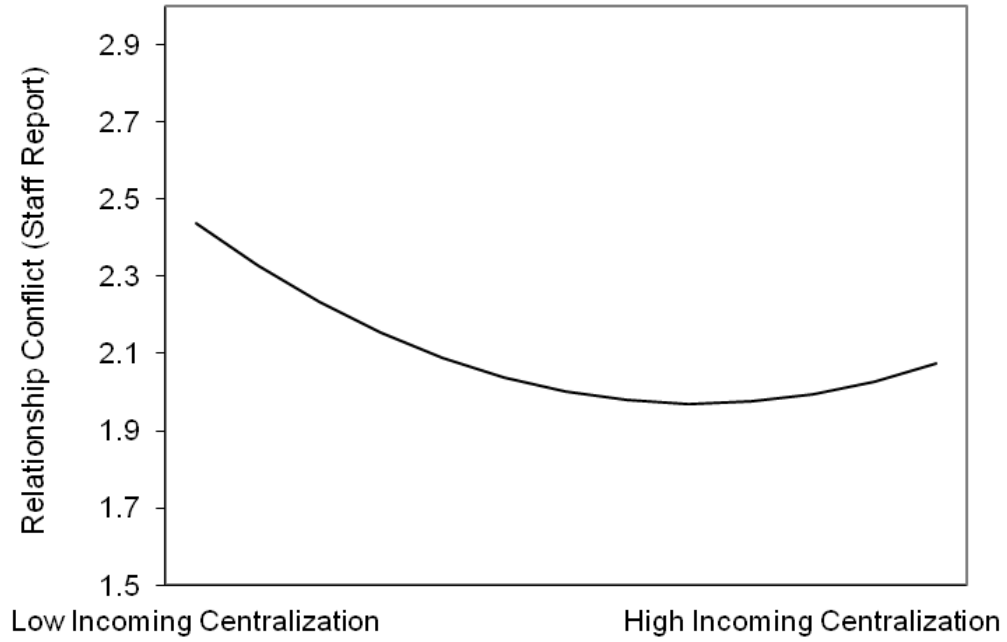
Figure 25. Study 1: Curvilinear relationship between task-focused leadership centralization and supervisor-reported process conflict.
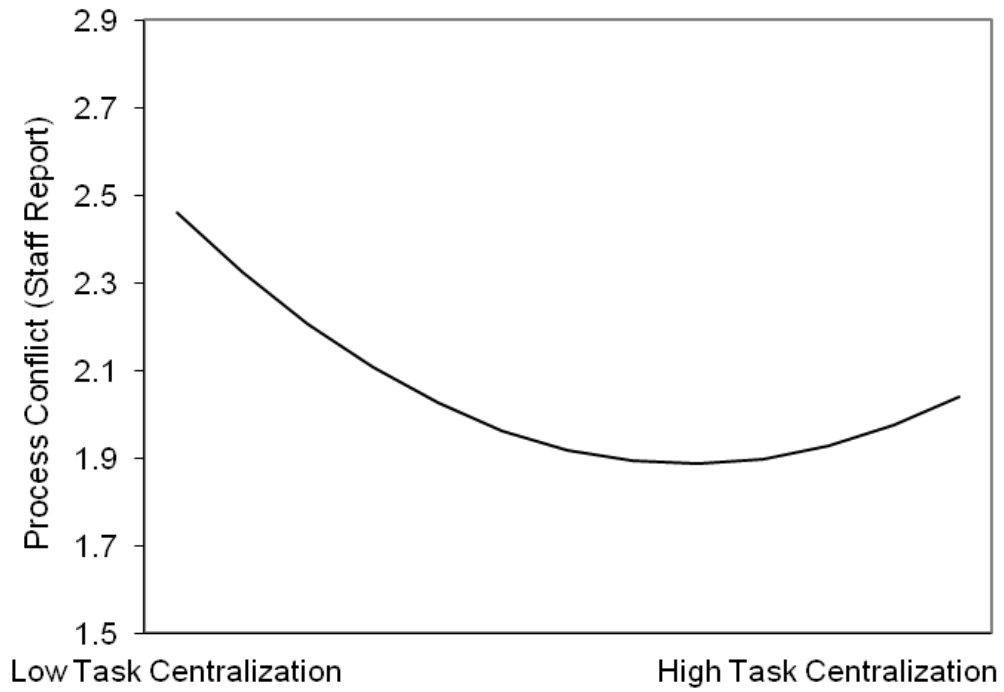
Discussion

Clinical nursing shifts face a challenge common to many modern groups in that they possess strict formal leadership hierarchies and yet must complete complex, interdependent tasks in volatile environments, the very conditions under which *informal* leadership is thought to be most important (Thompson, 1967; Carson et al., 2007; Heckscher & Adler, 2007; Uhl-Bien et al., 2007; Gulati & Puranam, 2009; Day et al., 2009; Gittell, 2003). In this study, I used the formal job titles of members of clinical nursing shifts in five mid-sized hospitals to calculate the shifts' levels of formal hierarchical differentiation. I then tested the relationship between differentiation, the patterns of leadership activity that developed in the shifts, and several shift-level outcomes, including patient care.

In hospitals, the formal organizational hierarchy is reinforced by large differences in the status and power of members at various levels of the hierarchy (Abbott, 1988; Havens, Vasey, Gittell, & Lin, 2010). Thus, the context of this study was one in which the vertical leadership model traditionally adopted by leadership researchers should be most likely to accurately describe intra-group leadership activity. However, descriptive statistics revealed that the leadership structures that emerged in clinical nursing shifts were more consistent with a shared, rather than a vertical, leadership model. In general, shifts exhibited a moderate to high density of leadership activity, with mean density scores ranging from 2.53 for outgoing leadership structures to 3.61 for social-focused leadership structures. This means that the average level of outgoing, incoming, and task-focused leadership activity between each member of clinical nursing shifts was rated

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between "slightly" and "a moderate degree," and the average level of social-focused

leadership activity between shift members was rated between "a moderate degree" and "a

large degree." Moreover, the average leadership centralization values reported in this

study were relatively low, with a high of 40.07 for incoming leadership activity and a low

of 13.65 for social-focused leadership activity. Finally, the mean reciprocity values were

relatively close to zero, with shift members' ratings of each others' leadership activity

tending to differ by only one point on a five-point scale. These data suggest that multiple

shift members were involved in fulfilling each of the leadership functions measured in

this study, and that leadership relationships between members tended to characterized by

mutual, rather than unidirectional influence.

Despite the fact that overall, leadership within the nursing shifts in this study

tended to be shared, there was some evidence that greater formal hierarchical

differentiation within the shifts tended to encourage more "vertical" patterns of

leadership relationships among shift members. This effect was particularly pronounced

with respect to leadership density, as hierarchy was negatively associated with the density

of outgoing and task-focused leadership activity. Hierarchy was also negatively

associated with the reciprocity of social-focused leadership.

While hierarchy tended not to have a strong direct effect on the centralization of

group leadership structures, it did interact with empowering managerial behavior to

predict these structures, just not in the way I predicted. While I predicted higher levels of

empowering leadership behavior would reduce the centralization of leadership activity in

hierarchically differentiated groups, shifts with very empowering formal managers tended

to develop patterns of incoming and task-focused leadership activity that were *more* centralized than shifts with managers who engaged in little empowering behavior. These results stand in stark contrast to extant theory suggesting that empowering managerial behaviors encourage the distribution of leadership responsibility among other group members (Chen et al., 2007; Kirkman & Rosen, 1997; 1999). One potential explanation for these findings is that members of nursing shifts whose managers engaged in high levels of empowering behavior may have viewed these managers as competent and trustworthy leaders, and because they felt the managers were doing such a good job fulfilling their shifts' leadership responsibilities, were less motivated to engage in informal leadership behavior themselves or look to other NDLs to fulfill these functions. Paradoxically, empowering nursing managers may have actually consolidated leadership influence within their shifts by engaging in behaviors intended to disperse it. Although further investigation of the consequences of empowering managerial behavior for the patterns of informal leadership activity in groups is necessary before firm conclusions can be drawn, the results of this study suggest such investigation is warranted.

Aside from empowering managerial behavior, the other predicted moderators of the impact of hierarchical differentiation on group leadership activity (a shared group-level LSS and positive group mood) displayed weak or inconsistent interaction effects. However, there were some interesting direct effects between these variables and group leadership structures. Specifically, a shared LSS tended to be associated with more reciprocal incoming and outgoing leadership activity in groups, while a high level of positive group mood was positively associated with the density of all four types of

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leadership structures, and negatively associated with the centralization of social-focused leadership activity. In other words, groups with a shared LSS or a high level of positive mood did tend to develop leadership structures that were more shared, but these effects were not necessarily stronger in groups with more formal hierarchical differentiation.

In addition to understanding the predictors of emergent leadership structures in hierarchically differentiated groups, the other major objective of this study was to assess the consequences of these structures. I predicted that shared leadership structures would improve absorptive capacity and patient care, increase task and process conflict while reducing relationship conflict, and improve member growth and satisfaction. These hypotheses received mixed support. Denser leadership structures tended to promote staff-reported absorptive capacity (although this effect was only fully significant for task-focused leadership). However, these trends were largely the result of leadership density promoting information sharing within shifts. Compared to information sharing, density exhibited relatively weak relationships with the information seeking and innovation components of absorptive capacity, and thus had only weak effects on the overall absorptive capacity measure.

The centralization and reciprocity of leadership structures, considered independently, generally did not exhibit significant direct relationships with absorptive capacity or its components. However, supplemental analyses revealed that the centralization of incoming and task-focused leadership activity displayed a relatively consistent (unhypothesized) pattern of curvilinear relationships with absorptive capacity. In general, increased centralization was associated with higher absorptive capacity up to a

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point, but then further increases in centralization produced diminishing returns in absorptive capacity. It is possible that structures with intermediate levels of leadership centralization allowed shifts to capitalize on the benefits of both the shared (participation and information sharing from multiple members) and vertical (clear lines of communication, "go-to" people to coordinate information synthesis) leadership structures, while minimizing their corresponding drawbacks. Although I did not formally hypothesize any interaction effects, the centralization and reciprocity of group leadership structures occasionally interacted with density to qualify its effects on absorptive capacity dimensions such that, in general, dense leadership activity was most conducive to absorptive capacity when it was also decentralized and reciprocal.

A similar pattern of results was observed with respect to patient care. Although many of my predicted relationships were not supported, there were slight trends suggesting that denser task-focused and social-focused leadership structures were positively associated with high-quality care. These findings are consistent with prior results from the shared leadership (Carson et al., 2007), social networks, (Sparrowe et al., 2001), and early small groups literatures (Leavitt, 1951), which have reported that denser informal networks in groups tend to improve group performance. Mediation analyses revealed that the positive association between dense patterns of task-focused leadership activity and patient care was partially explained by the increases in absorptive capacity produced by dense task-focused leadership structures.

The centralization of group leadership activity was most meaningful when considered as a moderator of the effects of density. Particularly with respect to patient-

reported care, in shifts with highly centralized patterns of leadership, increases in the overall level (density) of leadership seemed to decrease the quality of care the shifts provided. In contrast, in shifts with decentralized leadership structures, denser leadership activity was beneficial with respect to care, perhaps because higher overall levels of leadership participation helped facilitate the more shared, democratic goal-setting and problem-solving approaches adopted by these groups. However, it is important to note that I did not formally hypothesize these relationships, and as such additional research is needed to replicate these interactions.

The relationship between leadership reciprocity and patient care was weak and inconsistent, and therefore no firm conclusions about the influence of reciprocity on group performance can be drawn.

The pattern of results with respect to group conflict was somewhat unexpected. I predicted that shared leadership structures would increase task and process conflict in groups while reducing relationship conflict. However, contrary to some of my predictions, the density of all types of leadership activity tended to be negatively associated with all types of conflict. Moreover, my supplemental analyses revealed that leadership centralization, particularly task-focused and incoming centralization, tended to display an inverse-U curvilinear relationship with all three types of conflict, such conflict was highest in groups that had a moderate level of leadership centralization. I also again found several (unhypothesized) interactions between the density and centralization of shifts' leadership structures and conflict. For incoming, task-focused, and social-focused leadership activity, the relationship between density and conflict in clinical nursing shifts

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was negative and significant when centralization was high, but not when centralization was low. However, the relationship between outgoing density and centralization and conflict had the opposite pattern: outgoing leadership density reduced conflict when outgoing leadership centralization was low but not when outgoing leadership centralization was high.

There are three reasons why outgoing leadership activity might display a different pattern of relationships with conflict than incoming, task-focused, and social-focused leadership. Conceptually, outgoing leadership is leadership activity group members engage in themselves, while the incoming (and task-focused and social-focused) leadership reflect individuals' response to leadership from other members. In incoming, task-focused, and social-focused leadership structures that are high in both density and centralization, there is therefore likely to be a high level of consensus among group members about who is the leader of the group. Consistent with functional theories of hierarchy, these types of structures may result in relatively little conflict because when the central leaders engage in leadership it is likely to receive affirming and committed responses (Weber, 1968; Magee & Galinsky, 2008; Anderson & Brown, 2010). However, because outgoing leadership involves members' own leadership attempts, high-density, high-centralization outgoing leadership structures may produce "extra" leadership attempts that distract from or compete with the leadership being initiated by the groups' few emergent leaders. The outgoing leadership structures that result in least conflict may be those in which no one group member emerges as a dominant leader and therefore all group members feel they are getting adequate leadership "airtime."

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There are also two possible methodological explanations for the different pattern of results observed for outgoing as compared to incoming, task, and social leadership activity. First, outgoing leadership was self-reported in this study, while incoming, task-focused, and social-focused leadership were members' assessments of others' leadership activity. Thus, it is possible that individuals used different criteria for evaluating and reporting their own leadership behavior as compared to the behaviors they observed in others. Second, outgoing centralization in this study was calculated based on the out-degree centrality measure, while the centralization of incoming, task-focused, and social-focused leadership was based on the in-degree centrality measure. It may be that this difference also contributed to the different pattern of relationships observed for outgoing leadership compared to the other types of leadership activity. As it is impossible to determine which of these potential explanations actually accounted for the observed effects, future research better explaining the unique properties and consequences of outgoing leadership structures would be valuable.

The results of this study generally did not support the hypothesis that shared leadership structures promote the psychological growth of members of clinical nursing shifts. There are several possible explanations for this. First, this study was conducted over a relatively short period of time, with only a few months separating the first and second online surveys. Psychological growth is a process that necessarily unfolds over an extended period of time, and the timeframe of this study may not have been long enough to allow meaningful differences in growth to develop between members of different shifts. Second, non-independence tests revealed that neither shift membership nor

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hospital membership explained a significant amount of variance in participants'

responses to the growth measure, so in this study individual-level factors (e.g. learning

orientation, locus of control) may have been the dominant predictors of personal growth.

Since growth is generally conceptualized as an individual, rather than a collective,

phenomenon, future research exploring personal growth might be better focused at the

individual level of analysis. Third, the measure of personal growth used in this study

exhibited poor inter-rater reliability, and an exploratory factor analysis revealed

participants tended to not respond in a consistent manner to the different items contained

in the measure. The measure used in this study was an adapted measure of individuals'

growth in their personal lives, and it may not have been appropriate gauge for the type of

growth and development that occurs in a work context. Unfortunately, aside from the

Ryff (1989) Personal Growth Scale that was adapted for use in this study, virtually no

previously validated measures of individual growth currently exist. As such, future

research should work to develop a valid and reliable measure of individuals' overall

growth in the workplace. If that is not feasible, researchers may be better served to focus

on a particular type of workplace growth for which a viable measure currently exists (e.g.

leadership development; DeRue & Wellman, 2009; Spreitzer & McCall, & Mahoney,

1997).

There were also few direct effects of leadership structural properties on the job

satisfaction of members of clinical nursing shifts. The one exception was reciprocity,

with members of shifts with more reciprocal leadership activity tending to report higher

levels of job satisfaction. As with several other outcomes, the (unhypothesized)

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interaction between the density and centralization of shifts' outgoing and task-focused leadership structures was an important predictor of members' level of job satisfaction. Specifically, density had a positive relationship with job satisfaction in shifts where the centralization of leadership activity was low, but a negative relationship with satisfaction in shifts where the centralization of leadership activity was high.

Study-Specific Limitations and Strengths

The findings of this study should be considered in light of its limitations. To avoid repetition, only limitations specific to this study are discussed here, while limitations that characterize the overall approach to studying group leadership structures adopted in this dissertation are considered in the overall discussion section. The first limitation of this study is that, despite the many measures I employed to encourage participation, I was not able to obtain complete network data for most of the groups in this study. As discussed previously, missing data is problematic for network studies, since any approach used to impute missing data makes assumptions about the nature of the missing data and hence can introduce biases. These biases are particularly noteworthy given that a slightly lower threshold for using groups' data for hypothesis testing was adopted in this study than has been used in previous work (Sparrowe et al., 2001; Oh et al., 2004). However, there are several reasons why the 70% response threshold used in this study is still relatively conservative and unlikely to have influenced the pattern of my results. First, the network-based metrics I calculated in this study were primarily based on in-degree data. In other words, they represented mostly individuals' ratings of others, not ratings individuals themselves provided. Simulation studies have suggested that the median-based

imputation process that I used in this study is less susceptible to bias when used in conjunction with in-degree metrics (Kossinets, 2006). Second, recent simulations have shown that reasonably accurate estimations of global network properties can be made with a level of missing data approaching up to 50% (Gulati, Sytch, & Tatarynowicz, 2012), and the network metrics included in this study assess only global network properties. Third, I controlled for any bias that was introduced by my data imputation process by including a control variable representing shifts' response rate to the first (network survey). This ensured that the effects reported were independent of any variation introduced by missing network data or my imputation approach.

Another limitation of this study was that the response rate at one of the five participating hospitals was much lower than the other hospitals. Preliminary analyses revealed that this hospitals' relative lack of responsiveness produced significant differences between shifts that did not participate in this study and those that did. During data collection at this hospital, I was contacted by an employee who informed me that hospital administrators had followed up on a prior survey, which employees had been ensured was confidential, by identifying individual respondents based on their handwriting and questioning them about their responses. As a result, the employee told me that despite the fact that I took several precautions to ensure participants' anonymity, employees at this hospital were hesitant to participate in this study due to concerns about how the information they provided would be handled. There was also cause for concern that the employees from this hospital who did participate may not have responded honestly for fear their responses would be tracked back to them.

To some extent, concerns about biases introduced by the hospital's low response rate are alleviated by the fact that I controlled for hospital-level differences in all my analyses. This procedure accounted for any differences in shifts' responses that were explained solely by hospital membership. However, to insure my results were robust to issues arising from non-responsiveness or biased responses at the problematic hospital, I conducted a robustness check in which I re-ran my analyses excluding all shifts from the hospital in question. The only major difference in my results involved the relationship between hierarchy and group leadership structures. Specifically, in the robustness check the direct effect of hierarchy on task-focused leadership density became non-significant, but the direct of hierarchy on incoming leadership density became marginally significant and the direct effect of hierarchy on incoming and task-focused centralization became fully significant. However, the interaction of hierarchy and empowering managerial behavior predicting outgoing leadership density became non-significant, as did the interaction of hierarchy and empowering managerial behavior predicting incoming and task-focused centralization. The relationships between group leadership structures and the outcomes in my conceptual model remained consistent with the reported results.

An additional limitation of this study involved the index I used to measure hierarchical differentiation. Although this approach is similar to the way hierarchy has been assessed in previous studies (e.g. Battilana & Casciaro, 2012), my decision to adopt it was based on two assumptions that warrant further discussion. First, I assumed that the most appropriate way to represent formal hierarchical differentiation was to assess the extent to which a small number of jobs in a shift possessed dramatically more formal

authority than all other jobs, rather than focusing on the dispersion of jobs across hierarchical levels using a measure such as the Herfindahl Index (Rhoades, 1993) or Blau's Heterogeneity Index (1977). Second, I assumed that the difference in formal authority between jobs at each of the five tiers of the rating system I developed was roughly equal. In other words, I assumed that the difference in formal authority between a Tier One job (e.g., Nursing Assistant) and a Tier Two job (e.g. Nurse) was the same as the difference between a Tier Four job (e.g. Nurse Manager) and a Tier Five job (e.g. Director). With respect to the first assumption, my decision to use an outlier-based rather than dispersion-based measure was consistent with my theorizing that the impact of hierarchy on the patterns of leadership activity in groups was based on the impact of one or a few individuals being formally designated to positions of much greater authority than the rest of the group (rather than the equal distribution of jobs across many levels of hierarchy). The index of formal hierarchical differentiation used in this study was thus a more accurate assessment of the type of differentiation I was interested in than the Herfindahl Index or Blau's Heterogeneity Index.

The assumption of equal differences in formal authority between jobs at different tiers of the rating system, however, was a bit more tenuous. In developing the rating system, I worked with subject matter experts at each of the five hospitals that participated in this study, and care was taken to ensure that differences in formal authority between levels were approximately equal. However, this was admittedly an imperfect process, and it is possible that the differences between some levels were greater than the differences between others. To guard against this possibility, I conducted an additional robustness

check. I contacted one subject matter expert from each of the participating hospitals and asked them to use a 10-point, rather than a five-point scale to differentiate between the five job-tiers of the hierarchy ranking system. In other words, if they felt there was a relatively larger difference between Tier Three jobs and Tier Four jobs than between Tier Four jobs and Tier Five jobs, they could assign Tier Five a 10, Tier Four a 9, and Tier Three a 6 on the new scale. This approach allowed respondents to describe the differences in formal authority between tiers with more distinction. After receiving the subject matter expert's responses, I averaged their new ratings of the various tiers. In the new rating system, Tier Five jobs were coded 10, Tier Four jobs were coded 6, Tier Three jobs were coded 5, Tier Two jobs were coded 4, and Tier One jobs were coded 1. I then re-calculated the hierarchy index using the new values and re-ran my analyses for Hypotheses 1-4.

The pattern of effects in this robustness check was similar, but generally slightly stronger, than the initial analyses. Only two effects were reduced in significance, the interaction of hierarchy and empowering managerial behavior predicting outgoing leadership density (which became non-significant), and the interaction of hierarchy and a shared LSS predicting social-focused leadership density (which became marginally significant). The direct effect of hierarchy on the density and centralization of incoming leadership structures became marginally significant and the direct effect of hierarchy on the centralization of task-focused leadership structures became fully significant. The interaction of hierarchy and empowering managerial behavior became a marginally significant predictor of the centralization of outgoing leadership, and the interaction

between hierarchy and empowering managerial behavior became a marginally significant predictor of the reciprocity of social-focused leadership. These results suggested that the relationship between formal hierarchical differentiation and the patterns of leadership activity within groups is relatively robust to the approach used to calculate differentiation. However, they also suggested that significant variation existed in the degree of formal authority separating the tiers of the original ranking system, and that the new rating system might offer a more accurate representation of the actual degree of formal hierarchical differentiation within clinical nursing shifts.

Finally, the form of the patient-reported care data I collected in this study was somewhat inconsistent with the form of the data obtained from the online surveys. Specifically, while the online surveys captured variables at the shift level, only unit-level patient-reported care data was available for many of the shifts in this study. I addressed this issue by disaggregating the data and assigning each shift the score corresponding to the unit of which it was a member. This methodological compromise enabled me to maintain consistency across my analyses and include the patient-reported care data in my results. However, it should be noted that this approach to handling the data has been associated with an elevated risk of Type I error (Clarke, 2008). This limitation, combined with the relatively low statistical power for the patient-reported care analyses, means that the results for patient-reported care should be interpreted with extreme caution.

The above limitations notwithstanding, this study was also characterized by several strengths. First, I was able to obtain whole-network data for a large number of shifts across a large number of organizations, making this one of the larger network data

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collections reported to date. Second, this study included data collected at different time periods and from different sources, reducing the likelihood of common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), and enabling me to assess the robustness of my results across multiple perspectives. Finally, this study was one of the first to study the effects of naturally occurring hierarchical differentiation in an organizational context. In organizations, formal hierarchical differentiation is typically concurrent with differences in experience and access to information and rewards that are difficult to recreate in a lab setting. By focusing on the influence of formal leadership roles in the context of a hierarchical organization, this study was able to provide a strong test of the influence of these roles on the patterns of leadership activity that develop in groups.

CHAPTER V

Study 2: The Interactional Foundations of Group Leadership Structures

Overview

The second study in this dissertation was a controlled experiment of small groups working on a problem-solving task. Although the task was not specific to a health-care context, it contained many of the features that typically characterize work in such contexts (e.g. a shared goal, asymmetric information, time pressure), facilitating some level of comparison across the two studies. The first objective of this study was to test my conceptual model while experimentally manipulating, rather than measuring, formal hierarchical differentiation. By randomly assigning participants to condition (formal hierarchical differentiation vs. no formal hierarchical differentiation) the experimental methodology employed in this study enabled me to better test the causal association between differentiation, emergent group leadership structures, and my outcomes of interest. The second objective of this study was to videotape groups at work on a complex problem-solving task, which was not possible in Study 1. An exploratory qualitative analysis of these videos offered additional insights into the nature of the interpersonal dynamics underlying group-level leadership structures.

Methods

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Participants and Design

240 participants, recruited through the paid subject pool of a large, Midwestern University, received $10 to participate in the study. The average age of participants was 20.63 years (*SD* = 2.85), 65 % were female, 58% were Caucasian, 23% were Asian, and 82% were undergraduate students (the remainder were graduate students). Preliminary analyses revealed the percentage of males in groups was not significantly related to emergent leadership structures or any of the outcomes in this study, so gender was not considered further. Participants were distributed across 2 conditions (formal hierarchical differentiation, no formal hierarchical differentiation).

Hierarchical Differentiation Manipulation

Upon arrival, participants were asked to complete a short survey, which is included in Appendix 3 (Leadership Pretest). They were then randomly divided into groups of four and each group was assigned its own breakout room. Once in their room, some of the groups (formal hierarchical differentiation condition) were told that the initial survey was a leadership assessment, and that the highest-scoring group member had been selected to serve as the manager of the group. This individual was provided with all of the group's materials, asked to distribute them, and told they were responsible for directing the activities of their group during the simulation and making a final decision about which candidate to recommend. Thus, the formal hierarchical differentiation manipulation endowed groups' designated managers with legitimate, expert, and information power, as frequently occurs with designated managers in organizations (French & Raven, 1959; Bass, 2008). Other groups were not told anything about the

pretest or given any instructions related to leadership (no hierarchical differentiation condition).

Groups then completed the Insight Enterprise Software business simulation (Hoffman & Peterson, 2011). The objective of the simulation was to select one of three candidates to fill the open Vice President of Finance position at Insight Enterprise Software, a fictitious company. Each group member was assigned to one of four roles within Insight (e.g. Vice President of Marketing, Vice President of Finance), and given a handout explaining the qualities they should look for in a candidate given their role. The handouts also contained some shared and some unique information about each candidate. When only the shared information was considered, one candidate appeared to be the least qualified for the position, but when the unique information was incorporated it became clear that this candidate was actually the most qualified. Thus, to successfully complete the simulation, groups needed to develop a comprehensive profile of the strengths and weaknesses of each candidate based on the information in their members' handouts and then compare each candidate's profile with Insight's strategic priorities. Groups were given 25 minutes to arrive at a decision and complete a short form in which they recommended one of the candidates and explained why they believed that individual was the best choice for the open position. A complete version of the Insight Enterprise Software simulation materials is included in Appendix 3.

Upon completing the simulation, participants were asked to respond to a questionnaire that included measures of group leadership structure, group conflict, satisfaction with the group, a manipulation check, and some basic demographic

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information. This questionnaire is also included in Appendix 3 (Final Questionnaire).

After participants completed the questionnaire they were debriefed, paid, and given a

chance to raise questions or concerns about the experiment before being dismissed.

Video Recording

Groups were videotaped as they worked on the problem solving task. The videos

were not used in hypothesis testing, but I performed a qualitative analysis of the videos to

explore the nature of the leadership interactions among participants, as well as how these

relationships were impacted by formal hierarchical differentiation. All participants were

informed they would be videotaped at the beginning of the study and signed a waiver

authorizing the use of the videos for research purposes.

Measures

Group leadership structure. I calculated the density, decentralization, and

reciprocity of group leadership structures using the same social network-based approach

as Study 1. The only difference was that a seven-point (rather than a five-point) Likert-

type scale was used in this study, and participants were asked to describe the leadership

activities of each member of their problem-solving group based on the role that

individual was assigned during the simulation (e.g. VP of Sales, VP of HR). Participants

were required to wear name tags during the simulation and while they completed the

subsequent questionnaire to ensure they remembered the role each group member had

been assigned.

Information sharing. Group information sharing, one of the three components of

absorptive capacity, was assessed using the same 4 item scale as Study 1 ($\alpha = .75$). The

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referent of the measure was changed from "shift" to "group," and a seven-point Likert-type response scale was used (1 = Strongly disagree, 7 = Strongly agree). Because participants in this study did not have the opportunity to interact with individuals outside their group, and some of the items on the scale used to measure the innovation component of absorptive capacity were not appropriate given the nature of the problem-solving activity (e.g. developed new skills to foster innovations), I did not measure the information seeking and innovation components of absorptive capacity in this study.

Group performance. Group performance was operationalized in two ways. The first measure of group performance, *recommendation correctness*, assessed whether the group recommended that Insight hire the most qualified candidate to fill the open position (coded 1 for correct recommendation, 0 for incorrect recommendation). The second measure of performance, *recommendation quality*, assessed the quality of the written rationale provided by the group to support their recommendation. Two trained coders blind to condition weighed the reasons provided by the group on the short questionnaire against the "optimal" solution to the simulation, which was provided in a key. The coders used a seven-point Likert-type scale to rate each group with respect to the following item. "Please provide your overall rating of the quality of this group's analysis" (1 = Very low quality, 7 = Very high quality). Agreement between coders as to the quality of groups' recommendations was high ($\alpha = .83$). The mean of the two coders' ratings was used to assess recommendation quality.

Task, process, and relationship conflict. Group conflict was measured using the same measures as Study 1. The referent of the measure was changed from "shift" to

"group" and a seven-point response scale was used instead of a five-point response scale (1 = Not at all, 7 = A lot). As in Study 1, to determine the appropriate approach for representing task, process, and relationship conflict in this study, I conducted an exploratory factor analysis on the conflict items. Consistent with Study 1, the results of this analysis, which are displayed in Table 39 below, suggested that a 3-factor model best fit the data, with the underlying task, relationship, and process conflict dimensions each loading onto their own factor, and then these three factors together loading onto a second order conflict factor. All of the factor loadings for this model (3 Factor Model A in Table 39) were positive and significant at $p < .01$, and the model fit statistics indicated the model was a good fit (Hu & Bentler, 1999). Thus, in this study I assessed the impact of hierarchy on each of the conflict dimensions separately, as per my original hypotheses. The coefficient alpha's for these measures were .86 for relationship conflict, .89 for task conflict, and .81 for process conflict.

Table 39. *Study 2: Confirmatory Factor Analysis of Group Conflict Items*

Model	Model Fit Indices			
	χ^2	RMSEA	NNFI	CFI
1 Factor Model All items loading onto a single first-order conflict factor.	374.98	0.20	0.89	0.91
2 Factor Model A Relationship and task conflict loading onto a single relationship/task factor, process conflict loading onto its own factor, both factors loading onto a second-order conflict factor.	293.13	.18	.91	.93
2 Factor Model B Relationship and process conflict loading onto a single relationship/process factor, task conflict loading onto its own factor, both factors loading onto a second-order conflict factor.	240.33	0.15	.93	.95
2 Factor Model C Task and process conflict loading onto a single task/process factor, relationships conflict loading onto its own factor, both factors loading onto a second-order conflict factor.	183.90	.13	.95	.96
3 Factor Model A Task, relationship, and process conflict as separate first-order factors, all loading onto a second-order conflict factor.	89.87	.07	.98	.99
3 Factor Model B Task, relationship, and process conflict as separate first-order factors, no higher-order factor.	361.07	.16	.89	.91

Note. $n = 240$ individuals.

Work satisfaction. I measured participants' satisfaction with their problem-solving groups using the same two items as Study 1 (α = .87). The referent of the measures was changed from "job" to "problem-solving group" and a seven-point response scale was used for the first item (1 = Not at all, 7 = Very).

Data Analysis Approach

I tested my hypotheses using t-tests, ordinary least squares (OLS) regression and logistic regression (Cohen et al., 2003). To represent the experimental conditions in my regression models, I created a contrast-coded variable called hierarchical differentiation (coded 0.5 for groups in the hierarchical differentiation condition, -0.5 for groups in the no hierarchical differentiation). Because the correctness of each group's final recommendation was a binary variable, I used chi-squared tests and logistic regression to test hypotheses related to recommendation correctness, and OLS regression to test predictions related to all other outcomes in this study, which were continuous variables. Logistic regression and chi-squared tests are better able to account for binary dependent variables than t-tests and OLS regression, as they are robust to the abnormal distribution of the standard errors associated with binary variables (Cohen et al., 2003). Consistent with Study 1, I used path analysis to test for mediation (Edwards & Lambert, 2007; Preacher et al., 2007). To facilitate the interpretation of interaction terms, I mean-centered continuous independent variables before entering them into the regression models.

Results

Manipulation Check

To ensure participants were aware of the presence or absence of formal hierarchical differentiation, in the final questionnaire they were asked if a member of their group had been formally designated as a manager. In the formal hierarchical differentiation condition, 112 of 116 participants (97%) indicated their group had a formally designated manager [the remaining four participants (3%) indicated their group did not have a formal manager]. In the no formal hierarchical differentiation condition, three of 124 participants (2%) indicated their group had a formal manager [121 participants (98%) indicated their group did not have a formally designated manager]. A chi-square test revealed that these differences between conditions were significant, $\chi^2(1, N = 240) = 231.76$, $p < .001$. Across all conditions, no more than 1 participant per group responded incorrectly to the manipulation check. These results suggest that the presence or absence of formal hierarchical differentiation was highly obvious to participants.

Formal Hierarchical Differentiation

Table 40 displays the means and standard deviations of study variables by condition. Hypothesis 1a predicted groups with formal hierarchical differentiation develop leadership structures that are less dense than groups with no formal hierarchical differentiation. There were no significant differences in the density of outgoing (formal hierarchical differentiation $M = 4.05$, $SD = .73$, no formal hierarchical differentiation $M = 4.03$, $SD = .74$, $t(58) = .12$, $p = .91$), incoming (formal hierarchical differentiation $M = 3.78$, $SD = .63$, no formal hierarchical differentiation $M = 3.70$, $SD = .60$, $t(58) = .52$, $p = .61$), task-focused (formal hierarchical differentiation $M = 3.61$, $SD = .90$, no formal

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hierarchical differentiation M = 3.43, SD = .88, $t(58)$ = .78, p = .44), or social-focused

(formal hierarchical differentiation M = 5.23, SD = .61, no formal hierarchical

differentiation M = 5.17, SD = .68, $t(58)$ = -.35, p = .73) leadership activity between

groups in the formal hierarchical differentiation condition and groups in the no formal

hierarchical differentiation condition. Thus, Hypothesis 1a was not supported.

Hypothesis 1b predicted that formal hierarchical differentiation increases the

centralization of group leadership structures. Problem-solving groups in the formal

hierarchical differentiation condition (M = 29.10, SD = 14.84) developed more

centralized incoming leadership structures than groups in the no formal hierarchical

differentiation condition (M = 29.10, SD = 14.84), although this relationship was only

marginally significant ($t(58)$ = 1.89, p < .06). However, formal hierarchical

differentiation did not produce more centralized outgoing (formal hierarchical

differentiation M = 27.85, SD = 11.71, no formal hierarchical differentiation M = 28.18,

SD = 12.78, $t(58)$ = .10, p = .92), task-focused (formal hierarchical differentiation M =

23.03, SD = 13.87, no formal hierarchical differentiation M = 19.83, SD = 11.48, $t(58)$ =

.98, p = .33), or social-focused (formal hierarchical differentiation M = 11.47, SD = 6.74,

no formal hierarchical differentiation M = 10.13, SD = 5.35, $t(58)$ = .86, p = .40)

leadership activity. Thus, Hypothesis 1b was not supported.

Hypothesis 1c predicted that groups with formal hierarchical differentiation

develop less reciprocal leadership structures than groups without formal leaders. This

Hypothesis was also not supported with respect to outgoing (formal hierarchical

differentiation M = -19.03, SD = 7.78, no formal hierarchical differentiation M = -16.84,

$SD = 6.04$, $t(58) = 1.23$, $p = .23$), incoming (formal hierarchical differentiation $M = -24.14$, $SD = 9.07$, no formal hierarchical differentiation $M = -22.19$, $SD = 8.98$, $t(58) = .84$, $p = .41$), task-focused (formal hierarchical differentiation $M = -24.69$, $SD = 8.79$, no formal hierarchical differentiation $M = -25.55$, $SD = 8.00$, $t(58) = .40$, $p = .69$), or social-focused (formal hierarchical differentiation $M = -16.48$, $SD = 7.55$, no formal hierarchical differentiation $M = -17.10$, $SD = 8.40$, $t(58) = .30$, $p = .77$) leadership.

Table 40. *Study 2: Descriptive Statistics*

| Variable | Formal Hierarchical Differentiation Condition | | | No Formal Hierarchical Differentiation Condition | | |
	Mean	Standard Deviation	*n*	Mean	Standard Deviation	*n*
Outgoing Leadership Density	4.05	.73	29	4.03	.74	31
Incoming Leadership Density	3.78	.63	29	3.70	.60	31
Task-Focused Leadership Density	3.61	.90	29	3.43	.88	31
Social-Focused Leadership Density	5.23	.61	29	5.17	.68	31
Outgoing Leadership Centralization	27.85	11.71	29	28.18	12.78	31
Incoming Leadership Centralization	29.10[†]	14.84	29	22.79	10.66	31
Task-Focused Leadership Centralization	23.03	13.87	29	19.83	11.48	31
Social-Focused Leadership Centralization	11.47	6.74	29	10.13	5.35	31

Variable	Formal Hierarchical Differentiation Condition			No Formal Hierarchical Differentiation Condition		
	Mean	Standard Deviation	*n*	Mean	Standard Deviation	*n*
Outgoing Leadership Reciprocity	-19.03	7.78	29	-16.84	6.04	31
Incoming Leadership Reciprocity	-24.14	9.07	29	-22.19	8.98	31
Task-Focused Leadership Reciprocity	-24.69	8.79	29	-25.55	8.00	31
Social-Focused Leadership Reciprocity	-16.48	7.55	29	-17.10	8.40	31
Information Sharing	6.04	.49	29	6.21	.50	31
Satisfaction With Group	7.43	1.03	29	7.50	.78	31
Relationship Conflict	1.62	.43	29	1.74	.45	31
Task Conflict	2.51	.68	29	2.62	.66	31
Process Conflict	1.57	.53	29	1.69	.44	31
Recommendation Correctness	.66	--	29	.81	--	31
Recommendation Quality	5.00	.96	29	5.45	1.43	31

Note. $n = 60$ groups. Significance values reported are t-tests of mean differences ($df = 58$) except for Recommendation Correctness, which was a chi-squared test of mean differences ($df = 1, N = 60$).
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed.

Although I did not formally hypothesize a direct effect of formal hierarchical differentiation on the outcomes in my theoretical model, I tested whether these outcomes differed by experimental condition. However, problem-solving groups with formal hierarchical differentiation did not differ from groups without formal hierarchy with respect to their level of information sharing (formal hierarchical differentiation $M = 6.04$,

$SD = .49$, no formal hierarchical differentiation $M = 6.21$, $SD = .50$ $t(58) = 1.36$, $p = .18$),

satisfaction with their group (formal hierarchical differentiation $M = 7.43$ $SD = 1.03$, no

formal hierarchical differentiation $M = 7.50$, $SD = .78$, $t(58) = .33$, $p = .74$), relationship

conflict (formal hierarchical differentiation $M = 1.62$, $SD = .43$, no formal hierarchical

differentiation $M = 1.74$, $SD = .45$, $t(58) = 1.04$, $p = .30$), task conflict (formal

hierarchical differentiation $M = 2.51$, $SD = .68$, no formal hierarchical differentiation $M =$

2.62, $SD = .66$, $t(58) = -.62$, $p = .54$), process conflict (formal hierarchical differentiation

$M = 1.57$, $SD = .68$, no formal hierarchical differentiation $M = 1.69$, $SD = .44$, $t(58) = .98$,

$p = .33$), recommendation correctness (formal hierarchical differentiation % correct $= .66$,

no formal hierarchical differentiation % correct $= .81$, $\chi^2(1, N = 60) = 1.41$, $p =.24$), or

recommendation quality (formal hierarchical differentiation $M = 5.00$, $SD = .96$, no

formal hierarchical differentiation $M = 5.45$, $SD = 1.43$, $t(58) = 1.42$, $p = .16$).

Given the formal hierarchical differentiation manipulation did not produce large

differences in either group leadership structures or study outcomes, I elected to test

Hypotheses 5, 6, 7, 8, 9, 10, and 12 by assessing the relationship between the leadership

structures that developed in problem solving groups and the outcomes in my conceptual

model. The results of these analyses are presented in Tables 41- 44. Although I did not

formally hypothesize any interaction effects among the density, centralization, and

reciprocity of group leadership structures, I also tested all possible two-way and three-

way interactions among the structural properties of each type of leadership structure, and

these results are reported in the tables.

Hypothesis 5 predicted that dense, decentralized, and reciprocal leadership structures increase group-level absorptive capacity. Because information sharing was the only dimension of absorptive capacity I measured in this study, I tested Hypothesis 5 with respect to information sharing. There was not a significant relationship between the density (β = .04, p = .74), or centralization (β = -.12, p = .36), of outgoing leadership structures and information sharing. The reciprocity of outgoing leadership structures was positively associated with information sharing (β = .25, p < .06), but this relationship was only marginally significant. The density (β = .38, p < .01) of incoming leadership structures was positively related to information sharing, whereas the centralization (β = -.06, p = .69) and reciprocity (β = .07, p = .58) of incoming leadership activity was not associated with information sharing. As shown in Table 43, the density (β = .27, p < .05), but not the centralization (β = -.12, p = .38) or reciprocity (β = -.02, p = .83) of task-focused leadership structures predicted information sharing. Finally, the density (β = .46, p < .001) and centralization (β = -.32, p < .02), but not the reciprocity (β = .18, p = .18) of social-focused leadership structures was a significant predictor of information sharing. Thus, Hypothesis 5a and Hypothesis 5b were partially supported. There were no significant main effects of reciprocity on information sharing (although there was one marginally significant effect), so Hypothesis 5c received only minimal support.

There was one interaction that was significantly associated with information sharing. Namely, the density and centralization of incoming leadership structures interacted to predict information sharing (β = -.29, p < .03). To interpret this interaction, I graphed its simple slopes at values one standard deviation above and below the mean

(Aiken & West, 1993). As shown in Figure 26, when the centralization of incoming leadership activity in problem solving groups was high, the density of incoming leadership was not a significant predictor of information sharing. However, when incoming centralization was low, incoming density had a positive relationship with information sharing.

Hypothesis 6 predicted that the density, decentralization, and reciprocity of group leadership structures are positively associated with group performance. The results of the analyses testing this hypothesis are summarized in Tables 41-44. Hypothesis 6a predicted the density of group leadership structures is positively associated with performance. The density of outgoing leadership structures was not significantly associated with either recommendation correctness ($b = .37$, $SE = .44$, $p = .40$) or recommendation quality ($\beta = -.08$, $p = .53$). Likewise, the density of social leadership structures also did not significantly predict the correctness ($b = -.09$, $SE = .50$, $p = .87$) or quality ($\beta = .15$, $p = .27$) of groups' recommendations. However, there was a significant relationship between the density of groups' incoming leadership structures and both the correctness ($b = 1.34$, $SE = .64$, $p < .04$) and quality ($\beta = .32$, $p < .02$) of groups' recommendations in the problem-solving activity. Moreover, although there was not a significant relationship between the density of task-focused leadership structures and recommendation correctness ($b = -.27$, $SE = .35$, $p = .45$), there was a marginally significant relationship between task-focused density and recommendation quality ($\beta = .23$, $p < .09$). Thus, Hypothesis 6a was partially supported.

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Hypothesis 6b predicted decentralized leadership structures are positively associated with group performance. Supporting this hypothesis, there was a significant negative relationship between the centralization of outgoing leadership structures and the correctness of problem-solving groups' recommendations ($b = -.09$, $SE = .04$, $p < .02$), and a marginally significant negative relationship between the centralization of outgoing leadership activity and recommendation quality ($\beta = -.23$, $p = .09$). The results did not support my predictions with respect to incoming (correctness ($b = .02$, $SE = .03$, $p = .40$, quality $\beta = -.05$, $p = .72$) task-focused (correctness $b = -.03$, $SE = .02$, $p = .24$, quality $\beta = -.18$, $p = .17$), or social-focused (correctness $b = -.02$, $SE = .05$, $p = .62$, quality ($\beta = -.20$, $p = .13$) centralization. Thus, Hypothesis 6b received partial support.

Finally, Hypothesis 6c predicted that reciprocal leadership structures are associated with improved group performance. This hypothesis was not supported with respect to incoming (correctness $b = -.04$, $SE = .04$, $p = .32$, quality $\beta = -.05$, $p = .69$), or social-focused (correctness $b = .01$, $SE = .04$, $p = .88$, quality $\beta = .17$, $p = .21$) reciprocity. However, there were significant positive relationships between the reciprocity of outgoing leadership structures and the correctness ($b = .13$, $SE = .06$, $p < .02$), and quality ($\beta = .30$, $p < .03$) of groups' recommendations. There was also a marginally significant positive relationship between the reciprocity of task-focused leadership structures and the correctness ($b = .07$, $SE = .04$, $p < .06$), but not the quality ($\beta = .14$, $p = .28$) of groups' recommendations. These results provided partial support for Hypothesis 6c.

There was one significant two-way interaction predicting groups' performance in the problem-solving activity. The density and reciprocity of outgoing leadership

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structures interacted to predict recommendation quality (β = -.31, $p < .03$). As shown in Figure 27, when outgoing reciprocity was low, the density of outgoing leadership activity did not have a significant relationship with recommendation quality. However, when outgoing reciprocity was high, increases in the density of outgoing leadership activity in groups were negatively associated with the quality of the groups' recommendations.

There were also two significant three-way interactions predicting group performance. The density, centralization, and reciprocity of both incoming (b = -.02, SE = .01, $p < .02$) and social-focused (b = -.03, SE = .02, $p < .04$) leadership structures was positively associated with recommendation correctness (but not recommendation quality). These interactions are displayed graphically in Figure 28 and Figure 29. As shown in the figures, when the centralization of incoming and social-focused leadership activity in problem-solving groups was high, increases in the density of these types of leadership activity increased groups' probability of recommending the correct candidate when reciprocity was *low*, but not when reciprocity was *high*. In contrast, when the centralization of incoming and social-focused leadership activity was high, increases in density increased groups' chances of recommending the correct candidate when reciprocity was *high*, but not when reciprocity was *low*.

Table 41. *Study 2: Summary of Regression Results: Outgoing Leadership Structures Predicting Study Outcomes*

Variable	DV Information Sharing β	DV Satisfaction β	DV Relationship Conflict β	DV Task Conflict β	DV Process Conflict β	DV Rec. Correctness b (SE)	DV Rec. Quality β
Outgoing Density (D)	.04	.08	.09	.15	.19	.37 (.44)	-.08
Outgoing Centralization (C)	-.12	-.15	.11	.03	-.17	-.09* (.04)	-.23†
Outgoing Reciprocity (R)	.25†	.20	.01	.26*	.38**	.13* (.06)	.30*
D x C	-.13	-.08	-.12	-.08	-.20	.08 (.06)	.22
D x R	-.05	-.13	.10	.03	.07	-.09 (.09)	-.31*
C x R	-.01	-.15	.12	.10	.04	.01 (.00)	.06
D x C x R	.11	.19	.00	.00	-.12	-.00 (.01)	.10

Note. $n = 60$ groups. Statistics reported are standardized OLS regression coefficients, except for analyses related to recommendation correctness, which are unstandardized logistic regression coefficients with standard errors.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 42. *Study 2: Summary of Regression Results: Incoming Leadership Structures Predicting Study Outcomes*

Variable	DV Information Sharing β	DV Satisfaction β	DV Relationship Conflict β	DV Task Conflict β	DV Process Conflict β	DV Rec. Correctness b (SE)	DV Rec. Quality β
Incoming Density (D)	.38**	.33*	-.27*	.02	.04	1.34* (.64)	.32*
Incoming Centralization (C)	-.06	-.11	-.05	-.16	-.15	.02 (.03)	-.05
Incoming Reciprocity (R)	.07	.16	.04	.17	.07	-.04 (.04)	-.05
D x C	-.29*	-.01	.12	.06	.01	.03 (.04)	-.07
D x R	.24†	-.04	-.23†	-.28*	-.21	-.06 (.08)	.16
C x R	.21	.18	-.06	-.04	.08	.00 (.00)	-.05
D x C x R	.10	-.31†	.30†	.15	.17	-.02* (.01)	.02

Note. n = 60 groups. Statistics reported are standardized OLS regression coefficients, except for analyses related to recommendation correctness, which are unstandardized logistic regression coefficients with standard errors.
† p < .10, two-tailed, * p < .05, two-tailed, ** p < .01, two-tailed.

Table 43. *Study 1: Summary of Regression Results: Task-Focused Leadership Structures Predicting Study Outcomes*

Variable	DV Information Sharing β	DV Satisfaction β	DV Relationship Conflict β	DV Task Conflict β	DV Process Conflict β	DV Rec. Correctness b (SE)	DV Rec. Quality β
Task-Focused Density (D)	.27*	.36*	-.16	-.14	-.06	-.26 (.35)	.23†
Task-Focused Centralization (C)	-.12	-.24†	.19	-.04	.08	-.03 (.02)	-.18
Task-Focused Reciprocity (R)	-.02	.07	-.22†	.02	-.04	.07† (.04)	.14
D x C	.16	.06	-.16	-.17	-.28*	-.03 (.04)	.09
D x R	-.12	-.00	.23†	.18	.28	.05 (.06)	.10
C x R	.28†	.23	-.02	-.01	-.17	.07 (.04)	.09
D x C x R	-.20	.12	-.04	-.11	-.03	.01 (.01)	.06

Note. $n = 60$ groups. Statistics reported are standardized OLS regression coefficients, except for analyses related to recommendation correctness, which are unstandardized logistic regression coefficients with standard errors.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 44. *Study 2: Summary of Regression Results: Social-Focused Leadership Structures Predicting Study Outcomes*

Variable	DV Information Sharing β	DV Satisfaction β	DV Relationship Conflict β	DV Task Conflict β	DV Process Conflict β	DV Rec. Correctness b (SE)	DV Rec. Quality β
Social-Focused Density (D)	.46**	.52**	-.27*	-.26*	-.20	-.09 (.50)	.15
Social-Focused Centralization (C)	-.32*	-.32*	.26*	.10	.03	-.02 (.05)	-.20
Social-Focused Reciprocity (R)	.18	.32*	-.20	-.13	.04	.01 (.04)	.17
D x C	.11	.06	-.04	.13	-.04	.11 (.09)	.18
D x R	-.22†	-.12	-.09	-.12	-.02	-.08 (.06)	-.22
C x R	-.04	.00	-.16	-.05	.10	.00 (.00)	-.00
D x C x R	-.19	.05	.28†	.37*	.39*	-.03* (.02)	-.21

Note. $n = 60$ groups. Statistics reported are standardized OLS regression coefficients, except for analyses related to recommendation correctness, which are unstandardized logistic regression coefficients with standard errors.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Figure 26. Study 2: Density and centralization of incoming leadership structures predicting information sharing.
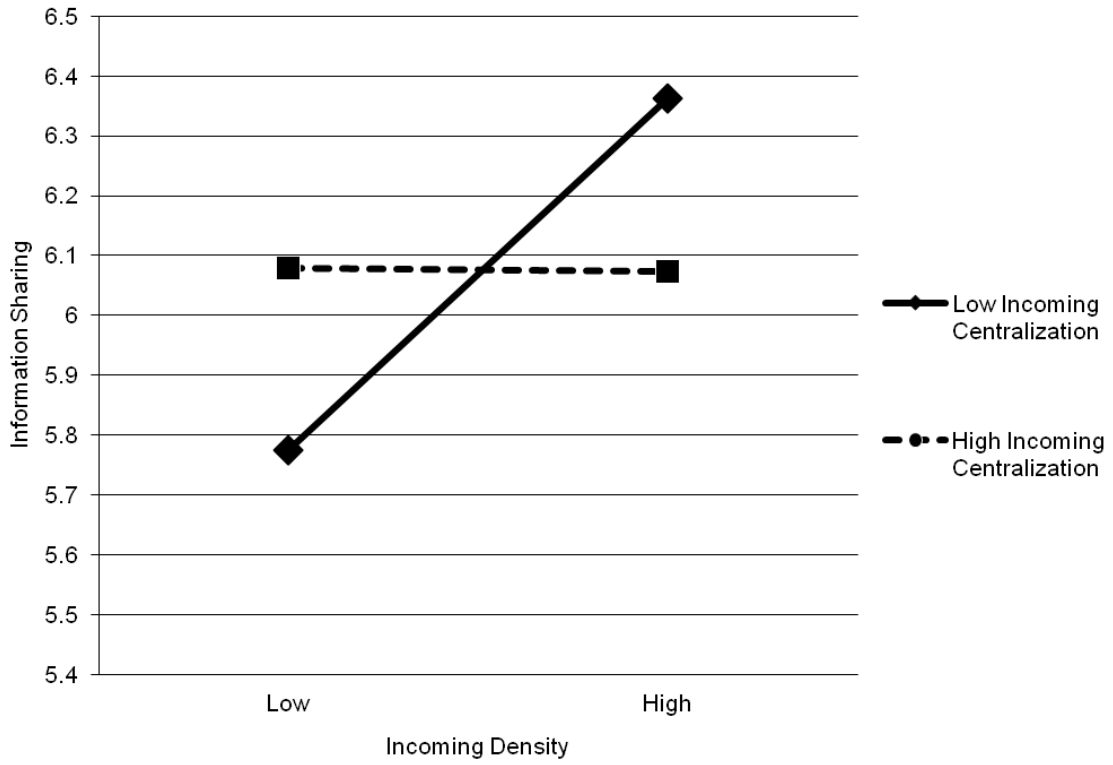
Figure 27. Study 2: Density and reciprocity of outgoing leadership structures predicting recommendation quality.
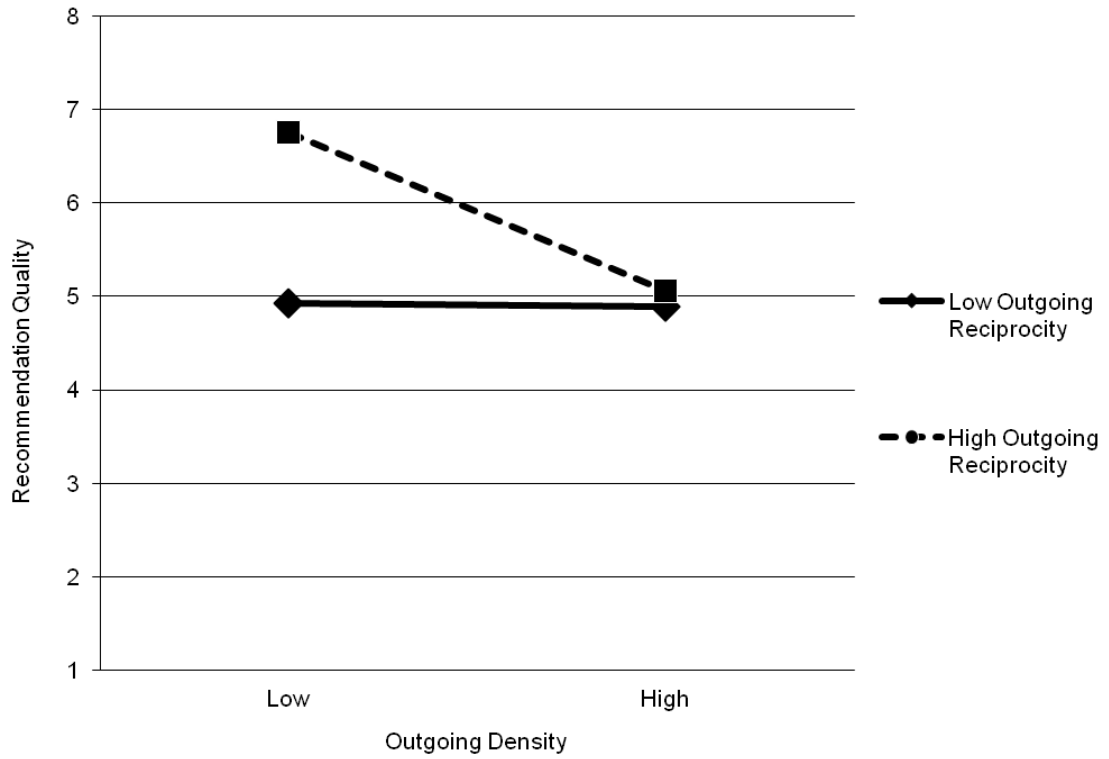
Figure 28. Study 2: Density, centralization, and reciprocity of incoming leadership structures predicting recommendation correctness.
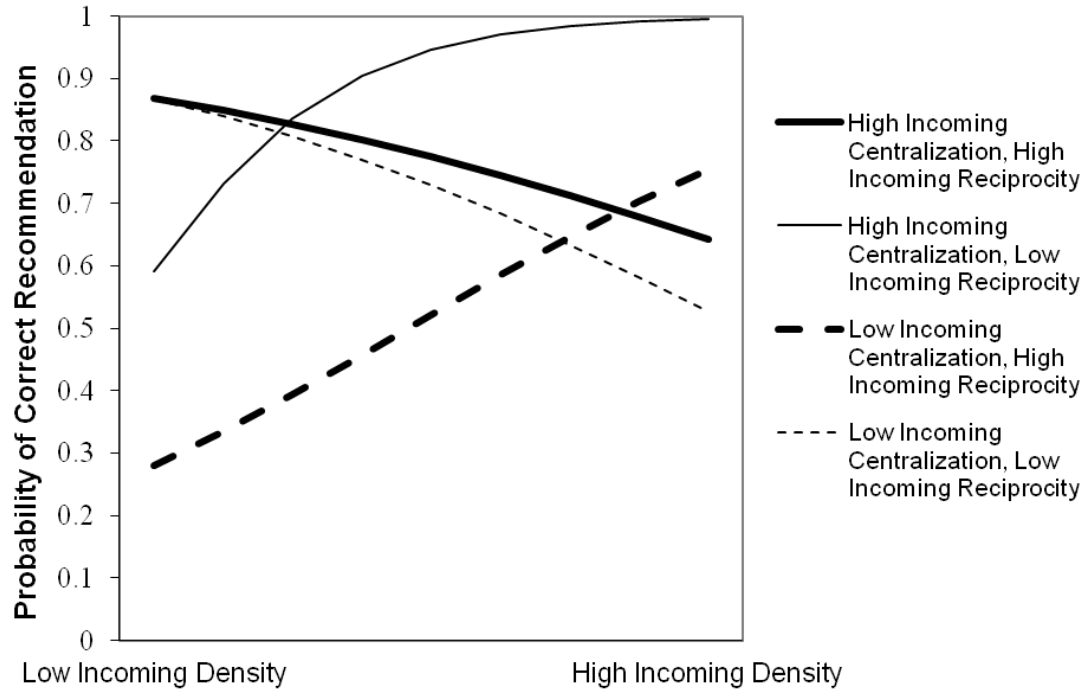
Figure 29. Study 2: Density, centralization, and reciprocity of social-focused leadership structures predicting recommendation correctness.
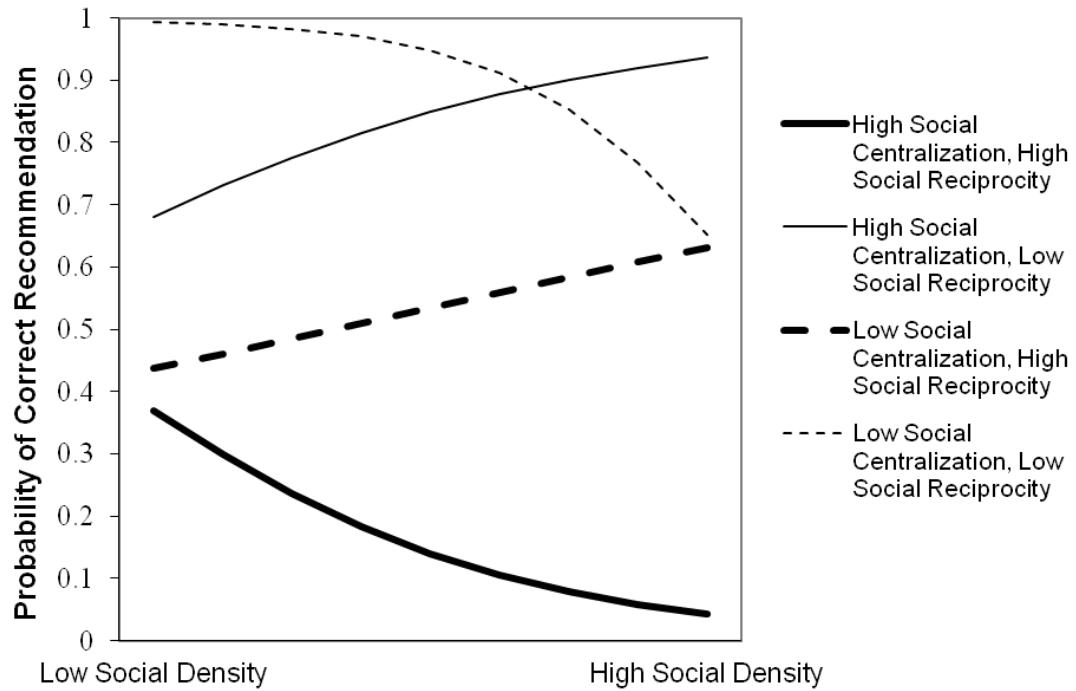
Figure 30. Study 2: Density and reciprocity of incoming leadership structures predicting task conflict.
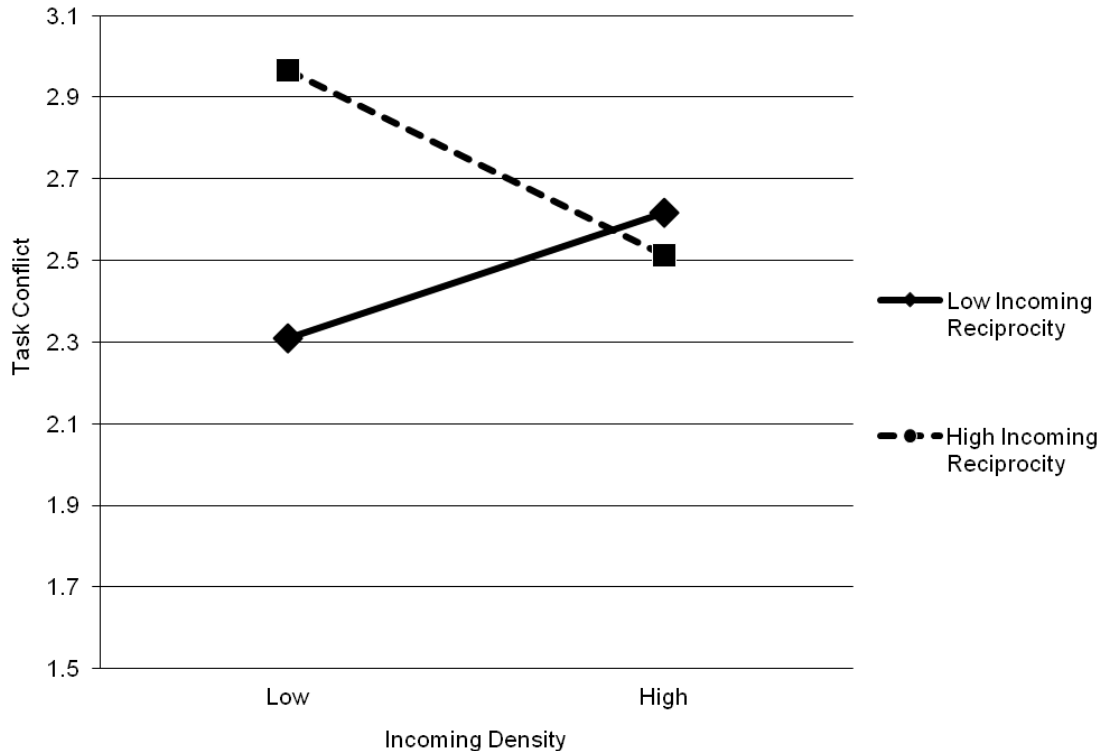
Figure 31. Study 2: Density, centralization, and reciprocity of social-focused leadership structures predicting task conflict.

A. Low social reciprocity
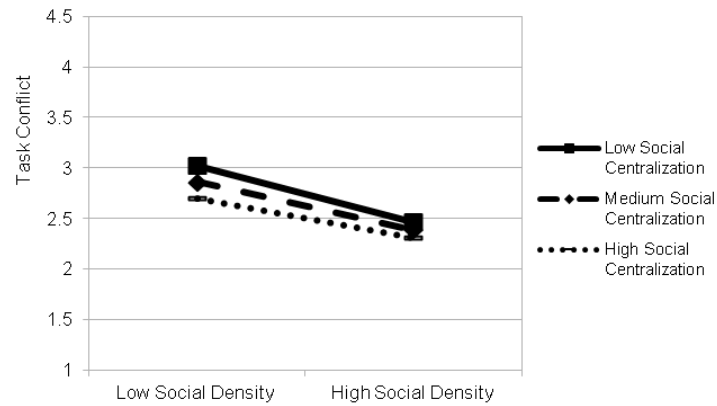
B. High social reciprocity
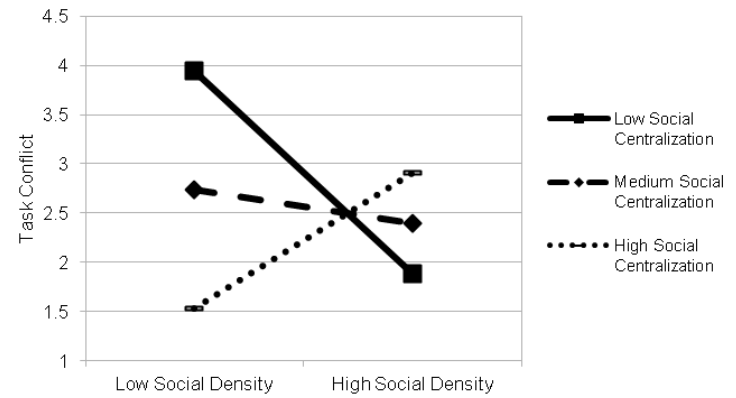
Figure 32. Study 2: Density and centralization of task-focused leadership structures predicting process conflict.
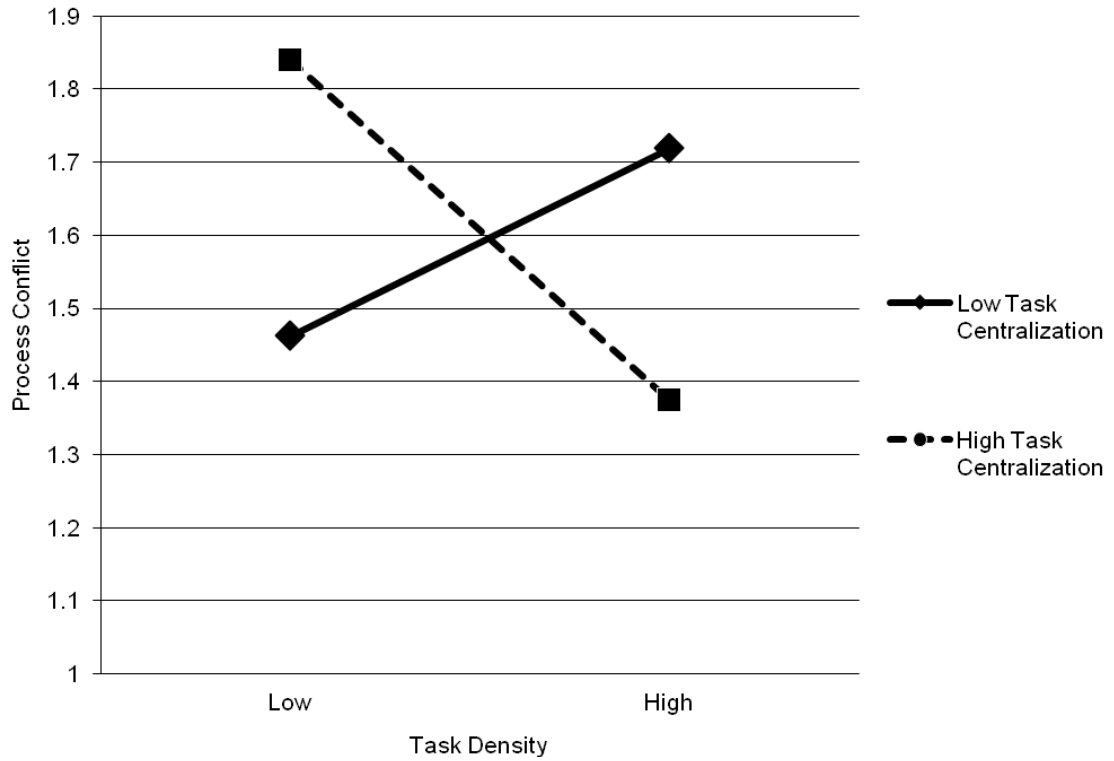
Figure 33. Study 2: Density, centralization, and reciprocity of social-focused leadership structures predicting process conflict.

A. Low social reciprocity
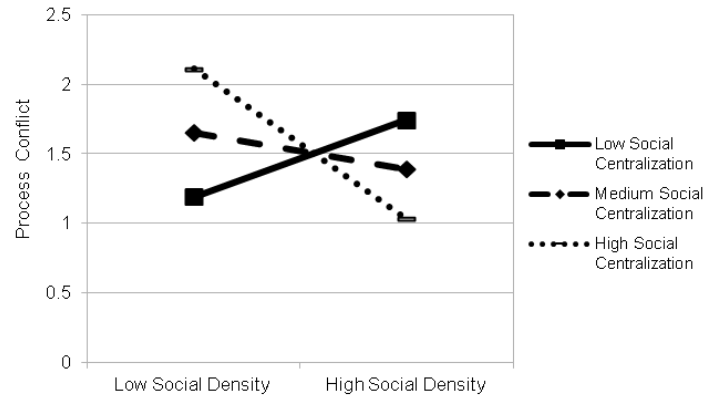
B. High social reciprocity
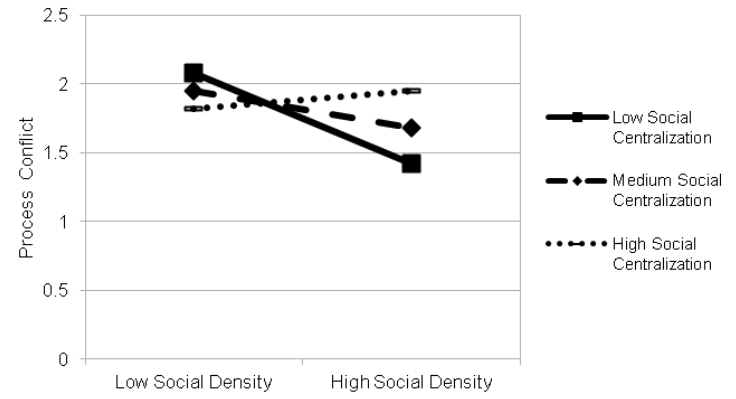
Hypothesis 7 predicted that the association between shared group leadership

structures and performance is explained by the beneficial effects these structures have on

group absorptive capacity. I used path analysis to test this hypothesis with respect to the

information sharing component of absorptive capacity. The results of this analysis are

displayed in Tables 45-48. Information sharing did not mediate the relationship between

the density (correctness $b = .09$, *95% CI* -.12, .54, quality $b = .09$, *95% CI* -.11, .37),

centralization (correctness $b = -.01$, *95% CI* -.03, .00, quality $b = -.01$, *95% CI* -.02, .00)

or reciprocity (correctness $b = .02$, *95% CI* .00, .06, quality $b = .02$, *95% CI* .00, .04) of

outgoing leadership structures and either the correctness or quality of groups'

recommendations. However, information sharing was a significant mediator of the

relationship between the density of incoming leadership structures and both the

correctness ($b = .35$, *95% CI* .01, 1.14) and quality ($b = .38$, *95% CI* .15, .68) of groups'

recommendations. Information sharing did not mediate the relationship between the

centralization (correctness $b = -.01$, *95% CI* -.03, .01, quality $b = -.01$, *95% CI* -.02, .01)

or reciprocity (correctness $b = .01$, *95% CI* -.01, .04, quality $b = .01$, *95% CI* -.02, .03) of

incoming leadership structures and performance. A similar pattern was observed for task-

focused leadership structures, with information significantly mediating the relationship

between the density (correctness $b = .33$, *95% CI* .07, .82, quality $b = .25$, *95% CI* .07,

.48), but not the centralization (correctness $b = -.00$, *95% CI* -.02, .01, quality $b = -.00$,

95% CI -.02, .01) or reciprocity (correctness $b = -.01$, *95% CI* -.06, .01, quality $b = -.01$,

95% CI -.03, .01) of these structures and performance. Finally, the relationship between

both the density (correctness $b = .77$, *95% CI* .30, 1.54, quality $b = .57$, *95% CI* .31, .91)

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and centralization (correctness $b = -.03$, *95% CI* -.10, -.00, quality $b = -.03$, *95% CI* -.07,

-.01) of social-focused leadership structures and group performance was significantly

mediated by information sharing, but information sharing was not a significant mediator

of the relationship between social-focused reciprocity and either the correctness ($b = .01$,

95% CI -.01, .05) or quality ($b = .01$, *95% CI* -.01, .04) of groups' recommendations. In

all, the results of the mediation analysis partially supported Hypothesis 7a and 7b, but did

not support Hypothesis 7c.

Table 45. *Study 2: Summary of Mediation Analysis: Outgoing Leadership Structures, Information Sharing, and Group Performance*

| | DV Recommendation Correctness | | | |
| | Model 1 | Model 2 | | |
Variable	Structure → Information Sharing b (SE)	Information Sharing → Rec. Correctness b (SE)	Indirect Effect b (SE)	95% CI
Outgoing Density	.07 (.10)	1.28* (.54)	.09 (.16)	-.12, .54
Outgoing Centralization	-.00 (.01)	1.26* (.55)	-.01 (.01)	-.03, .00
Outgoing Reciprocity	.01 (.01)	1.19* (.55)	.02 (.01)	.00, .06
	DV Recommendation Quality			
	Model 1 Structure → Information Sharing	Model 2 Information Sharing → Rec. Correctness	Indirect Effect	
Variable	b (SE)	b (SE)	b (SE)	95% CI
Outgoing Density	.07 (.10)	1.28** (.25)	.09 (.12)	-.11, .37
Outgoing Centralization	-.00 (.01)	1.21** (.24)	-.01 (.01)	-.02, .00
Outgoing Reciprocity	.01 (.01)	1.18** (.25)	.02 (.01)	.00, .04

Note. $n = 60$ groups. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals constructed using 5,000 bootstrapped samples.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed

Table 46. *Study 2: Summary of Mediation Analysis: Incoming Leadership Structures, Information Sharing, and Group Performance*

	DV = Recommendation Correctness			
	Model 1	Model 2		
	Structure → Information Sharing	Information Sharing → Rec. Correctness	Indirect Effect	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Incoming Density	.32** (.10)	1.09† (.57)	.35* (.28)	.01, 1.14
Incoming Centralization	-.01 (.01)	1.36* (.55)	-.01 (.01)	-.03, .01
Incoming Reciprocity	.01 (.01)	1.43 (.57)	.01 (.01)	-.01, .04

	DV = Recommendation Quality			
	Model 1	Model 2		
	Structure → Information Sharing	Information Sharing → Rec. Correctness	Indirect Effect	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Incoming Density	.32** (.10)	1.20** (.27)	.38** (.14)	.15, .68
Incoming Centralization	-.01 (.01)	1.27** (.25)	-.01 (.01)	-.02, .01
Incoming Reciprocity	.01 (.01)	1.28** (.25)	.01 (.01)	-.02, .03

Note. n = 60 groups. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals constructed using 5,000 bootstrapped samples.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed

Table 47. *Study 2: Summary of Mediation Analysis: Task-Focused Leadership Structures, Information Sharing, and Group Performance*

	DV = Recommendation Correctness			
	Model 1	**Model 2**		
	Structure → Information Sharing	**Information Sharing → Rec. Correctness**	**Indirect Effect**	
Variable	*b* *(SE)*	*b* *(SE)*	*b* *(SE)*	**95% CI**
Task-Focused Density	.20** (.07)	1.62** (.63)	.33** (.19)	.07, .82
Task-Focused Centralization	-.00 (.01)	1.27* (.54)	-.00 (.01)	-.02, .01
Task-Focused Reciprocity	-01 (.01)	1.40* (.55)	-.01 (.02)	-.06, .01
	DV = Recommendation Quality			
	Model 1	**Model 2**		
	Structure → Information Sharing	**Information Sharing → Rec. Correctness**	**Indirect Effect**	
Variable	*b* *(SE)*	*b* *(SE)*	*b* *(SE)*	**95% CI**
Task-Focused Density	.20** (.07)	1.22** (.26)	.25** (.10)	.07, .48
Task-Focused Centralization	-.00 (.01)	1.24 (.25)	-.00 (.01)	-.02, .01
Task-Focused Reciprocity	-01 (.01)	1.31 (.24)	-.01 (.01)	-.03, .01

Note. $n = 60$ groups. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals constructed using 5,000 bootstrapped samples.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed

Table 48. *Study 2: Summary of Mediation Analysis: Social-Focused Leadership Structures, Information Sharing, and Group Performance*

	DV = Recommendation Correctness			
	Model 1	Model 2		
	Structure → Information Sharing	Information Sharing → Rec. Correctness	Indirect Effect	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Social-Focused Density	.40** (.09)	1.92** (.68)	.77** (.33)	.30, 1.54
Social-Focused Centralization	-.03* (.01)	1.24* (.56)	-.03* (.03)	-.10, -.00
Social-Focused Reciprocity	.01 (.01)	1.33 (.55)	.01 (.01)	-.01, .05
	DV = Recommendation Quality			
	Model 1 Structure → Information Sharing	Model 2 Information Sharing → Rec. Correctness	Indirect Effect	
	b	*b*	*b*	
Variable	*(SE)*	*(SE)*	*(SE)*	95% CI
Social-Focused Density	.40** (.09)	1.42** (.29)	.57** (.15)	.31, .91
Social-Focused Centralization	-.03* (.01)	1.27** (.26)	-.03* (.02)	-.07, -.01
Social-Focused Reciprocity	.01 (.01)	1.22** (.25)	.01 (.01)	-.01, .04

Note. $n = 60$ groups. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals constructed using 5,000 bootstrapped samples.
[†] $p < .10$, two-tailed, [*] $p < .05$, two-tailed, [**] $p < .01$, two-tailed

Hypothesis 8 predicted the density, decentralization, and reciprocity of group

leadership structures is positively associated with task conflict. Tables 41-44 display the

results of these hypothesis tests. With respect to Hypothesis 8, there was no significant

association between the density ($\beta = .15$, $p = .26$) or centralization ($\beta = .03$, $p = .84$) of

outgoing leadership structures and task conflict in problem-solving groups, but the

reciprocity of outgoing leadership structures was positively associated with task conflict

($\beta = .26$, $p < .05$). There were no significant relationships between incoming (density $\beta =$

.02, $p = .89$, centralization $\beta = -.16$, $p = .24$, reciprocity $\beta = .17$, $p = .20$), and task-

focused (density $\beta = -.14$, $p = .30$, centralization $\beta = -.0$, $p = .74$, reciprocity $\beta = .02$, $p =$

.86) leadership structures and task conflict in groups. The density of social-focused

leadership structures was significantly associated with group task conflict ($\beta = -.26$, $p <$

.05), but this association was in the opposite direction as predicted. The centralization (β

$= .10$, $p = .45$), and reciprocity ($\beta = -.13$, $p = .32$) of social-focused leadership structures

were not significant predictors of task conflict. Thus, Hypotheses 8a and 8b were not

supported, while Hypothesis 8c received mixed support.

There was one significant two-way interaction with respect to task conflict. As

shown in Figure 30, the density and reciprocity of incoming leadership activity in

problem-solving groups interacted to predict task conflict ($\beta = -.28$, $p < .04$), such that at

low levels of reciprocity increases in the density of incoming leadership activity

displayed a slight positive relationship with task conflict, but at high levels of incoming

reciprocity increases in density had a negative relationship with task conflict. There was

also a significant three-way interaction between the density, centralization, and

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reciprocity of social-focused leadership activity predicting task conflict ($\beta = .37$, $p < .04$).
As shown in Figure 31a, when social-focused reciprocity was low, the density and
centralization of social-focused leadership activity did not interact to predict task conflict.
However, as shown in Figure 31b, when social-focused reciprocity was high, increases in
the density of social-focused leadership activity had a positive relationship with task
conflict when social-focused centralization was *high*, but a negative relationship with task
conflict when social-focused centralization was *low*.

Hypothesis 9 predicted that shared leadership structures increase process conflict.
The pattern of results with respect to Hypothesis 9 was similar to Hypothesis 8. Again,
there was no significant association between the density ($\beta = .19$, $p = .15$) and
centralization ($\beta = -.17$, $p = .21$) of outgoing leadership structures and process conflict,
but outgoing reciprocity was associated with increased levels of process conflict ($\beta = .38$,
$p < .01$). There were no significant relationships between the properties of incoming
(density $\beta = .04$, $p = .76$, centralization $\beta = -.15$, $p = .28$, reciprocity $\beta = .07$, $p = .59$),
task-focused (density $\beta = -.06$, $p = .65$, centralization $\beta = .08$, $p = .53$, reciprocity $\beta = -.04$, $p = .76$), or social-focused (density $\beta = -.20$, $p = .14$, centralization $\beta = .03$, $p = .84$,
reciprocity $\beta = .04$, $p = .77$) leadership structures and process conflict. Thus, Hypotheses
9a and 9b were not supported, while Hypothesis 9c received partial support.

There was one significant two-way interaction with respect to process conflict. As
shown in Figure 32, the density and centralization of task-focused leadership activity
interacted to predict process conflict ($\beta = .03$, $p = .84$), such that when task-focused
leadership was highly centralized, increases in the density of task-focused activity tended

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to reduce process conflict, whereas when task-focused leadership was decentralized increases in density were associated with higher levels of process conflict. There was also one significant three-way interaction, with the density, centralization, and reciprocity of social-focused leadership activity interacting to predict process conflict. As shown in Figure 33a, at low levels of social-focused reciprocity, the density of social-focused leadership activity in problem-solving groups was negatively associated with process conflict at high levels of centralization, but positively associated with process conflict at low levels of centralization. However, as shown in Figure 33b, this pattern of effects was reversed at high levels of social-focused reciprocity.

With respect to Hypothesis 10 – which predicted shared leadership structures reduce relationship conflict – the density, decentralization, and reciprocity of outgoing leadership structures were not associated with relationship conflict in problem-solving groups (density $\beta = .09$, $p = .51$, centralization $\beta = .11$, $p = .39$, reciprocity $\beta = .01$, $p = .95$). The centralization and reciprocity of incoming leadership structures were also not significant predictors of relationship conflict (centralization $\beta = -.05$, $p = .73$, reciprocity $\beta = .04$, $p = .73$), but the density of incoming leadership activity was negatively associated with relationship conflict ($\beta = -.27$, $p < .05$). The density and centralization of groups' task-focused leadership structures were not significantly associated with relationship conflict (density $\beta = -.16$, $p = .22$, centralization $\beta = .19$, $p = .14$), but the reciprocity of task-focused leadership activity in groups was marginally negatively associated with relationship conflict ($\beta = -.22$, $p < .08$). Finally, the density ($\beta = -.27$, $p < .05$) and centralization ($\beta = .26$, $p < .05$) of social-focused leadership structures displayed

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the predicted relationships with relationship conflict, while the reciprocity of social-focused leadership activity was not significantly associated with relationship conflict (β = -.20, p = .11). Thus, Hypotheses 10a, 10b were partially supported, while Hypotheses 10c was not supported. There were no significant interactions with respect to relationship conflict.

Hypothesis 12 predicted that shared leadership structures increase group members' work satisfaction. There was no association between outgoing leadership structures and the satisfaction of members of the problem-solving groups in this study (density β = .08, p = .54, centralization β = -.15, p = .26, reciprocity β = .20, p = .12). The density of incoming leadership structures was positively associated with group member satisfaction (β = .33, p < .02), but the centralization (β = -.11, p = .44) and reciprocity (β = .16, p = .24) of incoming leadership structures was not. With respect to task-focused leadership activity, the density of task-focused leadership structures was positively associated with the satisfaction of the members of the problem solving groups in this study (β = .36, p <.01). The centralization of task-focused leadership was negatively associated with member satisfaction (β = -.24, p < .07), but this relationship was only marginally significant. The reciprocity of task-focused leadership activity in problem-solving groups was not significantly associated with member satisfaction (β = .07, p = .58). With respect to social-focused leadership, the density (β = .52, p < .001), centralization (β = -32, p < .02), and reciprocity (β = .32, p < .02) of social-focused leadership activity all exhibited the predicted relationship with member satisfaction. Thus, Hypothesis 12a, 12b, and 12c all received partial supported.

Supplemental Analysis: Incoming Centralization as a Mediator

Since hierarchical differentiation had a marginally significant positive relationship with the centralization of incoming leadership activity in problem-solving groups, I tested whether the increased centralization of incoming leadership mediated the relationship between formal hierarchical differentiation and the outcomes in my conceptual model. The results of this supplemental analysis are summarized in Table 49. As shown in the table, none of the indirect effects of hierarchy on outcomes through the centralization of incoming leadership structures was fully significant. However, there was a marginally significant indirect effect of hierarchy on satisfaction via incoming leadership centralization, such that hierarchy increased the centralization of incoming leadership structures, and more centralized structures reduced group member satisfaction ($b = .09$, $SE = .09$, $p = .10$).

Supplemental Analysis: Curvilinear Relationships

In light of the results of Study 1, I also tested for the presence of curvilinear relationships between the density, centralization, and reciprocity of group leadership structures and the outcomes included in this study. However, very few of these relationships were significant and so the results of this analysis are not presented here.

Table 49. *Study 2: Summary of Mediation Analysis: Hierarchy, Incoming Leadership Centralization, and Outcomes*

Outcome	Model 1 Hierarchy→ Incoming Centralization *b* *(SE)*	Model 2 Incoming Centralization → Outcome *b* *(SE)*	Indirect Effect *b* *(SE)*	Indirect Effect 95% CI
Information Sharing	6.33* (3.25)	-.00 (.01)	-.03 (.05)	-.14, .06
Satisfaction	6.33* (3.25)	-.01 (.01)	-.09† (.09)	-.42, .01
Relationship Conflict	6.33* (3.25)	.00 (.01)	.02 (.04)	-.04, .12
Task Conflict	6.33* (3.25)	-.00 (.01)	-.03 (.05)	-.19, .04
Process Conflict	6.33* (3.25)	-.00 (.01)	-.01 (.04)	-.14, .04
Recommendation Correctness	6.33* (3.25)	.02 (.02)	.09 (.20)	-.17, .71
Recommendation Quality	6.33* (3.25)	.00 (.01)	.01 (.09)	-.13, .26

Note. $n = 65$ groups. Statistics reported are unstandardized regression coefficients with standard errors in parentheses. Bias-corrected 95% confidence intervals constructed using 5,000 bootstrapped samples.
† $p < .10$, two-tailed, * $p < .05$, two-tailed, ** $p < .01$, two-tailed

Exploratory Qualitative Analysis of Video Footage

As planned, I undertook an exploratory qualitative analysis of the video footage of groups working on the problem-solving task that was obtained as part of this study. During data collection, I videotaped 50 of the 60 problem solving groups that participated in this study (the remaining 10 groups were assigned to a breakout room without recording equipment). I watched each video through in its entirety, and made careful notes of the way each group approached the problem-solving task and how they structured their leadership activities. I also attempted to identify conversational or interactional "micro-moves" made by group members that encouraged the development of either shared or vertical leadership structures. As I was watching the videos, I periodically stopped to write memos describing trends I noticed in the data or occurrences I felt to be particularly revealing or noteworthy. After watching the videos, I went back through my notes and memos and identified emerging themes (Emerson, Fretz, & Shaw, 1995; Glaser & Strauss, 1977). In all, my exploratory analysis helped me interpret the quantitative results of this study, and also provided new insights about how enduring patterns of leadership activity develop within groups. Below, I outline the most significant insights that emerged from this study, and then specifically discuss my findings related to the interactional moves underlying shared and vertical leadership structures.

Insight 1: Different leadership structures during different portions of the activity. The problem-solving groups in this study all adopted a similar pattern of activities in completing the Insight Enterprise Software simulation. This pattern consisted of four

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phases of activity. In Phase One the groups read the instructions for the exercise and divided up the materials. In Phase Two, group members read and took notes on the materials for their role silently. In Phase Three, the groups discussed the potential candidates and selected one to recommend. Finally, in Phase Four the groups completed the recommendation sheet. Virtually all groups, regardless of condition, completed all four phases in this order. However, there were interesting differences by condition in the way that groups organized their activities during certain phases.

During Phase One, groups in the two experimental conditions did seem to exhibit different leadership structures. Groups in the formal hierarchical differentiation condition tended to adopt an almost purely vertical leadership structure. The formally designated manager was virtually always the individual who served as the single leader in this structure, reading the instructions to the activity, proposing a process, and assigning other members to their roles. Often, the formally designated manager asked group members if they had a preference for a particular role, but the manager always made the final role assignments. Other group members listened quietly while the designated manager read the instructions for the exercise and handed out the roles, and typically did not ask many questions. In contrast, members of groups in the no formal hierarchical differentiation condition tended to share their leadership activities more evenly during Phase One. In some of these groups, one individual volunteered to read the instructions, and this was often an indicator that the individual would emerge as an informal leader within the group. But, it was not uncommon for a different group member to begin distributing the materials for the simulation while the instructions were being read, and occasionally

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multiple group members took turns reading the instructions. Members of groups in the no formal hierarchical differentiation condition tended to ask many more questions about the instructions for the simulation during Phase One as compared to groups in the formal hierarchical differentiation condition, seemingly in an attempt to establish a shared understanding of the "rules" of the simulation and to develop an agreed-upon plan for completing the task.

Phase Two of the activity involved mostly quiet reading. There was little leadership activity of any kind that took place in this phase and few differences between conditions.

During Phase Three of the problem-solving activity, groups in both conditions tended to exhibit a pattern of leadership more consistent with the shared than the vertical model. Once groups began to discuss which candidate they should recommend for the vacant position, many members tended to participate in the process of soliciting information about each candidate, identifying the needs of each functional area within the fictitious organization, offering encouragement, raising new points or angles for the group to consider, proposing process improvements, and arriving at a final recommendation. Interestingly, despite the fact that designated managers were given formal authority to make the final decision with respect to their groups' recommendations, during Phase Three recommendations were only accepted as final when all group members agreed. There was some variation between groups in whether one or many individuals fulfilled Phase Three leadership functions, but this variation seemed to be more a function of the blend of personalities (particularly with respect to

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extraversion and/or trait dominance) within the group than whether the group had a

formally designated leader. Groups in which all members exhibited a similar level of

extraversion and dominance tended to share their Phase Three leadership activities more

broadly, regardless of whether one of their members was formally designated as a

manager, whereas groups with one or two members who were much more dominant than

the others tended to develop more vertical leadership structures with these individuals

occupying the leadership positions. However, by far the most common pattern of

leadership to emerge in both conditions in Phase Three was a relatively shared structure

with three or even all four group members sharing leadership responsibilities.

The other phase of the problem-solving activity where groups displayed

significant differences in leadership structures by condition was Phase Four. As in Phase

One, groups in the formal hierarchical differentiation condition tended to develop a more

vertical pattern of leadership activity during Phase Four than did groups in the no formal

hierarchical differentiation condition. In the formal hierarchical differentiation condition,

there was only one group in which the formally designated manager did *not* personally

write the groups' final recommendation (in that group, the designated manager explicitly

delegated the task to another group member). While the designated manager was

completing the recommendation sheet, he or she also tended to adopt a directive

leadership role, soliciting information needed to complete the sheet from other group

members. In contrast, groups in the no formal hierarchical differentiation condition

tended to exhibit shared leadership structures in Phase Four. In these groups, the member

who completed the recommendation sheet was most frequently determined on the basis

of expertise (in this case, neatness of handwriting). In some groups, members with good handwriting volunteered to complete the recommendation sheet, and in others group members who had emerged as leaders but purported to have poor handwriting actively removing themselves from consideration as a writer. For groups in the no formal differentiation condition that did not rely on handwriting proficiency to determine a writer, the writing task was typically either shared by all members, with each contributing the perspective of the role they had been assigned, or an individual who emerged as an informal leader during the prior phases assumed responsibility as writer. Regardless of the approach used to determine a writer, leadership activities in groups without formal hierarchical differentiation tended to be more equally shared, with multiple members suggesting how the recommendation sheet should be completed or volunteering information from their handouts.

To summarize, although the exploratory video analysis suggested that formal hierarchical differentiation did impact the nature of the leadership activity in the problem-solving groups in this study, this impact was most pronounced during certain portions of the problem-solving exercise, namely, those including activities that were best performed by only one individual – such as reading the instructions for the task (Phase One), or completing the recommendation sheet (Phase Four). During these portions of the task, groups with formal managers tended to exhibit more vertical patterns of leadership activity centered around the manager, while groups without formal leaders tended to exhibit more shared patterns. There was little to no visible difference between groups by condition, however, during other portions of the task, which either offered few

opportunities for leadership (Phase Two) or contained activities that were best performed by multiple individuals working together (Phase Three).

Insight 2: Importance of questioning. Many of the leadership behaviors traditionally studied in the literature involve leaders independently coming up with ideas, goals and proposals, and then encouraging others in the group to adopt them (Stogdill, 1963; Bass, 2008). For example, included in the transformational leadership behaviors identified by Podsakoff and colleagues (1990) are behaviors such as: "identify and articulate a vision", "foster acceptance of shared goals", and "communicate high performance expectations." In contrast to more traditional, one-way leadership behaviors, in this study a good deal of leadership was co-created by individuals as the result of a question-and-response process. Several types of questions were used by group members during this study to fulfill leadership functions. Below I describe the most significant of these question types.

Suggestion questions. Often, members would phrase their suggestions to other members for group activities as questions (e.g. "Should we discuss the pros and cons of each candidate?" rather than "We should discuss the pros and cons of each candidate"). When questions were used in this way, it was often followed by an informal polling among group members in which members voiced agreement or disagreement with the proposal. If a group member did not speak up during this polling period, he or she was assumed to agree with the proposal. If a majority of group members expressed agreement with the suggestion, it was adopted by the group. Thus, framing a suggestion in the form

of a question enabled group members to propose a course of action for the group in a way that did not seem overbearing and encouraged others to provide their input.

Invitation questions. While suggestion questions were a way for group members to lead the group in an unobtrusive manner, invitation questions were used to encourage other group members to contribute their idea and suggestions about a particular issue. Questions used as invitations for participation were typically quite broad and directed at the whole group (e.g. "What do you guys think we should do?"). Invitation questions were often followed by another group member offering a proposal or suggestion in response to the question, and these proposals were at times further refined by a different group member. Thus, invitation questions frequently initiated mutual, reciprocal leadership interactions.

Clarification questions. This type of questions was aimed at achieving additional clarity about some aspect of the problem-solving exercise or the groups' operation (e.g. "So are we allowed to talk about our information out loud?"). Asked by group members who apparently were legitimately confused or uncertain, these questions were a key means through which groups established a common understanding and shared goals about the "right" or "best" way to complete the problem-solving activity.

Deference questions. These questions were asked specifically to solicit the opinion of another individual, typically the group's designated leader (e.g. "Am I allowed to write on this?"). Questions framed in this way conveyed respect for the authority and/or expertise of another member of the group, and often served as a "grant," or appeal for that individual to engage in some form of leadership (DeRue & Ashford, 2010).

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Insight 3: Differing levels of comfort in the designated leadership role. Groups in the formal hierarchical differentiation condition displayed substantial variance with were in the leadership role. In general, the act of being singled out amongst the peers as having the "highest leadership potential" and assigned additional responsibilities seemed to be slightly uncomfortable for participants. Many would nervously giggle or make some sort of self-defacing remark such as "oh, wow." However, the range of participants' reactions upon learning they had been formally designated as a manager spanned a broad continuum, ranging from extreme expressions of disappointment and discomfort (e.g. "Holy *#*@….wow, this is unfortunate for you guys") to expressing no disappointment and moving immediately to directing the group's activities (e.g. "Hello, I am going to start by reading the instructions"). In the formal hierarchical differentiation condition, the behavior of individuals designated as managers seemed to play an important role in how smoothly groups functioned, particularly in Phase One and Phase Four. Groups that had a designated manager who did not lead or who seemed to be uncomfortable leading frequently experienced difficulties getting started with the exercise and dividing up the materials. The other members of these groups seemed to initially wait for their designated manager to act, but if enough time passed without that individual exhibiting convincing leadership, the other group members gradually began to take over the group's leadership functions. In contrast, designated managers who appeared to embrace the leadership role and immediately moved to direct the activities of other group members were more likely to retain some degree of leadership influence throughout the simulation.

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Insight 4: Importance of resourcing. The prevailing wisdom in the literature on leadership and status emergence seems to be that leadership influence in groups gravitates towards the members who possess valuable resources (skills, expertise, information) that can help the group succeed (e.g. Bunderson, 2003; Taggar, Hackett, & Saha, 2006; Mumford, Campion, & Morgeson, 2007). This literature assumes that resources are pre-determined and static, such that either a particular member of a group possesses a resource or he or she does not. However, my observations suggested that a more practice-based view of the role of resources in the leadership process might be warranted. In particular, although most group members tended to possess the same amount of information and materials, they differed greatly in the extent to which they "resourced," or created in practice assets such as information, expertise, and authority that they could then draw upon to help them lead others (Feldman, 2004). Individuals who possessed potential assets (e.g., a formal leadership designation, unique information from their handouts) but did not actively convert those assets into resources through practice were unlikely to play a significant leadership role in their group. Conversely, other individuals displayed an uncanny knack at leveraging the assets within their group, some of which were potentially available to all group members, to engage in leadership.

One instance of resourcing that occurred in many groups involved the creation of a matrix listing the strengths and weaknesses of each candidate in the problem-solving activity. As part of their packet of materials, each group received a sheet of blank paper, and each group member was provided with a pen. Any group member could potentially hold the paper, but simply possessing the paper did not by itself facilitate leadership.

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However, during Phase Three, some group members decided to use the scratch paper to record the strengths and weaknesses of each candidate based on the individual profiles provided to each group member. Engaging in this practice transformed the paper into a valuable resource, as it allowed the group codify and synthesize information that was previously only available in discrete parcels. Moreover, the group member who created the matrix tended to emerge as an informal leader during the group's Phase Three and Phase Four interactions. During the creation of the matrix the member possessing it was able to direct communication and information sharing among the group, and when the group was deliberating between candidates the group member in control of the matrix was equipped with more information than his or her peers, and as such were better able to point out the strengths and weaknesses of each candidate, and make persuasive arguments about which candidate the group should select. Additionally, during Phase Four the information on the matrix was valuable in filling out the recommendation sheet. Thus, in this example a raw material (scratch paper) that was potentially available to any group member was converted into a valuable resource through practice by the actions of a select few, which simultaneously enabled these individuals to emerge as informal leaders. This resourcing-based perspective suggests that it is not merely the possession of static resources, but the actualizing and leveraging of these resources through intentional action that is required to emerge as a leader, and suggests the role of resources in the development of group leadership structures is more dynamic and agentic than has been previously described by leadership scholars.

Interactional moves underlying shared and vertical leadership structures.

Building on the four insights described above, I identified several interactional moves

that served to shift the patterns of leadership activity within the problem-solving groups

in this study towards either a more vertical or more shared leadership structure. These

interactional moves are summarized in Table 50 and described in more detail below.

Table 50. *Study 2: Interactional Moves Encouraging Vertical and Shared Leadership Structures*

Interactional Moves Encouraging Vertical Leadership Structures	Interactional Moves Encouraging Shared Leadership Structures
Declarative or Imperative Statements	Invitation Questions
Grabbing Materials	Designated Managers Acting Unsure of Themselves
Responding to Questions	Social-Focused Leadership
Designated Managers Acting Confidently	Creating Shared Resources
Suggestion Questions (especially when used by Non-Designated Leaders)	
"Grants" of Leadership	
Creating Resource for Self	

Interactional moves encouraging vertical leadership structures.

Declarative or imperative statements. Declarative statements are those that make

a suggestion or express an opinion or fact (e.g. "I think we should create a pros and cons

list for all the candidates"), while imperative statements give instructions or express a

request or command (e.g. "tell me which candidate you would recommend"). These types

of statements were often used by group members in an attempt to lead others, but they

were much less likely than questions to encourage further discussion or invite other group

members to engage in leadership themselves, so they tended to create unidirectional

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leadership interactions in which one member of a group suggested or ordered something and then the other group members did it. Conceptually, declarative or imperative statements would not result in vertical leadership structures if they were not agreed with or "followed" by other group members (DeRue & Ashford, 2010). However, in this study imperative and declarative statements were only very rarely questioned or disputed by other group members. It is possible this occurred due to pluralistic ignorance (Prentice & Miller, 1993, Miller & McFarland, 1987). If a statement did not receive a verbal challenge from a group member, members seemed to assume other members all agreed with the idea, when in reality multiple group members may have had concerns that they were not voicing. As a result, the vast majority of declarative and imperative leadership attempts in this study received relevant responses, encouraging the formation of vertical leadership structures centered on the individual making these statements.

Grabbing materials. Individuals who first grabbed the packet containing the instructions and materials for the problem-solving activity often emerged as leaders. Because the materials, which included instructions and scratch paper, were necessary to complete the groups' tasks, group members with access to these materials were often in a position to direct the activities of others by, for example, assigning roles in the simulation or reading the written instructions aloud. Possessing the materials may have also had symbolic value, helping aspiring leaders to convey a sense of superior knowledge and expertise and establish control over other group members (DeRue & Ashford, 2010).

Responding to questions. In this study, responding to questions was one way group members expressed their opinions and asserted their competence and knowledge

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with respect to the simulation. The majority of the questions asked during the study took the form of suggestion questions or invitation questions. Because these two forms of questions were typically directed at the whole group rather than specific members, individuals could choose whether or not to respond. Those who frequently elected to respond to questions were able to fulfill many task-focused leadership functions without appearing overly controlling. Since the accuracy of the responses to questions was difficult to verify, even responding incorrectly to questions often increased one's chance of emerging as the leader in a vertical leadership structure.

Designated managers acting confidently. When individuals occupying the designated manager position in groups in the formal hierarchical differentiation condition behaved in a confident manner, it increased the likelihood that vertical leadership structures would form around these individuals. Because designated managers were formally endowed with authority, other group members tended to initially look to them for leadership. If the managers appeared to be very confident in the leadership role, it was interpreted as a signal that they were capable of directing the groups' activities (Anderson & Kilduff, 2009). As a result, the other group members were less likely to proactively engage in informal leadership, and more likely to passively follow along with the managers' suggestions and instructions as compared to members of groups with a designated manager who appeared anxious or unsure of him or herself.

Suggestion questions. Suggestion questions were often used by individuals to direct their groups' activities during the simulation, and as such tended to encourage the development of vertical leadership structures centered on individuals who frequently

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asked this type of question. The impact of suggestion questions was particularly profound when the questions were used by non-designated leaders. For managers, using questions to voice a suggestion rather than a declarative or imperative statement served to soften the suggestion and create an opportunity for other members of the group to voice their doubts or disagreement. However, non-designated leaders very rarely made declarative or imperative statements, perhaps because they were concerned about appearing overbearing to other group members. Thus, non-designated leaders frequently used suggestive questions as a way of fulfilling task leadership functions.

"Granting" leadership. While the majority of the interactional moves discussed in the section were used by participants to increase their personal level of leadership influence, occasionally I also observed moves that were intended to encourage leadership on the part of another group member, frequently a designated manager. Following DeRue and Ashford (2010), I refer to these moves as "grants" of leadership. Comments such as "you are the boss," or "you have the final authority in this decision," as well as deference questions, were at times used by group members to encourage others to play a more active leadership role. These utterances were relatively infrequent, but when enacted pushed leadership activity within the group to a more vertical pattern centered on the individual who was the target of the leadership grant.

Creating personal resources. The final interactional move that encouraged the development of vertical leadership structures involved the leadership resourcing behavior discussed above. One way that participants' enhanced their personal leadership influence was to, through their actions, create a unique resource that they and no other group

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member possessed. As discussed previously, one example of this sort of personal resourcing involved creating and personally controlling a matrix of information about each candidate, as well as the selection criteria for each role. In addition to creating a matrix, participants also created personal resources by positioning themselves as a subject matter expert with respect to business school topics (although in reality business knowledge had no bearing on individuals' ability to successfully complete the simulation), or by using their phones to track the time remaining in the exercise. By engaging in this sort of individually-focused resourcing activity, group members tended to shift the group towards a vertical pattern of leadership activity in which they occupied a central position.

Interactional moves encouraging shared leadership structures.

　　Invitation questions. As discussed above, asking broad or open-ended questions was a very effective way for group members to solicit input from others and initiate mutual leadership interactions. Other members frequently responded to invitation questions by asking additional questions, suggesting courses of action, or building on each others' ideas. For instance, in one group in this study a member initiated dialogue at the beginning of Phase Three by asking the invitation question, "So, what should we do now?" Another group member responded to this question by asking the clarification question, "Are we supposed to recommend one candidate?" to which yet a different member responded, "Yes. Should we just go around and say who we recommend?" When the majority of the group members nodded or verbally affirmed that suggestion, the group members proceeded to take turns recommending candidates. In this example,

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by asking an invitation question, a group member initiated a pattern of mutual leadership activity in which with multiple members contributed ideas and built on each others' suggestions. Over time, this sort of activity contributed to the development of more shared leadership structures.

Designated managers acting uncomfortable or uncertain. While designated managers who acted comfortable in the leadership role tended to encourage the development of vertical leadership structures, discomfort, apathy, or unease displayed by managers tended to encourage shared leadership structures. Although designated managers were initially given some latitude, if they persisted in shirking or avoiding leadership responsibilities, or appearing unsure of what the group should be doing, other members eventually stepped in to provide informal leadership and direction. Once this occurred, the designated manager rarely, if ever, re-asserted him or herself as a dominant figure in the groups' leadership interactions, and a more shared pattern of leadership activity tended to develop.

Social-focused leadership activity. In general, groups who exhibited relatively high levels of social-focused leadership activity seemed to develop more shared leadership structures. Interestingly, despite the fact that most groups reported a high overall level of social-focused leadership, in reviewing the videos I noticed much more task-focused than social-focused activity. In part, this may have been due to the nature of the problem-solving activity: participants were placed in groups with others who they did not know and with whom they had no expectation of interacting after the activity's conclusion. However, groups whose members did engage in a high level of social-

focused leadership (by, for example, motivating each other to perform well in the exercise, going out of their way to show concern for others' opinions, or sharing personal information) tended to create a social context in which all members were motivated to participate in the problem-solving activity, comfortable sharing their views and perspectives, and also more likely to engage in additional social-focused leadership. In this way, social-focused leadership activity encouraged the development of more shared leadership structures.

Creating a shared resource. Finally, while in some groups members enhanced their individual positions as leaders by creating personal access to a unique resource, in other groups members increased the groups' collective capacity to lead by creating a resource that could be used by all members of the group. For instance, to return to the matrix example, in some groups members proposed creating a matrix but rather than controlling its creation themselves placed the sheet of scratch paper in the middle of the table so that each group member could see it and write in it. Creating a shared (rather than an individual) resource appeared to be equally valuable to the group, but encouraged the development of a shared, rather than a vertical, pattern of leadership activity.

Discussion

In this study, I manipulated, rather than measured, formal hierarchical differentiation in experimental groups working on a problem-solving activity. I also conducted an exploratory qualitative analysis of videotapes of groups at work on the activity to identify the micro-level interpersonal interactions underlying group-level leadership structures.

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The manipulation check results revealed that virtually all of the participants in this study were aware of the presence or absence of a formally designated manager in their problem-solving groups, and the video footage provided little to no evidence that groups were suspicious of the formal hierarchy manipulation. Nevertheless, this study's quantitative results suggested that formal hierarchical differentiation had very little impact on the patterns of leadership activity that developed in problem-solving groups. There were also no differences by condition with respect to the outcomes included in this study, namely information sharing, task, process, and relationship conflict, satisfaction, and performance. The qualitative results suggested that formal hierarchical differentiation did influence the pattern of leadership activity in groups at the beginning and end stages of the problem-solving exercise. However, the qualitative data revealed that formal hierarchy had little influence on groups' patterns of leadership activity during the middle portion of the exercise, when the groups were discussing the candidates and arriving at a recommendation.

There are two potential reasons why the formal hierarchy manipulation did not influence the quantitative results of this study. The first is that while every effort was made to reinforce the formal hierarchical differentiation manipulation with differentiation on other dimensions that are typically associated with occupying a formal managerial role in organizations (differences in information, perceived expertise, and decision-making authority), I had difficulty fully recreating some of these differences in an experimental setting, given that participants did not know each other prior to the study and were essentially peers with respect to age, education, and experience. As a result, the formal

hierarchical differentiation that occurred in this study was likely less powerful than that which occurs in organizational contexts, which could explain the limited effects of the manipulation.

The second is that the nature of the problem-solving activity may have superseded formal hierarchical differentiation in determining the leadership structures that emerged in problem-solving groups. The problem-solving activity, particularly during Phase Three, was generally quite high in interdependence, such that to complete it successfully multiple group members needed to share the information contained in their personal handouts and make suggestions about which candidate the group should endorse, all of which could be better accomplished by sharing leadership responsibilities (Thompson, 1967; Gittell, 2003). Although no reward was offered for successful completion of the task, participants seemed motivated to complete it successfully, and this motivation may have been sufficient to override the groups' formal hierarchical structures and encourage shared, informal leadership during Phase Three. Moreover, participants spent much more time on Phase Three of the simulation than any other phase of the activity. Thus, it is possible that the network approach used in this study to assess group leadership structures, which asked about the patterns of leadership that developed overall in the activity, was predominantly influenced by Phase Three leadership dynamics, which tended to be similarly shared across both the hierarchical differentiation and no hierarchical differentiation conditions.

Despite the inefficacy of the formal hierarchy manipulation, I tested a subset of my hypotheses by assessing the relationship between the leadership structures that *did*

emerge in the problem-solving groups in this study (regardless of condition) and the outcomes in my conceptual model. Similar to Study 1, and consistent with the literatures on social networks and small groups (Sparrowe et al., 2001; Leavitt, 1951), denser leadership structures tended to be associated with a variety of positive outcomes, specifically increased information sharing, member satisfaction and performance, and reduced conflict. Also as in Study 1, the direct effect of leadership centralization seemed to be less powerful than density in predicting the outcomes in this study. However, the centralization of group leadership structures again frequently moderated the relationship between the density of group leadership activity and outcomes. These effects were not formally hypothesized, but the overall pattern was such that increases in density tended to be functional at low levels of centralization, but either negligible or dysfunctional at high levels of centralization. Most of the direct effects associated with the reciprocity in this study occurred with respect to outgoing leadership reciprocity, which was associated with increased levels of task and process conflict, but also with improved group performance in terms of both the quality and correctness of groups' recommendations.

The results of my exploratory qualitative analysis of the video footage of groups working on the problem-solving task also provided valuable insights about interactional dynamics through which leadership structures emerge. For instance, the video data suggested that questioning represents an important and understudied way that group members shape the leadership structures that develop in groups. In the videos I watched, leadership behavior as it is traditionally conceptualized was frequently eclipsed by more collaborative leadership interactions in which questions, rather than orders or statements,

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were the most commonly used means of directing collective activities. Currently, the role of questioning behavior in the leadership process is poorly understood, and the results of my exploratory qualitative analysis suggest that additional empirical and theoretical attention in this area would be warranted.

Finally, this studies' qualitative results suggested that very different types of interactional moves underlie shared and vertical leadership structures. Not only were the leadership behaviors enacted by members of shared and vertical leadership structures distributed differently (dispersed throughout the group vs. concentrated in one or a few individuals), but the nature of the behaviors themselves tended to be different. Members of groups with shared leadership structures tended to create opportunities and invitations for other members to participate in the leadership process through interactional moves such as creating shared resources or asking broad, invitation-oriented questions. In contrast, vertical leadership structures tended to develop as the result of interactional moves focused on advancing a particular individual's personal agenda or standing within the group, for instance monopolizing control over information or resources, or using declarative or imperative statements.

Study-Specific Limitations and Strengths

The most significant limitation of this study is the low efficacy of the formal hierarchy manipulation in influencing the patterns of leadership activity that developed in the problem-solving groups. The absence of significant differences between conditions nullifies one of the traditional strengths of experimental designs: the ability to infer causality (Singleton & Straits, 1999). Although subsequent analyses revealed interesting

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relationships between the leadership structures that developed in this study and the outcomes in my conceptual model, because the structures developed as a function of things other than the formal hierarchy role manipulation (for instance, differences in the distribution of extraversion or trait dominance among group members), it is impossible to rule out the possibility that both the differences in leadership structures and the differences in study outcomes were caused by these exogenous factors. This limitation was compounded by the fact that, unlike Study 1, the design of this study did not include control variables as a way of ruling out some of the more plausible of these potential alternative explanations. Thus, the results of the analyses testing Hypotheses 5, 6, 7, 8, 9, 10, and 12 should be interpreted with the utmost caution.

That major limitation notwithstanding, this study was also characterized by several strengths. Specifically, this study tested many of same relationships as Study 1 in the context of a new type of task and a new population. The fact that some degree of consistency was observed in the pattern of these relationships across both studies increases the likelihood that these findings are generalizable. Second, unlike in Study 1, in this study it was possible to obtain video recordings of groups at work on a complex, interdependent task. A preliminary exploratory analysis of these videos provided new insights into the interactional dynamics underlying shared and vertical leadership structures, and suggested several potentially fruitful lines of future inquiry.

CHAPTER VI:

Overall Discussion

A reoccurring criticism of the leadership literature is that it suffers from construct proliferation and continues to package slight revisions of existing ideas as completely new models of leadership (Bedeian & Hunt, 2006; DeRue et al., 2011). These critiques may stem from the fact that researchers so often conceptualize leadership as the stable characteristics or behaviors exhibited by the designated managers of groups. After more than fifty years of intensive research, scholars may have virtually exhausted the list of managerial attributes it is possible to study (House & Aditya, 1997). The time is right, therefore, for approaches that acknowledge that the characteristics and behaviors of individuals in positions of formal authority represent just the tip of the iceberg that is the phenomenon of leadership, and that these behaviors are enabled and supported by larger leadership structures resulting from a multitude of acts of collaborating, facilitating, directing, and supporting (McIntosh, 1989; Fletcher & Kaufer, 2003).

Adopting shared leadership models, which conceptualize leadership as a dynamic, shared process, is one way leadership researchers have explored collective leadership processes. By reinforcing the established sociological insight that informal influence frequently emerges in group settings (Bales, 1953; Slater, 1955; Brass; 1984), and that

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receiving more informal leadership contributions tends to improve group performance (Leavitt, 1951; Sparrowe et al., 2001; Pearce & Sims, 2002; Carson et al., 2007), shared leadership research has demonstrated the limitations of traditional leadership approaches. However, shared leadership models suffer from limitations of their own: for instance, the unrealistic assumption that all group members share equally in leadership (Locke, 2003; Magee & Galinsky, 2008), an adherence to conceptualizing leadership relationships in terms of traditional leader and follower roles, and a focus on the density of leadership activity in groups at the expense of other aspects of leadership "sharedness" – for example decentralization or reciprocity (DeRue, 2011).

In this dissertation, I have attempted to advance leadership theory by extending and integrating the shared and vertical leadership models. I have done so by addressing the following three research questions: 1) How does formal hierarchy shape leadership activity in groups? 2) How can hierarchically differentiated groups promote the emergence of shared leadership? and 3) How do different patterns of emergent leadership activity in groups influence group and individual outcomes?

To address these questions I developed a conceptual model of the causes and consequences of leadership structures in hierarchically differentiated groups and tested the model with a survey-based study of clinical nursing shifts and a controlled experiment. A summary of the results of my hypothesis tests across both studies is presented in Table 51. In this chapter, I review the results of my two studies as they bear on each of my three research questions, discuss how these results contribute to organizational theory and organizational practice, highlight some dissertation-wide

limitations and strengths of my approach to studying group leadership structures, and

identify several future research directions.

Table 51. *Summary of Hypothesis Tests*

Hyp.	Summary	Study 1				Study 2			
		Outgoing	Incoming	Task-Focused	Social-Focused	Outgoing	Incoming	Task-Focused	Social-Focused
1a	Hierarchy (-) Density	**Yes**	No	**Yes**	No	No	No	No	No
1b	Hierarchy (+) Centralization	No	No	**Marginal**	No	No	**Marginal**	No	No
1c	Hierarchy (-) Reciprocity	No	No	No	**Yes**	No	No	No	No
2a	Empowering Managerial Behavior Moderates 1a	No	No	**Marginal**	No	*n/a*	*n/a*	*n/a*	*n/a*
2b	Empowering Managerial Behavior Moderates 1b	No (+ Direct Effect)	No (- Cent.)	No (+ Cent.)	No	*n/a*	*n/a*	*n/a*	*n/a*
2c	Empowering Managerial Behavior Moderates 1c	No	No	No	No	*n/a*	*n/a*	*n/a*	*n/a*
3a	Shared LSS Moderates 1a	No	No	No (+ Direct Effect)	No (- Density)	*n/a*	*n/a*	*n/a*	*n/a*
3b	Shared LSS Moderates 1b	No	No	No	No	*n/a*	*n/a*	*n/a*	*n/a*
3c	Shared LSS Moderates 1c	No (+ Direct Effect)	No (+ Direct Effect)	No	No	*n/a*	*n/a*	*n/a*	*n/a*
4a	Positive Group Mood Moderates 1a	No (+ Direct Effect)	No (+ Direct Effect)	No (+ Direct Effect)	No (+ Direct Effect)	*n/a*	*n/a*	*n/a*	*n/a*
4b	Positive Group Mood Moderates 1b	No	No	No	No (- Direct Effect)	*n/a*	*n/a*	*n/a*	*n/a*
4c	Positive Group Mood Moderates 1c	No	No	No	No (- Density)	*n/a*	*n/a*	*n/a*	*n/a*
5a	Density (+) Absorptive Capacity	No	No	**Yes**	No	No	**Yes (Info. Sharing)**	**Yes (Info. Sharing)**	**Yes (Info. Sharing)**
5b	Centralization (-) Absorptive Capacity	No	No (Curv. Sig)	No (Curv. Sig)	No	No	No	No	**Yes (Info. Sharing)**

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		Study 1				Study 2			
Hyp.	**Summary**	**Outgoing**	**Incoming**	**Task-Focused**	**Social-Focused**	**Outgoing**	**Incoming**	**Task-Focused**	**Social-Focused**
5c	Reciprocity (+) Absorptive Capacity	No	No	No	No	**Marginal**	No	No	No
6a	Density (+) Performance	No	No	**Yes (Sup. Report)**	**Yes (Staff Report)**	No	**Yes (Correct. & Quality)**	**Marginal (Quality)**	No
6b	Centralization (-) Performance	No	No	No	**Marginal**	**Yes (Correct.) Marginal (Quality)**	No	No	No
6c	Reciprocity (+) Performance	No	No	No	No (- Patient. Reported Care)	**Yes (Correct. & Quality)**	No	**Marginal (Correct.)**	No
7a	Absorptive Capacity Mediates 6a	No	**Marginal (Staff Report)**	**Yes (Staff & Sup. Report)**	No	No	**Yes**	**Yes**	**Yes**
7b	Absorptive Capacity Mediates 6b	No	No	No	No	No	No	No	**Yes**
7c	Absorptive Capacity Mediates 6c	**Marginal (Sup. Report)**	No	No	No	No	No	No	No
8a	Density (+) Task Conflict	No	No	No	No (- Staff Report)	No	No	No	No (- Conflict)
8b	Centralization (-) Task Conflict	No	No (Curv. Sig.)	No (Curv. Sig.)	No	No	No	No	No
8c	Reciprocity (+) Task Conflict	**Yes (Staff Report)**	No	No	No	**Yes**	No	No	No

		Study 1				Study 2			
Hyp.	Summary	Outgoing	Incoming	Task-Focused	Social-Focused	Outgoing	Incoming	Task-Focused	Social-Focused
9a	Density (+) Process Conflict	No (- Sup. Report)	No (- Sup. Report)	No (- Staff & Sup. Report)	No (- Staff & Sup Report)	No	No	No	No
9b	Centralization (-) Process Conflict	No	No (Curv. Sig.)	No (Curv. Sig.)	No	No	No	No	No
9c	Reciprocity (+) Process Conflict	No	No	No	No	**Yes**	No	No	No
10a	Density (-) Relationship Conflict	No (- Staff Report)	No	No (- Staff Report)	No (- Staff & Sup Report)	No	No (- Conflict)	No	**Yes**
10b	Centralization (+) Relationship Conflict	No	No (Curv. Sig)	No (Curv. Sig)	**Yes (Staff & Sup. Report)**	No	No	No	**Yes**
10c	Reciprocity (-) Relationship Conflict	No	No (+ Staff Report)	No	**Marginal (Sup. Report)**	No	No	**Marginal**	No
11a	Density (+) Growth	No	No	No	No	*n/a*	*n/a*	*n/a*	*n/a*
11b	Centralization (-) Growth	No	No	No	No	*n/a*	*n/a*	*n/a*	*n/a*
11c	Reciprocity (+) Growth	No	No	No	No	*n/a*	*n/a*	*n/a*	*n/a*
12a	Density (+) Satisfaction	No	No	No	No	No	**Yes**	**Yes**	**Yes**
12b	Centralization (-) Satisfaction	No	No	No	No	No	No	**Marginal**	**Yes**
12c	Reciprocity (+) Satisfaction	**Yes**	No	**Yes**	No	No	No	No	**Yes**

Review of Results

How Does Formal Hierarchy Shape Leadership Activity in Groups?

The results of Study 1 supported my prediction that formal hierarchical differentiation influences group leadership structures in a more "vertical" direction. However, the Study 1 results also suggested that this influence may be less comprehensive than has been traditionally assumed by leadership scholars. Specifically, the level of formal hierarchical differentiation within clinical nursing shifts was more strongly associated with the density of the shifts' leadership structures than their centralization or reciprocity. Moreover, formal differentiation was more likely to influence the shifts' outgoing, incoming, and task-focused leadership structures than their social-focused leadership structures. Finally, the results revealed that the extent to which differentiation increased the centralization of leadership activity within shifts was contingent upon the behavior of the shift members occupying designated managerial positions, although not in the manner I hypothesized. Paradoxically, shifts with high formal differentiation were most likely to develop centralized leadership structures when their designated managers engaged in high levels of empowering behavior, perhaps because this sort of behavior was interpreted as effective leadership by others in the shift, encouraging increased reliance on the "empowering" managers.

Study 2 did not provide any quantitative evidence that hierarchy produces vertical leadership structures in shifts. However, given the extensive theory and evidence that has developed in multiple research paradigms supporting the effectiveness of formal hierarchy in influencing the psychology and behavior of members of organizations

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(Parsons, 1940; Weber, 1968; French & Raven, 1959; Milgram, 1974; Magee & Galinsky, 2008; Anderson & Brown, 2010), it seems probable that the lack of support observed in Study 2 is a function of the limitations of the manipulation and/or measurement approach employed in Study 2, rather than the true absence of a relationship between formal hierarchy and group leadership patterns. Future research that employs additional or more powerful ways of establishing differences in privilege and responsibility between the designated managers and other members of groups in the formal hierarchical differentiation condition (for instance, performance-based payments to leaders), or that assesses the groups' leadership structures across multiple points in time might be better able to capture the hypothesized effects.

How can Hierarchically Differentiated Groups Promote the Emergence of Shared Leadership?

The quantitative results of my dissertation were largely inconclusive with respect to this research question. Because none of the moderators in my conceptual model were manipulated in Study 2, only Study 1 tested the efficacy of the three group-level factors (positive group mood, a shared LSS, and empowering managerial behavior) I predicted would moderate the effect of hierarchy on group leadership structures. In Study 1, none of the three factors in my conceptual model reduced the influence of hierarchical differentiation on patterns of intra-shift leadership activity. In fact, one of the factors (empowering managerial behavior), actually encouraged a *more positive* relationship between hierarchy and vertical leadership structures. Although both positive group mood and a shared LSS tended to encourage the emergence of shared leadership structures in

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nursing shifts, this effect was independent of that exerted by the shifts' formal hierarchies.

The qualitative results of Study 2, however, revealed several ways that members of groups with formal hierarchical differences might promote the sharing of leadership activities through their behavior. These results suggested that when members of groups address each other using broad, open-ended "invitation questions" rather than declarative or imperative statements, they encourage decentralized leadership participation and the construction of reciprocal, rather than unidirectional, leadership interactions. Similarly, when group members frequently enact social leadership behaviors that convey respect for others' opinions and support for their ideas, they create a mutually supportive, psychologically safe climate (Dutton & Heaphy, 2003; Edmondson, 1999) in which shared leadership structures are more likely to flourish. Finally, the qualitative data from Study 2 suggested that creating shared resources that all group members can draw from (rather than a personal resource that is controlled by just one person) may also facilitate shared leadership emergence.

How do Different Patterns of Emergent Leadership Activity in Groups influence Group and Individual Outcomes?

In both studies, I also explored the relationship between the patterns of leadership activity that developed in groups and numerous outcomes. The results suggested that the patterns of leadership activity in groups have significant consequences for the performance and well-being of groups and their members. Although the pattern of effects was strongest for information sharing and conflict, group leadership structures were

associated in significant ways with every outcome included in this study except for member psychological growth. However, the nature of these relationships was not always consistent with my predictions.

The density of group leadership structures seemed to display the most consistent pattern of direct effects with the outcomes in my conceptual model. Groups with denser leadership activity tended to have a higher level of absorptive capacity, which seemed to result primarily from the higher levels of information sharing that took place in groups with dense patterns of leadership activity. Although the results were somewhat inconsistent, higher overall level of leadership in groups also tended to display a positive relationship with group performance and group member satisfaction.

Contrary to some of my hypotheses, denser group leadership activity also displayed a relatively strong and consistent pattern of negative relationships with task, process, and relationship conflict. Further research is necessary to follow up on these findings, but they are intriguing given that increased conflict is commonly cited as a potential danger of shared leadership structures (e.g. Locke, 2003, Anderson & Brown, 2010). Perhaps one explanation for these counter-intuitive results can be found in the video data from Study 2, which suggested that the leadership behavior exhibited in groups that share leadership often takes a different form than has traditionally been conceptualized. Although members of groups that developed shared leadership structures occasionally led through declarative statements and commands, leadership influence was far more frequently exerted through subtle questioning that invited counter-proposals and additional contributions from other group members. When leadership is conceptualized in

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this way, it is easy to see how higher levels of leadership behavior might reduce task and process conflict in groups by giving all members an opportunity to share their views and contribute to establishing and shared direction and joint purpose.

Although a high density of all types of leadership activity seemed to be extremely functional for groups, the results with respect to the centralization of leadership activity were less straightforward. Centralization had only weak and inconsistent direct effects on study outcomes. However, supplemental analyses in Study 1 revealed several (non-hypothesized) curvilinear relationships between centralization and outcomes, particularly conflict and absorptive capacity. The pattern of these relationships was such that groups with intermediate levels of centralization tended to experience less conflict and possess higher levels of absorptive capacity than groups whose leadership activity was either highly centralized or highly decentralized. These findings suggest that the optimal pattern of leadership activities in some groups may be a "hybrid" model, in which leadership influence is neither totally controlled by designated managers, nor totally shared among group members. Although more research is necessary before firm conclusions can be drawn, it is possible that hybrid leadership structures enable groups to reap both the clear lines of communication and control offered by formal hierarchy (Weber, 1968; Magee & Galinsky, 2008; Anderson & Brown, 2010), and also the benefits with respect to adaptability and motivation that have been associated with shared, informal leadership (Leavitt, 1951; Etzioni, 1965; Dalton, 1959; Scott & Davis, 2007; Carson et al., 2007; Day et al., 2009).

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Across both studies, there was also a fairly consistent (non-hypothesized) pattern of interactions that emerged between the density and centralization of group leadership activity. In many cases, the value of dense patterns of leadership activity depended upon whether that activity was dispersed or relatively centralized. Although there was some variation in the pattern of the density-centralization interaction across different outcomes and types of leadership activity, two general trends emerged. First, leadership structures that were both low in density and low in centralization (in other words, that had little overall leadership activity and no emergent leaders) were dysfunctional for groups with respect to virtually all outcomes. Second, in many cases the benefits of dense leadership structures were contingent upon the centralization of these structures. High-density leadership structures tended to be most beneficial to groups in which leadership was also decentralized, perhaps because high levels of both leading and responding assisted groups in carrying out the more complex, informal patterns of coordination described by shared leadership models. However, in groups with highly centralized leadership structures, increases in leadership density tended to have a null or negative association with outcomes, perhaps because in these groups extraneous leadership activity from individuals who did not emerge as leaders distracted from the leadership enacted by the groups' few emergent leaders, or represented confusion among group members about who they should be following.

The reciprocity of group leadership structures came closest to displaying the predicted pattern of relationships with study outcomes, although the effects of reciprocity were relatively weak and inconsistent compared to those of density. Leadership

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reciprocity tended to be positively associated with absorptive capacity (and/or information sharing) and member satisfaction, have a null relationship with relationship conflict but a positive relationship with task and process conflict, and have a positive relationship with group performance. Interestingly, the reciprocity of outgoing leadership structures was more consistently related to outcomes than the reciprocity of incoming, task-focused, or social-focused leadership activity. As I discuss below, there are also very real limitations to the approach to measuring leadership reciprocity used in this study, and it may be that developing a more sophisticated measure of reciprocity would enhance future researchers' ability to understand its effects.

Theoretical Contributions

In this section, I summarize the major contributions of this dissertation to organizational theory. First, this research extends efforts to describe the micro-level interactional and relational dynamics underlying the formation of macro-level social structures (Weick, 1979; Giddens, 1986), and in particular leadership structures (Uhl-Bien, 2006; DeRue & Ashford, 2010; DeRue, 2011). My theoretical development and empirical studies provide new insights into how, over time, stable patterns of leadership interaction develop between members of groups, and how these leadership relationships form the foundations of group-level leadership structures. By highlighting the importance of dyadic relationships in the leadership process, this work provides additional theoretical scaffolding supporting the use of social network analysis to study leadership activity in groups. Although the potential to apply network methodology to better understand leadership dynamics is great (Denis, Langley, & Sergi, 2012), network analysis has been criticized for being "a set of techniques and measures devoid of theory" (Brass, 2012, pg. 681). In this dissertation, I explain theoretically what the network measures of group leadership activity represent at a micro-level, and I introduce, explain and test the impact of a new network concept (reciprocity) in predicting group outcomes. I also present qualitative descriptions of how different types of leadership structures are created by fundamentally different micro-level interactional moves.

This study also makes significant strides by considering the influence of several different types of group leadership activity. Although the early small group studies examined task-focused and social-focused leadership activity in groups separately (Bales,

1953; Slater, 1955), contemporary network-based leadership research focuses almost exclusively on the extent to which individuals are viewed as leaders by others. In this dissertation, I drew on my theoretical explication of leadership structures to identify four different types of leadership networks to include in my empirical analyses. My results suggest that there are benefits to this more nuanced approach. While there were positive correlations between the four types of leadership structures I measured, these correlations tended to be only moderate in size and occasionally the various types of leadership structures displayed different relationships with antecedents and outcomes. For instance, the reciprocity of outgoing leadership activity was a more significant predictor of study outcomes than the reciprocity of any other type of leadership, and social-focused leadership tended to have the most consistently negative relationships with task, process, and relationship conflict. Incoming and task-focused leadership activity, however, generally tended to be highly correlated and have very similar relationships with study outcomes. Thus, this dissertation contributes to leadership theory by beginning to catalogue, compare, and contrast the effects of different dimensions of group leadership activity.

Additionally, this study is one of the first to theoretically explicate and empirically test the relationship between formal hierarchical differentiation and group leadership structures. While leadership scholars have traditionally assumed that formal hierarchy totally dictates groups' leadership activity (to the extent that the "leaders" studied in leadership research are usually designated managers), this assumption is often implicit. As such, little theory exists to explain the mechanisms through which formal

hierarchy impacts leadership activity in groups, or what the boundary conditions of this relationship might be. In this dissertation, I have explained theoretically why hierarchy should encourage more vertical patterns of leadership activity in groups. However, I have also provided empirical evidence to suggest that the relationship between hierarchy and the patterning of leadership activity in groups as much more limited and contingent than is typically portrayed in leadership theories.

In explaining and demonstrating the influence of hierarchy on leadership activity in groups, this dissertation also takes important steps towards theoretically integrating the shared and vertical leadership models. Currently, leadership studies tend to either assume leadership is completely centralized, or completely shared, with little consideration of the potential for a middle ground (although see Pearce & Sims, 2002; Zhang et al., 2012). However, both of these assumptions are unrealistic. In few, if any, groups, does only one person fulfill all leadership responsibilities, just as in few, if any, groups do all members fully engage in leadership activities. By identifying both the influence of hierarchy on intra-group leadership dynamics, and also the boundary conditions of this effect, this study integrates and extends both vertical and shared leadership theory. Moreover, the curvilinear and interaction effects I uncovered could serve as a foundation for the development of hybrid leadership models which acknowledge that, although some degree of leadership sharing may be beneficial for groups, the information sharing and conflict resolution benefits provided by having a relatively small number of individuals fulfill a disproportionate amount of a groups' leadership activities may also be significant.

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Finally, this dissertation contributes to leadership theory by providing a more comprehensive consideration of the consequences of group leadership structures than has been available to date. I replicate previous findings that dense leadership activity in groups tends to be functional, but extend those findings by showing that the benefits of density are at times contingent upon the distribution (or centralization) of leadership activity within a group. Moreover, while some have pointed to the potential for shared leadership activity to result in increased conflict, my results generally do not support this possibility. Rather, I find that leadership structures that are dense and have a moderate level of centralization are highly effective at reducing the level of task, process, and relationship conflict in groups. Finally, I provide some initial (albeit modest) support for the assertion that, in addition to being beneficial for collectives, shared leadership structures tend to result in positive consequences for their members, in the form of increased work satisfaction.

Practical Implications

In addition to its theoretical significance, this dissertation has several important practical implications for both managers and non-managers in organizations. For managers, the results of this study should encourage movement beyond the largely individualistic thinking that characterizes popular perspectives on leadership effectiveness and development. Current approaches emphasize the personal qualities (e.g. traits, behaviors, life experiences, values) of individual leaders as being paramount to leadership effectiveness. Appoint the right people to designated leadership positions (Fiedler, 1996), the thinking goes, and ensure they have access to the appropriate training

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and developmental opportunities (DeRue & Wellman, 2009; Dragoni et al., 2009), and all that remains to be done is sit back and reap the benefits. The results of this dissertation, however, suggest that the personal qualities and developmental opportunities of individuals only tell part of the story with respect to leadership effectiveness. It is also important to better understand the collective leadership capabilities of groups, and how these capabilities might be enhanced.

For example, identifying a highly motivated, skilled, and charismatic individual leader may be less valuable to an organization if that person is the single leader in a vertical leadership structure in a context in which shared leadership is more appropriate. Ironically, my results suggest that appointing such a highly motivated, competent individual to a designated leadership position in this sort of environment would actually tend to encourage the formation of the very sort of vertical leadership activity that would ultimately prove ineffective. As such, organizations should move beyond a focus on identifying and developing individual leaders, and towards an increased focus on developing effective leadership *systems*. This might involve assessing the blend of personalities within a group, the type of tasks the group works on, and the nature of the groups' external environment, and determining whether a shared, vertical, or hybrid leadership structure would best help coordinate group actions in light of these conditions. Organizations could then design whole-group interventions to help group members discuss the actual leadership dynamics within their group, as well as how to move those dynamics closer to the optimal pattern.

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While the managerial implications of this dissertation are important, the vast majority of working individuals today are members of hierarchically differentiated groups in which *someone else* is the designated manager. The current leadership literature offers many suggestions and recommendations targeted at designated managers, but it is largely silent on whether and how individuals not formally designated as leaders can contribute to fulfilling their groups' leadership responsibilities. Thus, it is also worth spending a few moments to review the implications of this project for lower-ranking members of organizations. My quantitative results suggest that individuals without formal leadership designations can and frequently do contribute in important ways to fulfilling their groups' leadership functions. Moreover, the results of my exploratory video analysis suggest several ways in which individuals can help create shared leadership dynamics in their group, to the benefit of themselves and others. By framing their task-focused suggestions and ideas in the form of questions, individuals can direct the attention of the group to important task-related issues without appearing to compete for leadership control of the group. Further, by engaging in social-focused leadership behavior, which in this dissertation was relatively uninfluenced by formal hierarchical dynamics, individuals can encourage the development of more effective groups, more satisfied co-workers, and more shared task-focused leadership activities.

Dissertation-Wide Limitations and Strengths

The above contributions notwithstanding, the approach to understanding group leadership structures developed this dissertation is subject to some high-level limitations. Although this study represents the most comprehensive assessment of group leadership

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structures conducted to date, and although the network survey items used emerged as the

result of a comprehensive, theory-based development process (Hinkin, 1995; 1998), each

type of leadership structure included in this study was assessed using a single-item

measure. While using single-item measures is customary in social network research

(Kilduff & Tsai, 2003), and allows researchers to minimize survey length and thereby

improve response rates (Bednar & Westphal, 2006), the reliability (Wanous & Reichers,

1996), and content validity (Gosling, Rentfrow, & Swann, 2003) of one-item measures

can be questionable.

To some extent, reliability concerns are mitigated by the fact that consistencies

emerged in the patterns of results reported across both studies in this dissertation. The

validity concerns are more significant, however. My incoming leadership measure has

been used in multiple network-based leadership studies published in peer-reviewed

journals (e.g. Mehra et al., 2006; Carson et al., 2007), and the outgoing leadership

measure was a slight modification of the incoming item. As such, validity concerns for

those measures should be relatively minimal. However, the validity of my measures of

task-focused and social-focused leadership structures is worthy of additional discussion.

One source of validity concerns related to these measures may be the belief that

the task-focused and social-focused behaviors I described in my theoretical development

are not actually leadership. While task and social activities have long been considered

leadership when enacted by designated managers (Stogdill, 1963; Blake & Mouton,

1978; Fiedler, 1967), there may be doubts as to whether, when performed by non-

managers, they represent leadership or some other construct [e.g. taking charge behavior

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(Morrison & Phelps, 1999), teamwork (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008), or respectful engagement (Baker & Dutton, 2007)]. While it is impossible to resolve this debate in the context of this dissertation, and while there are certainly areas of overlap between informal task-focused and social-focused leadership behaviors as I have described them and other constructs in the micro OB literature, two lines of reasoning support the present approach.

First, the belief that task-focused and social-focused behaviors constitute leadership when enacted by designated managers, but do not constitute leadership when enacted by others, entails that the most important component of leadership behavior is not the content of the behavior, nor its effect on others, but *the formal role of the individual enacting the behavior*. Thus, the belief aligns with traditional approaches that assume leadership arises only from the activities of formal authority figures. However, this assumption is highly questionable in light of both the dominant conceptual definition of leadership, which describes the phenomenon as an influence process and makes no mention of formal roles, and of the substantial evidence summarized in this dissertation that suggests individuals who do not occupy formal managerial positions frequently engage in leadership activity and are perceived by others as leaders (e.g. Bales, 1953; Bavelas et al., 1965; Dalton, 1959; Brass, 1984; Sparrowe, 2005; Carson et al., 2007). If the scientific study of leadership is to move beyond an exclusive focus on designated managers, it is therefore imperative that it establish a set or sets of behaviors that produce leadership, *regardless of who they are enacted by*.

Second, evolutionary evidence suggests that the task-focused and social-focused behaviors described in this dissertation are the two types of behavior most deeply linked to leadership influence. This evidence, which is nicely summarized by Van Vugt and colleagues (Van Vugt, 2006; Van Vugt, Hogan, & Kaiser, 2008), has established that some form of leadership (defined as a process of social influence through which individuals coordinate their actions to achieve shared goals) is evident in all known human societies, as well as many animal species. An evolutionary analysis suggests leadership is so pervasive because it offers groups that adopt it evolutionary advantages. In other words, "the emergence of leadership is fine-tuned to specific coordination problems that humans have faced across evolutionary history" (Van Vugt, 2006, pg. 356). Perhaps the two most fundamental group coordination needs are to establish a shared direction and maintain group cohesion. In the case of our ancestors, early hominid groups that could not collectively determine where to move next, and/or prevent conflicts between group members from causing some members to leave the group, were unlikely stay together, reducing their members' chance of survival. The task-focused and social-focused influence behaviors I have described in this dissertation help modern groups resolve those same two coordination problems. Task-focused behaviors help groups establish and maintain a shared direction with respect to their work activities, while social-focused behaviors help maintain group cohesion. Thus, task-focused and social-focused behaviors would seem to be an appropriate starting point in moving beyond formal roles and overall leadership perceptions to identify the tangible behaviors responsible for producing leadership influence.

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The most significant validity concern related to the leadership structure measures used in this dissertation, therefore, is whether the items that I developed to measure task-focused and social-focused leadership behavior adequately assessed the content domains of those two constructs. The available evidence bearing on this concern is mixed. On one hand, in Study 1, the density of both task-focused and social-focused leadership structures displayed strong positive correlations with the density of incoming leadership structures, suggesting that the two measures were related to individuals' overall leadership perceptions. To further test the content validity of the task-focused and social-focused items, I conducted a validation study of 198 working individuals recruited via Amazon Mechanical Turk. In this study, I compared the task-focused and social-focused items used in this dissertation with longer, more established measures of task-focused and social-focused leadership behavior. Participants were asked to recall the most recent leader they had worked for and rate that person using the incoming, task-focused, and social-focused measures used in this study, as well as the Initiating Structure ($\alpha = .86$) and Consideration ($\alpha = .89$) scales from the Leadership Behavior Description Questionnaire (Stogdill, 1963) and the Define Mission ($\alpha = .93$) and Support Social Climate ($\alpha = .92$) subscales from the Team Leadership Questionnaire (TLQ, Morgeson et al., 2010). The task-focused network item displayed strong positive correlations with both task-focused leadership scales included in the validation study (Initiating Structure $r = .69$, $p < .001$; Define Mission $r = .58$, $p < .001$), as well as the incoming leadership network measure ($r = .69$, $p < .001$) and perceptions of leadership effectiveness ($r = .69$, $p < .001$). Similarly, the social-focused network item displayed strong positive

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correlations with both social-focused leadership scales included in the validation study (Consideration $r = .70$, $p < .001$; Support Social Climate $r = .73$, $p < .001$), as well as the incoming leadership network measure ($r = .47$, $p < .001$) and perceptions of leadership effectiveness ($r = .71$, $p < .001$). While the likelihood that these correlations were inflated due to common method bias is high (Podsakoff et al., 2003), the validation study offered additional support for the argument that the task-focused and social-focused items used in this dissertation provided accurate, if high-level, assessments of the larger constructs of task-focused and social-focused leadership behavior.

On the other hand, comparing the quantitative network data from Study 2 with my qualitative analysis of the video data suggested that, at least with respect to social-focused leadership behavior, group members' responses to the network items did not accurately describe the actual leadership activity that occurred within the groups. Specifically, consistent with Lord's (1977) observations, I noticed a relatively low level of social-focused leadership behavior (compared to task-focused behavior) in the problem-solving groups in Study 2. However, participants' responses to the network items indicated that there tended to be *more* social focused leadership activity than task-focused activity in their groups. Thus, it may be that the nature of the social-focused measure ("to what degree does this individual demonstrate respect and concern for you") was such that individuals tended to give anyone who did not explicitly *disrespect* them fairly high scores. As discussed below, these findings suggest it will be important for future research to explore the psychometric properties of the task-focused and social-focused leadership measures developed in this study in more detail.

Another limitation of the overall approach adopted in this dissertation is that the quantitative data in both studies were cross-sectional, and therefore describe only relationship partners' overall tendencies with respect to their leadership interactions. Supporting the appropriateness of this approach, prior research suggests that, over time, stable and enduring patterns of leading and following do tend to develop within groups and between individuals (Bales et al., 1951; Hollander, 1985; Anderson et al., 2001; Graen & Uhl-Bien, 1995). Nevertheless, the cross-sectional nature of the measurement of leadership structures in this dissertation makes it ill-suited to address important questions related to change, either with respect to moment-to-moment fluctuations (as were evidenced in Study 2 when groups tended to exhibit different leadership structures in different phases of the problem-solving task), or more permanent evolution over time. To more fully understand group leadership structures, it will be important for future research to explore the issue of structural change and adaptation in more detail. A qualitative approach such as that adopted by Klein and colleagues (2006), or a longitudinal survey with network data collected at multiple points in time would be better suited to this effort than the methodology adopted here.

Moreover, while my theorizing suggested that leadership influence results from a two-part interact between individuals, each of my network leadership measures only assessed one part of that interact. The measure of outgoing leadership activity captured participants' leadership attempts, but not whether the targets of these attempts responded to them in a relevant, supportive way. In contrast, the measures of incoming, task-focused, and social-focused leadership assessed individuals' responses to what they

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perceived as others' leadership, but not whether those others consciously attempted to engage in leadership behavior. It was difficult to capture both components of the leadership interact I described in a single item that was not double-barreled, and even a single-barreled item would be difficult to interpret (Edwards, 1995). So, I elected to measure the two components of successful leadership interactions with separate items. While this compromise enabled me to explore the causes and consequences of each of the components of leadership interactions individually, and while to some extent the reciprocity measure I used offers a high-level description of the nature of leadership interactions between members of a group, the disconnect between theory and measurement resulting from my choice to use discrete items to measure leadership attempted and received is certainly a limitation of this research.

Additionally, although the reciprocity metric developed for this study enabled one of the first consideration of the impact of mutual leadership dynamics on group outcomes, the measure itself is not without limitations. The most significant limitation is that the reciprocity index was calculated by summing difference scores, and thus is subject to many of the psychometric limitations associated with the use of difference scores in organizational research, including low reliability and a limited ability to consider the absolute level of the items being compared (in this case, two group members' ratings of each others' leadership; see Edwards, 1995). It will be important for future research interested in empirically assessing the results of leadership reciprocity to improve upon the measurement approach developed in this dissertation. One option might be to adopt a procedure similar to that used by Mehra and colleagues (2006), who

coded for mutual leadership relationships between formal and informal leaders by visually inspecting network diagrams. Alternatively, some variety of the polynomial regression approach advocated by Edwards and colleagues (Edwards & Parry, 1993; Edwards, Ostroff, & Judge, 2007) might prove useful, although the computations required to conduct the requisite analyses across an entire matrix of network data would be formidable.

Finally, in assessing the causes and consequences of group leadership structures, this study considered the four types of leadership structures (incoming, outgoing, task, and social) independently. I stopped short of exploring the possibility for relationships between, for example, task and social leadership structures, nor did I consider which structures would be most predictive of study outcomes when all four types were considered simultaneously (Johnson & LeBreton, 2004). My decision to analyze the data in this manner was in part due to the fact that, because many of the leadership structures considered in this dissertation have not been previously studied, little *a-priori* theoretical rationale existed for predicting the relative importance of one type of structure over another. The decision was also based on study scope: the number of analyses described in this dissertation is quite large, and to introduce the possibility for joint effects or interactions between the various types of leadership structures would have rendered it nearly impossible to report the results a parsimonious fashion. Nevertheless, the presence of significant correlations between the various leadership structures measured in this study, combined with the finding from my exploratory video analysis that social-focused leadership behavior sometimes encourages more shared task-focused leadership

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structures suggests that exploring the relationship between the various types of leadership structures I have identified, as well as their relative importance in predicting group and individual outcomes, would be a valuable enterprise for future research.

The limitations of this dissertation, however, must be considered in light of its considerable strengths. This research represents one of the most comprehensive investigations of group leadership structures conducted to date. It advances both our theoretical understanding of these structures and our ability to measure them using social network analysis. Adopting a network-based approach allowed me to analyze the patterns of leadership activity that develop in groups with a greater level of specificity than has ever been achieved before, creating a rich picture of the causes and consequences of group leadership structures. This study is also one of the first to consider how leadership structures are impacted by formal hierarchical differentiation, and by revealing the limited influence of formal hierarchy on emergent leadership activity it has the potential to change the way both scholars and practitioners think about and talk about leadership. Moreover, I tested my conceptual model across multiple contexts and using multiple methodologies, which enabled triangulation across the two studies in this dissertation and greater confidence in the generalizability of the reported results (Singleton & Straits, 1999).

Future Research Directions

The theory, results, and limitations of this dissertation suggest several important initiatives for future research. First, it is critical to take steps to address the limitations of the network leadership measures used in this study, either by more thoroughly

establishing the validity of these measures or by creating improved ones. The development of relatively short and comprehensively validated measures of informal leadership behavior is essential if leadership research is to continue to progress beyond vertical models and their associated limitations. For instance, it would be valuable for future studies to compare the performance of one-item and slightly longer (e.g. three-item) network-based measures of leadership structures, to determine if longer measures would better assess the content domain of the underlying constructs. Moreover, it will be important to investigate whether, and how, the enactment of task-focused and social-focused behaviors by non-designated leaders influences the overall leadership perceptions of other NDLs. Research that more convincingly established that individuals who enact higher levels of task-focused and social-focused leadership behavior are more likely to be perceived by their peers as informal leaders would strike a significant blow against criticisms that informal task-focused and social-focused influence behaviors do not actually constitute leadership.

In a similar vein, once network measures of task-focused and social-focused leadership are more thoroughly validated and more widely accepted, it will be important to begin to compare and contrast the properties of group leadership structures with the properties of other, more widely researched types of social networks. It seems likely, for instance, that task-focused leadership structures are related in some ways to the advice (McDonald & Westphal, 2003), or influence (Friedkin & Johnsen, 1997) networks that have been the subject of many prior network studies. Similarly, social-focused leadership structures may have "ties" to groups' friendship (Gibbons, 2004) or energy (Baker,

Cross, & Wooten, 2003) networks. More thoroughly integrating network-based

leadership approaches with the larger networks literature has the potential to not only

advance our understanding of informal leadership, but also eventually to make valuable

contributions to our understanding of more general network phenomena. A similar

integration effort should also be undertaken between informal leadership behavior and

the more "micro" types of coordination behavior identified by proactivity (Morrison &

Phelps, 1999; Grant & Ashford, 2008) and teamwork (Taggar & Brown, 2001; Burke,

Stagl, Salas, Pierce, & Kendall, 2006; LePine et al., 2008) researchers.

The qualitative results from Study 2 suggest that it would also be beneficial to

develop a more complete understanding, and way of measuring, the interactional moves

underlying leadership construction. DeRue and Ashford (2010) laid important

foundations for this effort with their discussion of the "claiming and granting" process

that leads the emergence of leadership identities within groups. However, DeRue and

Ashford's theory was rather vague about what claiming and granting behaviors actually

entail, and thus was generalizable at the expense of being specific (and, perhaps,

falsifiable). Interestingly, the interactional moves I identified in Study 2 were not

traditional leadership behaviors, nor were they established leadership structures. Rather,

they were specific, concrete, *structuring* behaviors (that is, behaviors that tended to

encourage the development of a particular type of structure). Additional investigation and

explication of these behaviors would be extremely valuable.

The results of Study 1 also suggest the importance of more fully investigating and

explaining hybrid leadership structures that blend the properties of two or more "pure-

type" leadership models. The extant research and theory pertaining to leadership structures has primarily focused on identifying and testing pure-type models. For instance, traditional leadership studies test the effectiveness of the vertical leadership model, shared leadership studies test the totally shared leadership model, and existing taxonomies of leadership structures (Mayo et al., 2003, DeRue, 2011) compare the properties of various pure-type structures. However, the results reported here suggest that, in some cases, the leadership structures most capable of coordinating outstanding group performance combine features of multiple pure type models. More fully exploring what these hybrid structures look like, what their benefits and drawbacks are, and what contextual or interpersonal conditions promote their emergence, is a critical task for future research.

Finally, the issue of leadership structure change and fluctuation across time and task phases is one that is well deserving of additional research attention. My Study 2 results suggest that, while groups do tend to develop consistency in their leadership patterns, they also tend to organically adapt their leadership structures to meet the coordination demands of shared tasks. It therefore is possible that not only do shared leadership structures facilitate group performance on ambiguous tasks high in interdependence, but also that groups are likely to adopt leadership structures that are more shared when they are confronted with those types of tasks (Thompson, 1967; Drazen & Van de Ven, 1985). Although I did not measure these sorts of contingency-based fluctuations in this dissertation, it seems likely that the nursing shifts in Study 1 for example, might have adopted one type of leadership structure when activity in the unit is

"normal" and a different type of structure when faced with a setback or an emergency. Thus, more closely tracking group leadership structures over time would offer scholars greater insight into the prevalence and efficacy of leadership structure development and change.

Conclusion

The inimitable James MacGregor Burns once wrote: "traditional conceptions of leadership tend to be so dominated by images of presidents and prime ministers speaking to the masses from on high that we may forget that the vast preponderance of personal influence is exerted quietly and subtly in everyday relationships" (Burns, 1978, pg. 442). This statement is perhaps more true today than it has ever been before. With my dissertation, I join an emerging body of scholars who believe leadership should be conceptualized and studied not as a title that is bestowed on individuals as a result of their formal position, but as a process that is co-created through the efforts of multiple individuals pushing each other towards common goals. At the present time, leadership researchers are still in the process of grappling with the theoretical and methodological challenges presented by this dramatic change in perspective. While the present research does not address all of these challenges, it does make important strides towards a more complete understanding of the nature, causes, and consequences of the reoccurring patterns of leadership influence in groups.

APPENDIX 1

Network Measures of Task-Focused and Social-Focused Leadership Structures

<u>Task-Focused Items</u>

To what degree does this person let you know what is expected of you? (.83)

To what degree does this person define and emphasize expectations for your work? (.77)

<u>Social-Focused Items</u>

To what degree does this person demonstrate respect and concern for you? (.83)

To what degree does this person look out for your personal welfare? (.82)

To what degree does this person do little things to make it pleasant to be a member of your group? (.78)

To what degree does this person go beyond his or her own interests for the good of the group? (.73)

Note. Factor loadings in parentheses. Bolded items used as measures of task and social-focused leadership structures.

APPENDIX 2

Study 1: Survey Materials

First Survey[8]

1. **What unit do you work in? (Select from drop-down menu)**

2. **What shift in** *<insert unit name>* **do you work in? (Select from list)**

3. **What is your name? (Select from list)**

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[8] * = Item is reverse-coded

4. The items in this section measure your beliefs about leadership in groups. Please indicate the extent to which you disagree or agree with each statement.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Groups work best when leadership is shared among multiple group members.	1	2	3	4	5
2. Groups work best when there is a single leader in the group. *	1	2	3	4	5
3. Leadership in groups is most effective when one person takes charge of the group. *	1	2	3	4	5
4. Groups are often led by multiple individuals	1	2	3	4	5
5. Groups perform best when all members of the group take responsibility for leading the group.	1	2	3	4	5

The following items ask about leadership within your shift. In responding to these items, please keep in mind that the individuals you perceive as leaders may or may not be officially designated as leaders by your organizations' management. Your responses will be kept strictly confidential and only aggregate, group-level responses will be reported to management. As such, please be an honest and candid as possible in reporting.

Please respond to the following items by selecting a value next to the name of each of the individuals on your shift. You do not need to select a value next to your own name.

1. To what degree do you *engage in* leadership towards this person?

A very large degree
A large degree
A moderate degree
Slightly
Not at all

		1	2	3	4	5
1.	Name 1	1	2	3	4	5
2.	Name 2	1	2	3	4	5
3.	Name 3	1	2	3	4	5
4.	…	1	2	3	4	5

2. To what degree do you *rely on* this person for leadership?

A very large degree
A large degree
A moderate degree
Slightly
Not at all

		1	2	3	4	5
1.	Name 1	1	2	3	4	5
2.	Name 2	1	2	3	4	5
3.	Name 3	1	2	3	4	5
4.	…	1	2	3	4	5

3. To what degree *does this person* demonstrate respect and concern for you?

	A very large degree				
		A large degree			
			A moderate degree		
				Slightly	
					Not at all

	A moderate degree / Not at all scale				
1. Name 1	1	2	3	4	5
2. Name 2	1	2	3	4	5
3. Name 3	1	2	3	4	5
4. …	1	2	3	4	5

4. To what degree *does this person* let you know what is expected of you?

	A very large degree				
		A large degree			
			A moderate degree		
				Slightly	
					Not at all

1. Name 1	1	2	3	4	5
2. Name 2	1	2	3	4	5
3. Name 3	1	2	3	4	5
4. …	1	2	3	4	5

6. IN THE PAST MONTH, to what extent did members of your shift typically experience the following emotions?

	A very large amount				
		A large amount			
			A moderate amount		
				Slightly	
					Not at all

1. Happy	0	1	2	3	4
2. Delighted	0	1	2	3	4
3. Glad	0	1	2	3	4
4. Cheerful	0	1	2	3	4
5. Pleased	0	1	2	3	4
6. Warmhearted	0	1	2	3	4

7. Please indicate the extent to which you disagree or agree with the following statements. Again, your individual responses to these statements will be kept strictly confidential and only group-level information will be reported to management, so please be as honest and candid as possible in responding.

"The designated manager of my shift..."

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	Gives my shift many responsibilities.	1	2	3	4	5
2.	Makes my shift responsible for what it does.	1	2	3	4	5
3.	Asks the shift for advice when making decisions.	1	2	3	4	5
4.	Uses shift advice and suggestions when making decisions.	1	2	3	4	5
5.	Controls much of the activity of the shift. *	1	2	3	4	5
6.	Encourages my shift to take control of its work.	1	2	3	4	5
7.	Allows my shift to set its own goals.	1	2	3	4	5
8.	Encourages my shift to come up with its own goals.	1	2	3	4	5
9.	Stays out of the way when the shift works on its performance problems	1	2	3	4	5
10.	Encourages my shift to figure out the causes/solutions to its problems.	1	2	3	4	5
11.	Tells the shift to expect a lot from itself.	1	2	3	4	5
12.	Encourages my shift to go for high performance.	1	2	3	4	5
13.	Trusts my shift.	1	2	3	4	5
14.	Is confident in what my shift can do.	1	2	3	4	5

8. Please indicate the extent to which you disagree or agree with the following statements about the work in your shift.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1 My job activities in this shift are greatly affected by the work of other people.	1	2	3	4	5
2 The work in this shift depends on many different people for its completion.	1	2	3	4	5
3 My job cannot be done unless others in my shift do their work.	1	2	3	4	5
1 There is a great deal of variety in the work performed by my shift.	1	2	3	4	5
2 Members of my shift must use a number of complex or sophisticated skills to complete their work.	1	2	3	4	5
3 The work in this shift is quite simple and repetitive.*	1	2	3	4	5

9. Finally, please provide a little information about yourself

Age? (Select from drop-down list).

Gender?

    a) Male

    b) Female

Which of the following BEST describes your ethnic or racial background?

    a) African American

    b) Asian American

c) Caucasian/White

d) Hispanic/Latino/a

e) Native American

f) Biracial

g) Other

How many years have you worked at *<insert hospital name>*? (Select from drop-down list).

How many years have you worked in your current shift? (Select from drop-down list).

Please select the option below that best describes your level of formal education:

1. High school graduate

2. Vocational/certification program (e.g. Medical assistant, nursing assistant)

3. Some college

4. College degree (includes LPN, ASN, BSN)

5. Masters degree (includes NP)

6. MD/PhD

1. **What unit do you work in? (Select from drop-down menu)**

2. **What shift in *<insert unit name>* do you work in? (Select from list)**

3. **What is your name? (Select from list)**

4. **The following items assess *your own* attitudes about work. Please select the value next to each statement that reflects the extent to which you disagree or agree with the statement. Your individual responses will be kept confidential, so please be as open and honest as possible in responding.**

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	I am not interested in work activities that will expand my horizons.	1	2	3	4	5
2.	I think it is important to have work experiences that challenge how I think about myself and the world.	1	2	3	4	5
3.	When I think about it, I haven't really improved much as an employee over the years.	1	2	3	4	5
4.	For me, work has been a continuous process of learning, changing, and growth.	1	2	3	4	5
5.	I gave up trying to make improvements or changes at work a long time ago.	1	2	3	4	5
6.	I does not enjoy being in new situations at work that require him/her to change his/her old familiar ways of doing things.	1	2	3	4	5
7.	I have a sense that I have developed a lot as an employee over time.	1	2	3	4	5

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[9] * = Item is reverse-coded.

5. Job satisfaction

	Very satisfied			
	Satisfied			
	Neutral			
	Dissatisfied			
	Very dissatisfied			
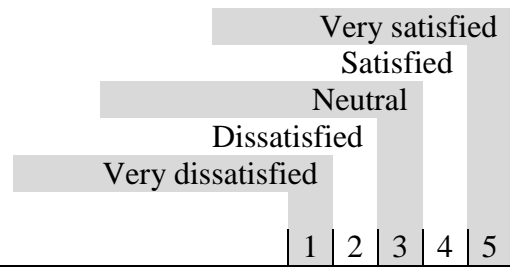
1. How satisfied are you with your job?	1	2	3	4	5

2. Please select the face below that best represents how satisfied you are with your job.


```
11    10    9    8    7    6    5    4    3    2    1
```
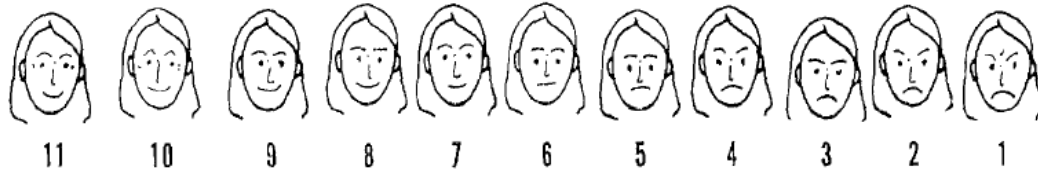
6. The following items assess your perceptions of conflict within your shift. Your individual responses will be kept confidential, so please be as open and honest as possible in responding.

		Not at all	A small amount	A moderate amount	A large amount	A very large amount
1.	How much friction is there among members of your work unit?	1	2	3	4	5
2.	How much are personality conflicts evident in your work unit?	1	2	3	4	5
3.	How much tension is there among members of your work unit?	1	2	3	4	5
4.	How much emotional conflict is there among members of your work unit?	1	2	3	4	5
5.	How often do people in your work unit disagree about the work being done?	1	2	3	4	5
6.	How frequently are there conflicts about ideas in your work unit?	1	2	3	4	5
7.	How much conflict about the work you do is there in your work unit?	1	2	3	4	5
8.	To what extent are there differences of opinion in your work unit?	1	2	3	4	5
9.	How often do members of your work unit disagree about who should do what?	1	2	3	4	5
10.	How frequently do members of your work unit disagree about the way to complete a group task?	1	2	3	4	5
11.	How much conflict is there about the delegation of tasks within your work unit?	1	2	3	4	5

7. To what extent do the members of your shift perform the following activities?

	A very large amount				
		A large amount			
			A moderate amount		
				Slightly	
					Not at all
1. Find out what other shifts are doing to manage patients?	1	2	3	4	5
2. Scan the environment outside the shift for ideas about how to improve?	1	2	3	4	5
3. Collect information and/or ideas from individuals outside the shift about ways to effectively use technology?	1	2	3	4	5
4. Scan the environment outside the shift for ways to improve the patient experience?	1	2	3	4	5

8. Please indicate the extent to which you disagree or agree with the following statements about your shift.

	Strongly agree				
		Agree			
			Neither agree nor disagree		
				Disagree	
					Strongly disagree
1. Members of this shift usually share information and do not keep information to themselves.	1	2	3	4	5
2. Members of this shift inform each other on different work issues.	1	2	3	4	5
3. Members of this shift really try to exchange information and knowledge.	1	2	3	4	5
4. Members of this shift always look for different interpretations and perspectives to confront a problem.	1	2	3	4	5

7. Please indicate the extent to which your shift has implemented the following innovations.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	Initiated new procedures or methods of working.	1	2	3	4	5
2.	Developed innovative ways of accomplishing its work targets and objectives.	1	2	3	4	5
3.	Developed new skills in order to foster innovations.	1	2	3	4	5
4.	Initiated improved teaching strategies and methods.	1	2	3	4	5

8. The following items ask you to assess your shifts' performance. Please indicate the extent you disagree or agree with each statement by selecting a value next to each item.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	Overall, this shift provides outstanding care to its patients.	1	2	3	4	5
2.	This shift is responsive to the needs of individual patients.	1	2	3	4	5
3.	This shift provides its patients with service in a timely manner.	1	2	3	4	5
4.	This shift makes many errors in treating its patients.*	1	2	3	4	5
5.	This shift's patients are typically satisfied with the quality of the care they receive.	1	2	3	4	5

1. **What is your name?** _____

2. **Please provide your impressions of the shifts that report to you by responding to the following items. Try to distinguish between shifts as much as you can. Please answer as openly and honestly as possible to ensure accurate conclusions.**

		None	A small amount	A moderate amount	A large amount	A very large amount
1.	How much friction is there among members of this shift?	1	2	3	4	5
2.	How much are personality conflicts evident in this shift?	1	2	3	4	5
3.	How much tension is there among members of this shift?	1	2	3	4	5
4.	How much emotional conflict is there among members of this shift?	1	2	3	4	5
5.	How often do people in this shift disagree about the work being done?	1	2	3	4	5
6.	How frequently are there conflicts about ideas in this shift?	1	2	3	4	5
7.	How much conflict about the work you do is there in this shift?	1	2	3	4	5
8.	To what extent are there differences of opinion in this shift?	1	2	3	4	5
9.	How often do members of this shift disagree about who should do what?	1	2	3	4	5
10.	How frequently do members of this shift disagree about the way to complete a group task?	1	2	3	4	5
11.	How much conflict is there about the delegation of tasks within this shift?	1	2	3	4	5
12.	How much friction is there among members of this shift?	1	2	3	4	5
13.	How much are personality conflicts evident in this shift?	1	2	3	4	5
14.	How much tension is there among members of this shift?	1	2	3	4	5

---

[10] * = Item is reverse-coded.

3. To what extent do the members of this shift perform the following activities?

	A very large amount	A large amount	A moderate amount	A small amount	Not at all
1. Find out what other shifts are doing to manage patients?	1	2	3	4	5
2. Scan the environment inside or outside the shift for ideas about how to improve?	1	2	3	4	5
3. Collect technical information and/or ideas from individuals outside the shift about ways to effectively use technology?	1	2	3	4	5
4. Scan the environment outside the shift for ways to improve the patient experience?	1	2	3	4	5

4. Please indicate the extent to which you disagree or agree with the following statements about this shift.

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. Members of this shift usually share information and do not keep information to themselves.	1	2	3	4	5
2. Members of this shift inform each other on different work issues.	1	2	3	4	5
3. Members of this shift really try to exchange information and knowledge.	1	2	3	4	5
4. Members of this shift always look for different interpretations and perspectives to confront a problem.	1	2	3	4	5

5. Please indicate the extent to which this shift has implemented the following innovations.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	Initiated new procedures or methods of working.	1	2	3	4	5
2.	Developed innovative ways of accomplishing its work targets and objectives.	1	2	3	4	5
3.	Developed new skills in order to foster innovations.	1	2	3	4	5
4.	Initiated improved teaching strategies and methods.	1	2	3	4	5

6. Finally, the following items ask you to assess the patient care provided by the shifts that report to you. Please indicate the extent to which you disagree or agree with each of the following statements. To ensure accurate conclusions, please be as open and honest as possible in your responses.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	Overall, this shift provides outstanding care to its patients.	1	2	3	4	5
2.	This shift is responsive to the needs of individual patients.	1	2	3	4	5
3.	This shift provides its patients with service in a timely manner.	1	2	3	4	5
4.	This shift makes many errors in treating its patients.*	1	2	3	4	5
5.	This shift's patients are typically satisfied with the quality of the care they receive.	1	2	3	4	5

APPENDIX 3

Study 2: Controlled Experiment Materials

Leadership Pretest

Subject Number_____

This short survey is designed to assess how you think about working and interacting with others. Please respond to the items by circling "TRUE" if the item accurately describes you, or "FALSE" if the item does not accurately describe you.

1. I think more about immediate results than I do about mentoring others.
      TRUE   FALSE

2. It's nice to know about people's long-term goals, but not necessary to get the job done.
      TRUE   FALSE

3. People talk about "mission" too much – it's best just to let people do their work and not try to bring values into the conversation.
      TRUE   FALSE

4. I like to surround myself with people who are better at what they do than I am.
      TRUE   FALSE

5. The best way to build a team is to set a group goal that is highly challenging, maybe even "crazy."
      TRUE   FALSE

6. I am a lifelong student of what makes other people "tick."
      TRUE   FALSE

Problem-Solving Activity Instructions

In the next part of the study you will work as a group to complete the Insight Enterprise Software business simulation.

About Insight: Insight Enterprise Software is an up and coming, fast-growing player in the Enterprise Software industry. Other major companies in the industry include PeopleSoft, Oracle, IBM, and SAP. Recently, the Senior Vice President of Finance / CFO of Insight experienced some significant family issues and decided it was time for him to retire. This has created an open VP of Finance/CFO position that needs to be filled immediately. Three candidates have emerged as clear favorites to fill the position. In keeping with Insight's desire to "promote from within," all three of the candidates are currently working for Insight in different capacities.

Instructions: Your job in this simulation is to make a recommendation regarding which of the 3 candidates should fill Insight's vacant Senior VP of Finance/CFO position. Each member of your group will act as a representative of one of 4 functional areas within Insight: Sales, Marketing, HR, and Operations. In this packet are 4 handouts, each corresponding to one of the 4 roles. Each member of your group should receive one handout. Each handout outlines the needs of its corresponding functional area and provides information about each of the candidates. Assume *all* of the information included in all of the handouts is accurate. You may not let any other group members look at your handout, but you may discuss the information it contains verbally. Once you receive your handout, write the title of the role you have been assigned on one of the nametags that have been provided, and wear the nametag so that the other members of your group can clearly see it. Following the experiment you will be asked to identify the other members of your group by role, so please wear your nametags for the remainder of the study and make an effort to remember the role assigned to each member of your group.

Your group will have approximately 25 minutes to review the information you have been provided and use the Recommendation Sheet to recommend one of the three candidates. **You should base your decision ONLY on how well each candidate meets the specific needs of each of Insight's 4 functional areas (roles) as described in the handouts**. You will be evaluated on the quality of your rationale as well as the correctness of your answer, so please be as thorough as possible in completing the recommendation sheet.

Problem-Solving Activity Recommendation Sheet

Please enter the group number written on the whiteboard in the blank below.

Group Number_____

Recommendation: Please circle the letter next to the name of the individual your group believes would be the best choice for Insight's new CFO.

   a) J. Davenport

   b) K. Miller

   c) C. Taylor

Rationale: Please describe the logic/rationale behind you group's selection.

_____

_____

_____

_____

Insight Enterprise Software
Senior Vice President, Sales

You are Insight's Senior Vice President of Sales (as indicated by the solid box on the organizational chart below).
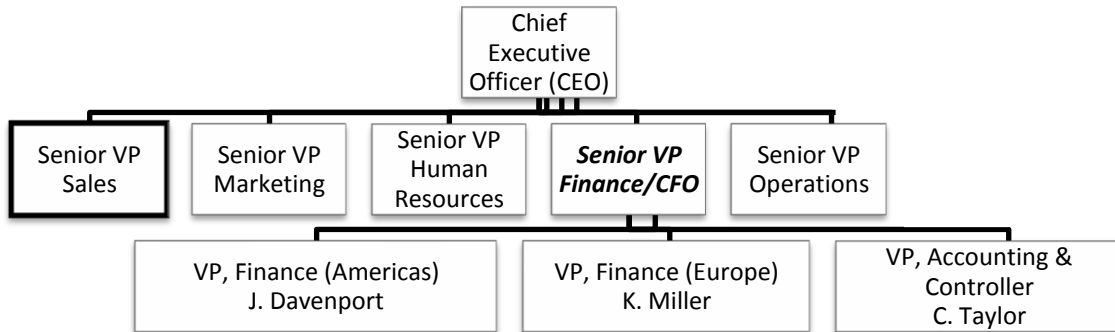
The sales functional area needs a CFO who has broad experience within Insight with a significant portion of this experience coming in Finance. You currently know the following information about each of the three candidates.

J. Davenport

J. Davenport is currently the Vice President of Finance with responsibility for the North and South American operations of Insight Enterprise Software. Prior to assuming this position, Davenport held numerous positions within the Finance division of Insight over the last 18 years. Five years ago and while continuing to work at Insight, Davenport completed an Executive MBA at the University of Illinois-Chicago. Davenport is involved in a homeless shelter and is currently serving as the shelter's volunteer CFO. Reliable sources in your personal network note that Davenport recently completed an internal executive leadership development course and is this year's chair of Insight's United Way charitable fund raising effort. They also describe Davenport as someone who is occasionally moody.

K. Miller

K. Miller is currently the Vice President of Finance with responsibility for the European operations of Insight Enterprise Software. Prior to this position and over the past 15 years, Miller held various managerial positions within Insight both in Finance and in other areas. Miller received an MBA from the University of Illinois with a concentration in Finance 17 years ago. Miller likes to play chess and has a passion for photography. In fact, Miller recently won first prize in a local photography contest. Reliable sources in your personal network note that Miller has been known to engage in unethical behavior.

C. Taylor

C. Taylor is currently the Vice President of Accounting and Controller for Insight Enterprise Software. Taylor received an MBA from the University of Texas with a concentration in Finance 15 years ago, and joined Insight immediately after completing that degree. Taylor is an avid runner who has completed several marathons, and is also the chairperson of a local organization (called "Move Your Feet") that works with local schools to encourage children to live active and healthy lifestyles. Reliable sources in your personal network note that Taylor is very detail-oriented and is an excellent public speaker. However, they also note that Taylor can be a little moody and that Taylor occasionally does not sufficiently celebrate success at the end of projects.

Insight Enterprise Software
Senior Vice President, Marketing

You are Insight's Senior Vice President of Marketing (as indicated by the solid box on the organizational chart below).

The marketing functional area needs a CFO who has broad experience within Insight and who can represent the company well by presenting at industry conferences and to outside investors and stakeholders. You currently know the following information about each of the three candidates.

J. Davenport

J. Davenport is currently the Vice President of Finance with responsibility for the North and South American operations of Insight Enterprise Software. Prior to assuming this position, Davenport held numerous positions within the Finance division of Insight over the last 18 years. Five years ago and while continuing to work at Insight, Davenport completed an Executive MBA at the University of Illinois-Chicago. Davenport is involved in a homeless shelter and is currently the serving as the shelter's volunteer CFO. Reliable sources in your personal network note that Davenport recently completed an internal executive leadership development course. However, they also inform you that Davenport does not have good attention to detail.
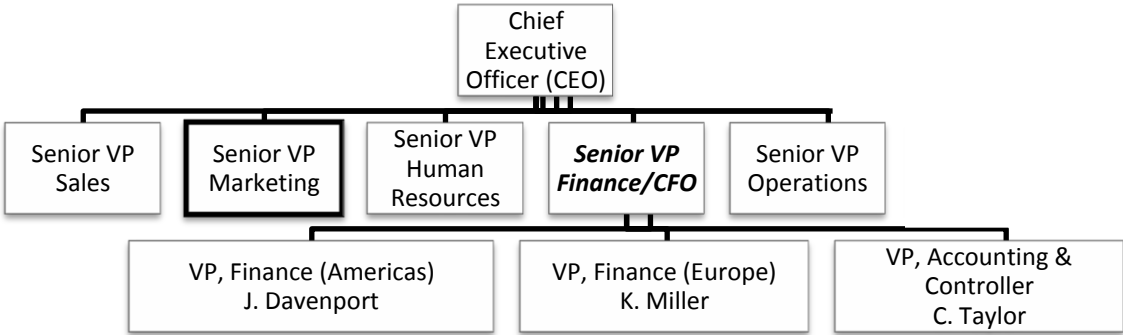
K. Miller

K. Miller is currently the Vice President of Finance with responsibility for the European operations of Insight Enterprise Software. Prior to this position and over the past 15 years, Miller held various managerial positions within Insight both in Finance and in other areas. Miller received an MBA from the University of Illinois with a concentration in Finance 17 years ago. Miller likes to play chess and has a passion for photography. In fact, Miller recently won first prize in a local photography contest. Reliable sources in your personal network describe Miller as someone who is occasionally moody, but note that Miller is an excellent public speaker and presenter and that Miller has recently completed an internal executive leadership development course.

C. Taylor

C. Taylor is currently the Vice President of Accounting and Controller for Insight Enterprise Software. Taylor received an MBA from the University of Texas with a concentration in Finance 15 years ago, and joined Insight immediately after completing that degree. Taylor is an avid runner who has completed several marathons, and is also the chairperson of a local organization (called "Move Your Feet") that works with local schools to encourage children to live active and healthy lifestyles. Reliable sources in your personal network describe Taylor as someone who is well-known for always behaving ethically. However, they also note that

Taylor can be a little moody every once in a while, and that Taylor occasionally doesn't sufficiently celebrate success at the end of projects.

Insight Enterprise Software
Senior Vice President, Human Resources

You are Insight's Senior Vice President of Human Resources (as indicated by the solid box on the organizational chart below).

```
                        ┌─────────────────┐
                        │ Chief Executive │
                        │  Officer (CEO)  │
                        └─────────────────┘
   ┌──────────┬──────────────┬─────────────┬──────────────┬──────────────┐
┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐
│Senior VP│ │Senior VP│ │Senior VP│ │Senior VP│ │Senior VP│
│ Sales   │ │Marketing│ │ Human   │ │Finance/ │ │Operations│
│         │ │         │ │Resources│ │  CFO    │ │         │
└─────────┘ └─────────┘ └─────────┘ └─────────┘ └─────────┘
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| VP, Finance (Americas) J. Davenport | VP, Finance (Europe) K. Miller | VP, Accounting & Controller C. Taylor |

Insight Enterprise Software
Senior Vice President, Human Resources

The Human Resources functional area needs a CFO who has broad experience within Insight and who always conducts themselves in a highly ethical way. You currently know the following information about each of the three candidates.

J. Davenport

J. Davenport is currently the Vice President of Finance with responsibility for the North and South American operations of Insight Enterprise Software. Prior to assuming this position, Davenport held numerous positions within the Finance division of Insight over the last 18 years. Five years ago and while continuing to work at Insight, Davenport completed an Executive MBA at the University of Illinois-Chicago. Davenport is involved in a homeless shelter and is currently serving as the shelter's volunteer CFO. Reliable sources in your personal network note that Davenport is this year's Chair of the company United way charitable fund raising effort. They further note that Davenport is known for always behaving extremely ethically. However, they describe Davenport as an uninspiring public speaker.

K. Miller

K. Miller is currently the Vice President of Finance with responsibility for the European operations of Insight Enterprise Software. Prior to this position and over the past 15 years, Miller held various managerial positions within Insight both in Finance and in other areas. Miller received an MBA from the University of Illinois with a concentration in Finance 17 years ago. Miller likes to play chess and has a passion for photography. In fact, Miller recently won first prize in a local photography contest. Reliable sources in your personal network describe Miller as someone who is an excellent public speaker and who is punctual and detail-oriented. However, they also note that Miller occasionally behaves unethically.
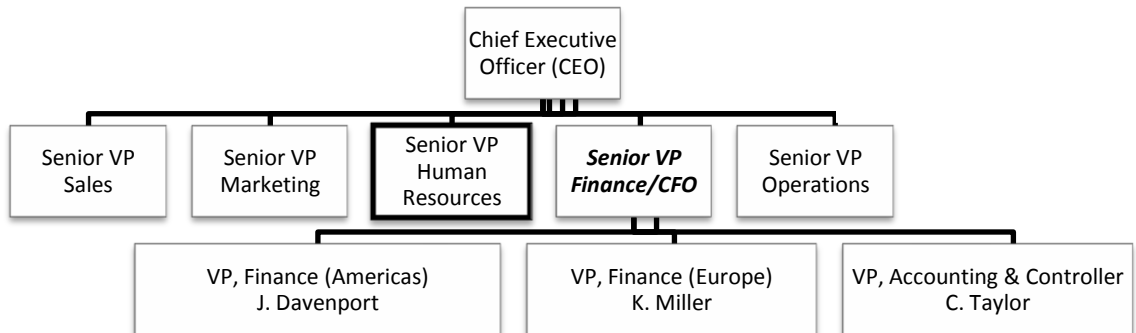
C. Taylor

C. Taylor is currently the Vice President of Accounting and Controller for Insight Enterprise Software. Taylor received an MBA from the University of Texas with a concentration in Finance 15 years ago, and joined Insight immediately after completing that degree. Taylor is an avid runner who has completed several marathons, and is also the chairperson of a local organization (called "Move Your Feet") that works with local schools to encourage children to live active and healthy lifestyles. Reliable sources in your personal network note that Taylor is responsible for Accounting and Financial controls for the worldwide operations of Insight. They also describe Taylor as a strong public speaker who has published extensively on

how to improve the speed of internal accounting and financial reporting practices. However, they say Taylor can be a little moody, and that Taylor occasionally does not sufficiently celebrate success at the end of projects.

Insight Enterprise Software
Senior Vice President, Operations

You are Insight's Senior Vice President of Operations (as indicated by the solid box on the organizational chart below).

```
                          ┌─────────────────┐
                          │ Chief Executive │
                          │  Officer (CEO)  │
                          └─────────────────┘
    ┌──────────┬──────────┬──────────┬──────────┬──────────┐
┌────────┐ ┌────────┐ ┌────────┐ ┌────────┐ ┌────────┐
│Senior VP│ │Senior VP│ │Senior VP│ │Senior VP│ │Senior VP│
│ Sales   │ │Marketing│ │ Human   │ │Finance/ │ │Operations│
│         │ │         │ │Resources│ │  CFO    │ │         │
└────────┘ └────────┘ └────────┘ └────────┘ └────────┘
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VP, Finance (Americas) J. Davenport	VP, Finance (Europe) K. Miller	VP, Accounting & Controller C. Taylor

Insight Enterprise Software
Senior Vice President, Operations

The Operations functional area needs a CFO who has broad experience within Insight and who is very detail-oriented given the increasing regulatory oversight within the industry. You currently know the following information about each of the three candidates.

J. Davenport

J. Davenport is currently the Vice President of Finance with responsibility for the North and South American operations of Insight Enterprise Software. Prior to assuming this position, Davenport held numerous positions within the Finance division of Insight over the last 18 years. Five years ago and while continuing to work at Insight, Davenport completed an Executive MBA at the University of Illinois-Chicago. Davenport is involved in a homeless shelter and is currently serving as the shelter's volunteer CFO. Reliable sources in your personal network note that Davenport is known for always behaving ethically.

K. Miller

K. Miller is currently the Vice President of Finance with responsibility for the European operations of Insight Enterprise Software. Prior to this position and over the past 15 years, Miller held various managerial positions within Insight both in Finance and in other areas. Miller received an MBA from the University of Illinois with a concentration in Finance 17 years ago. Miller likes to play chess and has a passion for photography. In fact, Miller recently won first prize in a local photography contest. Reliable sources in your personal network note that Miller recently completed an internal executive leadership development course, and describe Miller as being very detail-oriented.
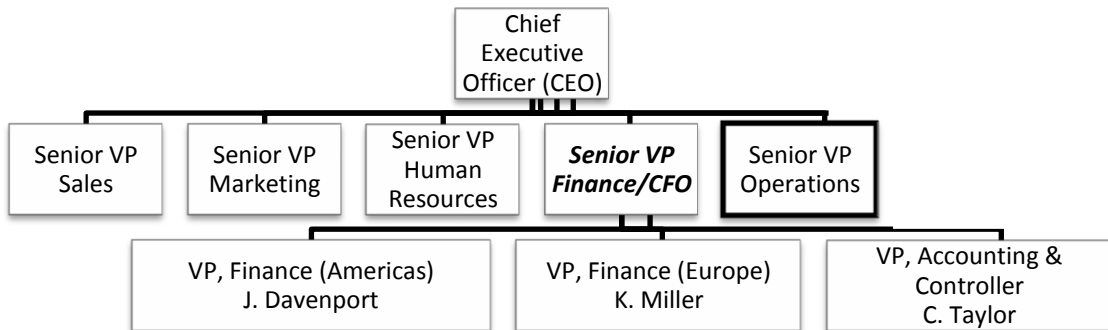
C. Taylor

C. Taylor is currently the Vice President of Accounting and Controller for Insight Enterprise Software. Taylor received an MBA from the University of Texas with a concentration in Finance 15 years ago, and joined Insight immediately after completing that degree. Taylor is an avid runner who has completed several marathons, and is also the chairperson of a local organization (called "Move Your Feet") that works with local schools to encourage children to live active and healthy lifestyles. Reliable sources in your personal network note that over the past 15 years, Taylor has held several technical and management positions in Finance, Marketing, and Sales at Insight. They also note that Taylor recently completed an internal executive leadership development course. However, they describe Taylor as

someone who can be a little moody, and as someone who occasionally does not sufficiently celebrate success at the end of projects.

Final Questionnaire

Questionnaire 3

Subject Number_____   Group Number_____

This questionnaire asks about your experience during the group problem-solving exercise. It is very important that you respond to these items as carefully and honestly as possible. Please remember to write your subject number and group numbers in the blanks on the top of the page.

1. **Please indicate which role you were assigned in the group problem-solving activity**

    ___ Senior Vice President, *Sales*

    ___ Senior Vice President, *Marketing*

    ___ Senior Vice President, *Human Resources*

    ___ Senior Vice President, *Operations*

2. **During the problem-solving activity, was a member of your group formally designated as a leader or manager?**

___ Yes, a member of my group was formally designated as a leader or manager

___ No, a member of my group was not formally designated as a leader or manager

Please respond to the following questions based on your interactions with other group members during the problem-solving activity. Please carefully consider each member's INDIVIDUAL contributions. You do not need to circle any information below the role you were assigned. In answering these questions, please keep in mind that the individuals you perceive as leaders may or may not have been officially designated as leaders by the experimenter.

To what degree did you *engage in* leadership towards the Vice President of **Sales**?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did you *engage in* leadership towards the Vice President of **Marketing**?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did you *engage in* leadership towards the Vice President of **HR**?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did you *engage in* leadership towards the Vice President of **Operations**?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

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To what degree did you *rely on* the Vice President of **Sales** for leadership?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did you *rely on* the Vice President of **Marketing** for leadership?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did you *rely on* the Vice President of **HR** for leadership?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did you *rely on* the Vice President of **Operations** for leadership?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **Sales** demonstrate respect and concern for you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **Marketing** demonstrate respect and concern for you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **HR** demonstrate respect and concern for you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **Operations** demonstrate respect and concern for you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **Sales** let you know what was expected of you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **Marketing** let you know what was expected of you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **HR** let you know what was expected of you?

1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

To what degree did the Vice President of **Operations** let you know what was expected of you?
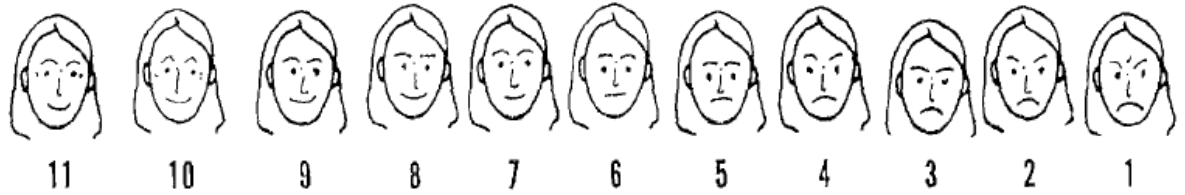
1	2	3	4	5	6	7
Not at all			A moderate amount			A great deal

1. The following items ask about information sharing in your problem solving group. Please respond to the items below by circling a number next to each statement indicating the extent to which you disagree or agree with the statement

	Strongly disagree	Neither agree nor disagree	Strongly agree

	1	2	3	4	5	6	7
1. Members of my group shared information and did not keep information to themselves.	1	2	3	4	5	6	7
2. Members of my group kept each other informed about issues they experienced while working on the problem-solving activity.	1	2	3	4	5	6	7
3. Members of my group really tried to exchange information and knowledge.	1	2	3	4	5	6	7
4. Members of my group looked for different interpretations and perspectives to confront the problem-solving activity.	1	2	3	4	5	6	7

	Not at all	A moderate amount	Very

	1	2	3	4	5	6	7
1. How satisfied were you with working in your group?	1	2	3	4	5	6	7

2. Please circle the face below that best represents how satisfied you were with working in your problem-solving group.

11   10   9   8   7   6   5   4   3   2   1

5. **The following items ask about conflict in your problem solving group. Please respond to the items below by circling a number next to each item.**

A lot

A moderate amount

Not at all

		1	2	3	4	5	6	7
1.	How much friction was there among members of your group?	1	2	3	4	5	6	7
2.	To what extent were personality conflicts evident in your group?	1	2	3	4	5	6	7
3.	How much tension was there among members of your group?	1	2	3	4	5	6	7
4.	How much emotional conflict was there among members of your group?	1	2	3	4	5	6	7
5.	How often did people in your group disagree about opinions regarding the work being done?	1	2	3	4	5	6	7
6.	How frequently were there conflicts about ideas in your group?	1	2	3	4	5	6	7
7.	How much conflict related to performing the task you were assigned was there in your group?	1	2	3	4	5	6	7
8.	To what extent were there differences of opinion in your group?	1	2	3	4	5	6	7
9.	How often did members of your group disagree about who should do what?	1	2	3	4	5	6	7
10.	How frequently did members of your group disagree about the way to complete the group's task?	1	2	3	4	5	6	7
11.	How much conflict was there about the delegation of tasks within your group?	1	2	3	4	5	6	7

6. Please provide some information about yourself

Age? _____

Gender?

    a) Male

    b) Female

Which of the following BEST describes your ethnic or racial background?

    a) African American

    b) Asian American

    c) Caucasian/White

    d) Hispanic/Latino/a

    e) Native American

    f) Biracial

    g) Other

Are you an undergraduate or graduate student?

    a) Undergrad

    b) Grad student

What is your program/major? _____

Honestly please tell us did you know any of the members of *your* problem solving group prior to beginning the experiment?

a) Yes

b) No

Honestly please tell us if you had difficulty remembering which members of your problem solving group were assigned to which roles when you were filling out this questionnaire?

a) Yes

b) No

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