ABSTRACT

Title of Dissertation:	TRANSFERRING SOCIAL CAPITAL FROM INDIVIDUAL TO TEAM: AN EXAMINATION OF MODERATORS AND RELATIONSHIPS TO INNOVATIVE PERFORMANCE
	Suzanne Keasey Edinger, Ph.D., 2012
Directed by:	Professor Paul E. Tesluk, Department of Organization and Human Resources, School of Management, University at Buffalo

In this dissertation, I explore the relationships between individual social capital, team social capital, and team innovative performance. The association between personal and group social capital is underexplored (Burt, 2000; Kilduff & Krackhardt, 2008), and is important to investigate so that we may improve our knowledge of how social capital transfers from individuals to their teams in ways that promote team innovation. I hope to contribute to the literature on social capital in teams in three important ways.

Within team-based settings with high innovation requirements, I first propose that the structural bridging social capital (i.e., ties outside the team) of team members is an important predictor of the team's structural bridging social capital. Second, transferring social capital from the individual to team level, I suggest that a team member's sharing of his/her bridging social capital resources is influenced by relational, cognitive, and task components, including group identification, dyadic trust, team member exchange, and shared vision. Finally, I investigate the role of transactive memory systems and bonding

social capital (i.e., ties inside the team) in explaining the relationship between team structural bridging social capital and team innovative performance.

Study participants were 263 members of 38 project teams in the merchandising displays division of a large paperboard and packaging manufacturer in the United States. I find that individual bridging social capital predicts team structural bridging social capital. Additionally, psychological identification with team, psychological identification with organization, team member exchange, and shared vision moderate the relationship between individual and team structural social capital. I conclude by discussing the implications of these findings for social capital and team innovative performance theory and practice.

TRANSFERRING SOCIAL CAPITAL FROM INDIVIDUAL TO TEAM: AN
EXAMINATION OF MODERATORS AND RELATIONSHIPS TO INNOVATIVE
PERFORMANCE

By

Suzanne Keasey Edinger

Advisory Committee:

Professor Paul E. Tesluk, Chair
Associate Professor Giuseppe (Joe) Labianca
Professor Cheri Ostroff
Professor M. Susan Taylor
Assistant Professor Vijaya Venkataramani

Dedication

This dissertation is dedicated with love to my family, who sacrificed much to enable my educational aspirations. To my husband, Matthew Jack Edinger, who reached the PhD finish line first: thank you for your love and steadfast support through some very difficult times. Your example of perseverance and your constant encouragement helped me believe that I could make it too, even though it sometimes seemed an impossible task. May we be blessed with another wonderful twenty years together. To my children, Madison Keasey Edinger and Callen Matthew Edinger, who are constant sources of joy in my life: thank you for your understanding when my school schedule kept me away from home and forced me to miss important events like concerts and baseball games. I hope I have provided an example for you of the value of hard work and determination. May your educational path be smoother than mine. To my mom, Martha Jane Keasey: thank you for your unwavering belief that I can do anything if I just put my mind to it. When I feel uncertain about whether I can succeed at something, you always know what to say to restore my self-confidence and help me to keep moving forward. Finally, to my dad, Howard Leroy Keasey, who passed away in 1993: thank you for instilling in me a belief in the value of education. I think you would have been happy and proud to see how my life has unfolded and where my educational path has led. Thank you to all of you, from the bottom of my heart.

Acknowledgements

Although a dissertation is a solo-authored paper, the process is a highly collaborative one. I wish to acknowledge the contributions of a number of people, without whom I would not have been successful in completing this program.

First, I wish to thank Paul Tesluk, the chair of my dissertation committee and my mentor throughout the PhD program. Thank you for your time, your interest, and your guidance not only on this project, but through the process of becoming a scholar. I am very grateful for your help.

Next, thank you to my dissertation committee members: Joe Labianca, Cheri Ostroff, Susan Taylor, and Vijaya Venkataramani. I appreciate your time and interest in my ideas: our conversations about my research have been invaluable. I wish to especially thank Susan for your support and encouragement in personal as well as professional matters throughout my PhD program.

Finally, a big thank you to my cohort-mates, Payal Sharma and Yonjeong Paik. We spent five challenging years supporting one another through the highs and lows of studying for a PhD. While we are now scattered around the world, I have faith that our friendship will stand the test of time and distance and we will continue to be there for one another throughout the many life-challenges to come. I am extremely fortunate to have shared this experience with two wonderful and incredibly bright colleagues and friends.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

To accomplish key objectives, organizations frequently rely on work *teams*, defined as "a distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission" (Salas, Dickinson, Converse, & Tannenbaum, 1992). In many ways teams have become an inextricable part of work life as organizations find teams to be critical for their ability to handle complex and ambiguous work environments, and implement flatter and more distributed organizational structures (Mathieu, Maynard, Rapp, & Gilson, 2008). Cross-functional and project team use has increased substantially in recent years (Fulk & DeSanctis, 1999), as organizations move away from the more classical grouping of teams by similarity in function and expertise (Fayol, 1949; F. W. Taylor, 1911; Weber, 1947). These new teams draw membership from different functional areas and bring diverse expertise and access to unique resources to the team. This realignment of team membership offers the potential to provide better cross-functional integration and quicken production and response time so that organizations can adapt more readily to customer needs and environmental demands (Poole, 1999). However, organizations and team leaders often find it difficult to determine how best to build effective teams that work together seamlessly and successfully utilize the resources which are distributed throughout their membership.

One important predictor of team effectiveness is the set of connections team members develop with one another. In particular, *social network structures*, or the patterns of informal ties among individuals, have the potential to facilitate and constrain the flow of resources between and within teams and thus have important work

implications (Brass, 1984). For example, scholars have used social networks to study and better understand job performance (Sparrowe, Liden, Wayne, & Kraimer, 2001), turnover (Kilduff & Krackhardt, 1994; Krackhardt & Porter, 1985), promotion (Burt, 1992), innovation (Obstfeld, 2005), creativity (Burt, 2004), and unethical behavior (Brass, Butterfield, & Skaggs, 1998).

The resources embedded within social network structures have been studied extensively through the lens of social capital. *Social capital* is defined as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships between individuals and in a social unit" (Nahapiet & Ghoshal, 1998). Similar to social networks, social capital also has important team implications. Specific examples include increased collaboration (Menor, Kristal, & Rosenzweig, 2007; Subramaniam & Youndt, 2005), trust (Fukuyama, 1995; Lane, Salk, & Lyles, 2001; Putnam, 1995), friendship (Richardson, 1986), improved knowledge transfer (Hansen, 1999), and productivity (Reagans & Zuckerman, 2001).

While some aspects of social capital have received a great deal of attention, we know relatively little about how social capital develops at the team level (Burt, 2000, p. 410) and especially about the role individual social capital plays in the development of group social capital (Kilduff & Krackhardt, 2008). Although it may seem intuitive that groups will incorporate the social capital connections of their members, this process may not be as automatic or simple as it first appears. Individual agency will play a role in determining to what extent individuals allow their personal social capital to become part of the group's social capital (Kilduff & Krackhardt, 2008; Kilduff & Tsai, 2003, pp. 129-130). Additionally, individuals who are strongly embedded in their teams may see more

compelling reasons to sharing their personal ties and thus may be more willing to do so. Investigating the relationship between individual and team social capital will help us understand how, and under what specific circumstances, social capital transfers from an individual to the team.

Another important but neglected characteristic of social capital is the interrelationship between its dimensions. Social capital has been previously conceptualized as having three distinct dimensions: structural, relational, and cognitive. *Structural* social capital refers to the overall pattern of connections between actors--that is, who individuals reach and how they reach them (Burt, 1992; Granovetter, 1992; Nahapiet & Ghoshal, 1998). *Relational* social capital describes the personal relationships individuals develop with one another based in a history of interactions that fulfill social motives such as sociability and prestige (Granovetter, 1992; Nahapiet & Ghoshal, 1998). *Cognitive* social capital refers to resources that provide shared representations, interpretations, and systems of meaning among individuals such as shared vision (Cicourel, 1973; Nahapiet & Ghoshal, 1998). Relatively little is known about the interrelationships between these dimensions, however, as most research has focused on a single dimension at a time (Nahapiet & Ghoshal, 1998; Putnam, 1995). For example, prior research has linked structural social capital to better overall job and group performance as well as greater job effort (Sparrowe et al., 2001); relational social capital encourages collaboration (Coleman, 1990) and can help overcome resistance to organizational change (R.M. Kramer, 1999); and cognitive social capital promotes integration and collective responsibility (Coleman, 1990). Considering social capital as a

one-dimensional construct may mask important separate as well as interactive effects of its different dimensions (Andrews, 2010).

Finally, an important objective of many work teams is in generating and implementing novel ideas and procedures, often termed *innovative performance* (Anderson, De Dreu, & Nijstad, 2004). Consistent with other types of team outcomes, innovative performance is subject to influence by many different team-related factors and processes (Kozlowski & Bell, 2003), including social capital (Mehra, Dixon, Brass, & Robertson, 2006). However, findings from a social capital perspective regarding team innovation have been somewhat confusing and contradictory. On one hand, social capital research has found that innovative teams with strongly interconnected members achieve greater levels of value creation (Tsai & Ghoshal, 1998), knowledge sharing (Hansen, 1999; Reagans & McEvily, 2003), and overall performance (Reagans & Zuckerman, 2001). On the other hand, teams with weakly interconnected members are more effective at searching for useful knowledge (Hansen, 1999) and at having their ideas judged as valuable by senior management (Burt, 2004). Additionally, Fleming and colleagues (2007) actually found that teams with strongly interconnected members had a net *negative* effect on innovation, even considering the career histories and length of relationships of the individuals involved. Thus, despite some investigation into the usefulness of social capital to innovative team outcomes, these contradictory findings suggest that important gaps remain in our knowledge of the phenomenon.

4

Purpose of the Study

        This dissertation's purpose is to contribute to the social capital and teams

literatures by considering three specific research questions regarding team social capital

within an innovative context:

1. *How does individual structural social capital relate to the development of*
   team structural social capital?

2. *How do the relational and cognitive dimensions of social capital (as well as*
   other moderators) influence the relationship between individual and team
   structural social capital?

3. *How do weak and strong social capital connections in teams interact with*
   each other and with team transactive memory systems to influence team
   innovative performance?

        The first contribution of this dissertation is to consider more fully the role

individual social capital plays in the development of group social capital. A lack of

knowledge in this area limits theory development because scholars may presume that

team member's personal social capital automatically transfers to the team and is available

for use both on behalf of the team and by other team members. This lack of

understanding also limits practice because managers may make assumptions that team

members are using their personal social capital in support of the team when they may not

always be doing so. For example, in situations where team members are rewarded

primarily based on their individual contributions rather than on team performance,

members may not see any benefit in sharing their ties with the team. Additionally, some

social capital resources, such as those acquired through relationships with influential top

managers are comparatively rare and difficult to cultivate. Thus, team members may be

hesitant to share these resources with their team without a compelling reason to do so.

Considering the direct relationship between individual and team structural social

capital only provides partial insight into the dynamics of this relationships. It is also

critical to understand the specific factors that might influence an individual's willingness

to share his/her personal connections and resources with the team. Not fully

understanding this process limits theory development since scholars have an incomplete

picture of the complexity of tie sharing and its relationship with social capital. This

knowledge gap also impacts practice since managers could be better able to effectively

manage their teams in ways that make the most of team member contributions if these

managers better understood the factors that influence the degree to which individual team

members share their ties and embedded resources with the team. Therefore, a second

contribution of this dissertation is in investigating moderators of the relationship between

individual and team social capital. Specifically, I investigated the multi-faceted nature of

social capital itself as well as interdependence and *tertius iungens* orientation as

moderators of tie sharing. *Interdependence* is defined as the extent to which group

members interact and depend on one another for a variety of outcomes, including those

related to tasks, goal attainment, and rewards (Campion, Medsker, & Higgs, 1993).

Tertius iungens orientation is "a strategic, behavioral orientation toward connecting

people in one's social network by either introducing disconnected individuals or

facilitating new coordination between connected individuals" (Obstfeld, 2005). These

variables seem likely to influence tie sharing since the level of connectedness that an

individual feels for his group seems an important consideration in how willing he might be to share his resources with that same group.

The third purpose of this dissertation is to help clarify the role strong and weak social capital connections play in team innovative performance. Teams with strongly interconnected members are more successful at knowledge sharing (Hansen, 1999; Reagans & McEvily, 2003), and have higher levels of performance (Reagans & Zuckerman, 2001) while teams with weakly interconnected members are more effective at searching for useful knowledge (Hansen, 1999). These findings from previous studies may appear contradictory and confusing because the strong and weak connections may interact with one another or since additional variables may influence the relationships between social capital and innovative behavior. This uncertainty limits theory development because researchers are unsure how to best approach the relationship between group social capital and team performance. This lack of understanding also limits practice because scholars are unable to make recommendations to managers about how best to encourage team innovative performance, and how to ensure that higher levels of social capital will, in fact, lead to higher levels of group performance. Thus, in this study, strong internal team connections moderate the relationship between weaker connections with colleagues outside the team and innovative performance. Also, a team's transactive memory system serves as a moderator between social capital connections with external colleagues and innovative team performance. A *transactive memory system* is defined as a set of individual memory systems in which members share awareness of who knows what and are able to combine member's memories and knowledge. Prior work on expertise in teams has suggested that specialized knowledge,

such as that needed when teams are working on innovative projects, needs to be effectively coordinated in order for it to be appropriately applied (Faraj & Sproull, 2000; Faraj & Xiao, 2005). What has not been studied, however, is how social capital and transactive memory systems might work together in coordinating and accessing knowledge as it is distributed across members of a team, thereby creating a more integrated set of knowledge for the team. By providing a theoretical integration of transactive memory systems with social capital in teams, the field's understanding of how group social capital contributes to important team outcomes such as innovative performance is more fully developed.

In summary, I contribute to the literature on social capital in teams in three important ways. Within an innovative context, I first propose that the personal social capital of a team's member is an important predictor of the group's social capital. Second, I suggest that relational, cognitive, and task components influence an individual's willingness to share resources. Finally, I investigate how weak and strong social capital connections interact and the role of transactive memory systems in explaining the relationship between group social capital and team innovative performance.

Overview of Chapters

In Chapter 2, I define the theoretical concepts I draw upon to build my conceptual framework. Then, I review literature that informs my study. I also differentiate my ideas from others that exist in the management literature, explaining how I extend research on social capital and team performance. In Chapter 3, I review the relevant literature that supports my arguments for my study, and present specific hypotheses regarding

individual and group social capital and their combinations in predicting innovative group

performance, which is illustrated by Figure 1. In Chapter 4, I describe the research

methods used to investigate these questions in my study, followed by results of my

analyses, in Chapter 5. Finally, I conclude with a discussion of my findings, study

limitations, and potential directions for future research in Chapter 6.

Figure 1: Hypothesized theoretical model
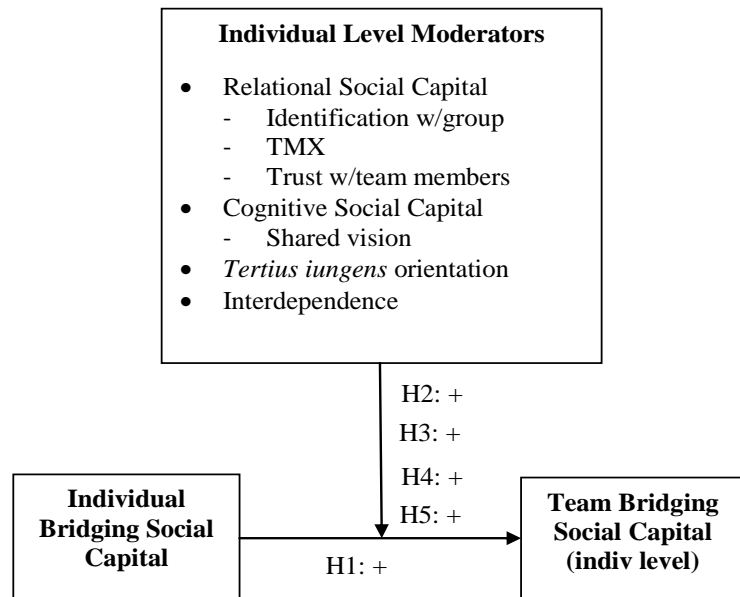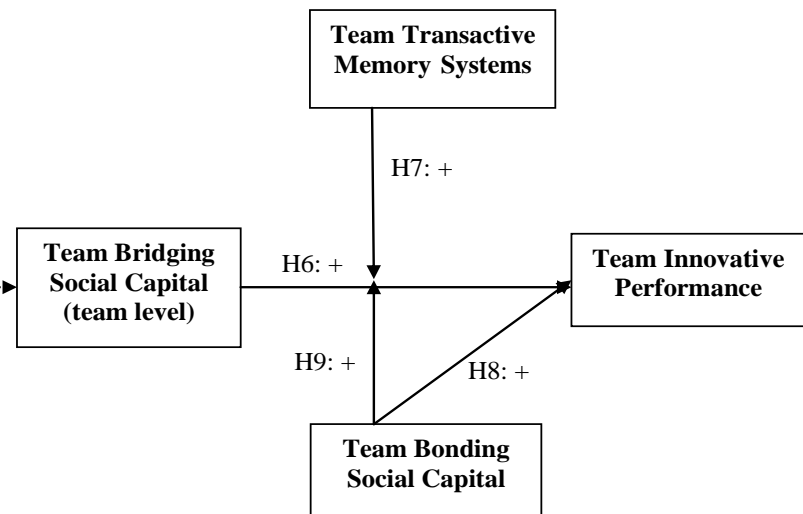
Chapter 2: Theoretical Background and Literature Review

In order to establish a theoretical foundation for the arguments in this dissertation, it is helpful to review the two primary literature streams that I draw upon. To that end, this chapter focuses on reviewing and integrating literature in the areas of individual and team social capital and team innovative performance.

Literature Review of Social Capital

Social capital is a concept with origins based in sociology. These sociology connections permit social capital to be viewed through the societal and community perspectives (e.g., Jacobs, 1961; Putnam, 2000). Most recently, however, social capital has been incorporated into research in organizational contexts (e.g., Burt, 2005; Leana & Pils, 2006), and the organizational context of social capital is the topic of this dissertation.

What is social capital? This dissertation builds upon prior work suggesting a link between social capital and performance. What follows is a brief outline of the origins of social capital and its relationship to performance.

Although not specifically defined in the book, the idea of social capital, or the human relationships of the city, first appeared in Jacobs' (1961) *The Death and Life of Great American Cities*. In the 1980's, Bourdieu first defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu, 1985, p. 243). Bourdieu's concept of social capital includes an individual-level variable and the belief that each individual has the opportunity to obtain social capital via decisive accomplishments. Also, he believes that social capital had the

ability to be changed into economic gains, similar to financial capital (Bourdieu, 1985). He emphasizes the network of connections and durable relationships that emerge from these networks. Thus, in Bourdieu's view, the ability of individuals to benefit from their social capital depends on the nature of the social obligations, connections, and networks available to the individual (Bourdieu, 1985). He also suggests that social capital has the potential to align organizational goal and enhance performance outcomes (Bourdieu, 1985).

Building on the work of Bourdieu, Coleman also links social capital to enhanced performance. Coleman (1990, p. 302) defines social capital as a group of 'socio-structural relationships' an individual could muster "making possible the achievement of certain ends that would not be attainable in their absence". Key to Coleman's concept of social capital is that certain outcomes cannot be achieved without the existence of the social capital embedded in the relationships between individuals. Coleman's view, contrary to that of Bourdieu's, links social capital with the individual *and* the community, an asset of the individual but constructed using the structural relationships of others.

Putnam's (1995) scholarly writing has added much of social capital in the context of societies to the current knowledge base of literature. He suggests that active participation in networks generates social capital, which then helps to explain coordination and cooperation in organizations as well as group performance (Putnam, 1995).

Scholars have considered whether social capital is a one-dimensional or a multi-dimensional construct. They have reached three different conclusions which are germane to this dissertation.

First, Putnam suggests that social capital may be either internally or externally focused. He labels internally focused social capital as *bonding social capital* and posits that it arises based on the relationships amongst members of a specific group. Putnam suggests that bonding social capital is useful to groups because it facilitates cohesion and member relationship development. In turn, cohesion is useful as it helps groups when pursuing collective goals and can contribute positively to organizational performance. On the other hand, Putnam labels externally focused social capital as *bridging social capital* and suggests that it offers connections *between* (rather than within) groups. These external connections can promote cooperation between diverse groups. According to Field, bridging social capital "tends to bring together people across diverse social divisions" (2008, p. 36).

The bonding and bridging ties between individuals can be measured in terms of not just their presence, but also their strength. In his seminal article, Granovetter (1973) popularized the concept of *weak ties* as particularly important in his study of networks and job seekers. Granovetter found that weak acquaintanceships, rather than strong friendships, lead to the most job opportunities. Weak ties are typically between individuals who do not know one another well and are characterized by infrequent contact and a casual, low intensity relationship (Granovetter, 1973). *Strong ties*, on the other hand, are characterized by frequent, intense interactions and are often accompanied by friendship or a kinship relationship (Nelson, 1989). Both forms of ties are useful. For example, divergent information is frequently found through weak ties, while strong ties are useful for assimilating information once it has been gathered (Hansen, 1999). In this

dissertation, I consider the role of both weak bridging ties and strong bonding ties in the development of team social capital and in improving innovative performance.

A second conceptualization of the multidimensionality of social capital is that advanced by Lin. He considers whether social capital is a resource of the individual or of the group (N. Lin, 1999). As a resource of the individual, social capital presumes that benefits accrue to a person in return for investments in relationships. Further, Lin suggests that the aggregation of an individual's social capital benefits the broader group. However, Lin's conceptualization of group social capital goes beyond this simple accumulation. At the group level, Lin suggests the core considerations should be how groups cultivate and sustain more or less social capital as an ability of the collective and how this ability increases both personal and group performance. Within this setting, the dominant focus is on the fundamentals and procedures of the construction and preservation of group social capital. The primary focus of this dissertation is to investigate and clarify the relationship between individual and group social capital.

Social capital and its application to organizational studies. Gradually, social capital was introduced into organizational studies to better understand how individuals and groups manage the intricate maze of relationships that comprise today's complex organizations. In the context of organizational research, Nahapiet and Ghoshal (1998) advance a third multi-dimensional model of social capital with structural, relational, and cognitive facets. The distinction between the dimensions is built on Granovetter's (1992) discussion of structural and relational embeddedness. Structural embeddedness includes the properties of both a social system and a network of relations as one. However, relational embeddedness concerns the type of intimate relationships that individuals

14

develop with each other through a record of contact. All three dimensions of social

capital have contributed findings of interest to the literature on social capital and

organization studies. In this dissertation, I consider the relationships between these three

dimensions, described in detail below.

The structural dimension. The pattern of links between individuals, or whom an

individual reaches and how he or she reaches them, is the structural dimension of social

capital (Burt, 1992). In this study, I consider structural social capital at both the

individual and group levels of analysis. This dimension has been widely studied by

scholars using social network approaches to social capital research. For example, Burt

investigated social capital and its relationship to both group and organizational outcomes

in numerous empirical studies. In his work, he suggests that two dissimilar types of

network structures, closure and structural holes, are important in the creation of social

capital (Burt, 2001). *Closure* is quite similar to Putnam's (1995) conception of bonding

social capital and describes the density of the connections between individuals in a

network. This structural property is often associated with trust and higher levels of group

performance. Burt's *structural holes* argument is similar to Putnam's conceptualization

of bridging social capital and describes how holes in the network create opportunities for

individuals to add value by brokering across the holes or gaps that occur between

disconnected groups, which is also associated with performance. Based on this work,

Burt (2001, p. 52) posits that both types of social capital are useful in different ways:

"while brokerage across structural holes is a source of added value, closure can be critical

to realizing the value buried in the structural holes". Organizational outcomes such as

performance can thus collect unique benefits from each type of social capital.

15

Group social capital, a concept advanced by Oh, Chung, and Labianca (2004), considers the "configuration of group members' social relationships within a group and in the social structure of the broader organization through which necessary resources for the group can be accessed" (Oh et al., 2004, p. 861). The authors posit that groups can leverage their network of relationships to create access to important resources such as information, influence, and support. Additionally, Oh and colleagues' (2004) theoretical framework proposes the utility of examining bonding and bridging social capital simultaneously, which is not frequently done in structural network studies, and suggests that they may have simultaneous effects of group and organizational performance.

In summary, structural social capital influences both group and organizational performance in several different ways. Additionally, internally and externally focused social capital may combine to produce a variety of different outcomes. Despite its relatively recent introduction to the field of organization studies, social capital is proving to be a useful predictor variable in a wide range of different studies. Structure is not however, the only important feature of social capital. In the next section, I consider the role of relational social capital.

The relational dimension. The relational dimension of social capital refers to the affective aspect of relationships (Nahapiet & Ghoshal, 1998). This dimension considers how the patterns of interactions which exist between individuals impact the quality of the personal relationships that develop between members of the team. Prior work on the relational dimension of social capital suggests that it includes several key components including trust and trustworthiness, norms and sanctions, and obligations and expectations.

Trust is often thought of as the core of the relational dimension of social capital. *Trust* is generally defined as "the willingness of a party to be vulnerable to the actions of another party" (Mayer, Davis, & Schoorman, 1995, p. 712). Trusting relationships are multi-dimensional, relying on shared respect and active exchange (Ingram & Roberts, 2000). Trust is a requirement for team members to leverage their associated relationships. Personal relations develop among individuals as a function of their history with each other and are fundamental to the concept of trust. Continued reciprocity and the acceptance of vulnerability evolve during a relationship through recurring interactions (Jones & George, 1998). Similarly, Granovetter (1985) suggests that trust grows from steadfastness and interdependence in relationships. Blau (1968, p. 454) creates a synopsis of the relationship development process by suggesting that:

> social exchange relations evolve in a slow process, starting with minor transactions in which little trust is required because little risk is involved and in which both partners can prove their trustworthiness enabling them to expand their relationship and engage in major transactions. Thus, the process of social exchange leads to the trust required for it in a self-governing fashion.

In essence, trust develops slowly over time and is reinforced through the cooperative exchanges of group members.

Burt (2005) suggests that behavioral variability is also an important predictor of trust. He posits that the ability to predict the probable behavior of another makes it more likely that others will be viewed as reliable, responsible, and able to make good on their commitments. Trusting others to do what they are responsible for, or have committed to

17

do, enables individual members to focus on their direct responsibilities knowing that others will carry out their agreed upon functions.

Trust is more likely to be present in teams with well-developed bonding social capital. In well-connected groups, news travels quickly if a group member is not completing his portion of the group's task or talking badly about other group members and that member is likely to be pressured to comply with group trust norms or risk exclusion from or marginalization in the group (Burt, 2005). In dense, highly cohesive groups, trust allows the team to be more efficient as less time needs to be spent on behavioral oversight and control.

Distrust or even a lack of trust greatly reduces team bonding social capital. Negative relationships, such as those present in groups without trust, affect the ability of the members to coordinate activities and to work cooperatively toward important organizational outcomes (Oh, Labianca, & Chung, 2006). In these negative situations, groups can fracture and erect barriers to cooperation and information exchange. Therefore, for social capital to exist, trust must be present in the relationships. Trust facilitates increased cooperation and information sharing (Dirks & Ferris, 2002) since certain confidential information may be shared only with those with whom one has a trusted relationship. Therefore, when individuals can be trusted to keep their word, uncertainty about behavior is diminished and the need to monitor behavior is reduced.

As teams move through the development cycle, norms are created that influence both individual and group behavior. Social norms are "generally accepted ways of thinking, feeling, or behaving that members of a group agree on and endorse as right or proper" (Smith & Mackie, 2000, p. 173). Social norms are indicative of the behaviors

that are expected and sanctioned by the group (O'Reilly & Chatman, 1996). Norms

provide individuals with a guide for what is considered acceptable behavior within a

specific group. The extent to which individuals comply with these norms becomes part

of their personal history or reputation. An individual's reputation influences his

perceived value to others and also serves as the motivating factor to comply with group

norms since loss of reputation may affect the individual's effectiveness as he may

become unable to enlist the support of others (J. S. Brown & Daguid, 1991). Social

pressures exert influence on group members to preserve a positive reputation.

Additionally, Coleman (1990) suggests that the obligations and expectations which are

inherent in social relationships create leverage that allows groups to develop sanctions for

noncompliance with behavioral norms. It is the ability to invoke a sanction against an

individual or a group that creates the foundation for commitment to common goals or

purpose.

The pressure on team members to perform, that is, meet their obligations and

commitments, has a cascading effect throughout the organization. By leveraging the

social capital that they may have within the organization, team members use their

influence to gain cooperation of the broader organization. If they personally do not have

a relationship with a group with whom they need to get their cooperation, they may look

to other team members to exercise their respective influence by leveraging their unique

relationships in the organization.

Based on the definitions and descriptions provided above, the differences between

bonding social capital and relational social capital may seem somewhat vague. Bonding

social capital typically occurs within homogenous groups of people (Putnam, 1995), such

19

as members of a team. These are a group's *internal* ties, in contrast to bridging social capital ties, which are *external* to a group. Bonding ties are usually strong, involving large investments of time and frequent interaction amongst group members. They are often measured through the density of group ties on some type of content relation, such as communication, friendship, or advice. Due to their homogeneity, many groups with high levels of bonding social capital also have high levels of trust and share similar norms, making them seem quite similar to relational social capital.

On the other hand, relational social capital ties focus on the *character* of the connection between individuals rather than its classification as internal versus external to a group. Relational social capital ties may be either strong or weak, and may occur both inside and outside a group or team. These are often measured through concepts such as trust and identification designed to help determine the nature of the relationship between two individuals. Some bonding ties are also relational ties and some relational ties are also bonding ties, but overlap is not necessary or even expected in many situations.

In summary, trust amongst team members serves as the foundation for the relational dimension of team social capital. Well-developed trust relationships allow groups to effectively share information, cooperate on tasks, and make efficient decisions. These trusting relationships also help teams to develop a consistent approach to organizational goals. This uniformity of mindset is a form of cognitive consistency—a shared mental model that is discussed in the next section.

The cognitive dimension. The cognitive aspect of social capital enables a shared understanding of group goals and objectives and therefore functions as a convergent device and a basis for group action (Nahapiet & Ghoshal, 1998). To the extent that

members of the team operate with a common mental model upon which plans are developed and decisions are made, the more focused is the group's direction and priorities which lead to higher performance levels. Rouse and Morris (1986, p. 360) defined *mental models* as "mechanisms whereby humans generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states". Individuals use mental models to help describe, explain, and predict events (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). They help to simplify and provide order in an often complex environment. However, the mental models of individuals may not always align. Klimoski and Mohammed (1994) described a mental model as shared based on the degree to which the model is adopted by members of a team.

Shared vision is another important component of cognitive social capital (Nahapiet & Ghoshal, 1998). This concept is defined as a "shared code or a shared paradigm that facilitates a common understanding of collective goals and proper ways of acting in a social system" (Tsai & Ghoshal, 1998). Shared vision allows team members to efficiently accumulate, organize, and retrieve relevant knowledge, thereby contributing to group performance.

For example, Leana and Pil (2006) found that internal social capital (including shared vision) leads to increases in student achievement in both reading and mathematics. Their longitudinal study design allowed them to both posit and find a causal relationship between cognitive social capital and performance. Shared vision is useful to groups and organizations as it develops a set of collectively held values which, in turn, help to create a sense of shared responsibility, promote integration, and encourage collective action

21

(Coleman, 1990). Additionally, social loafing is reduced when goals are held collectively by group members (Leana & Pils, 2006). Thus, cognitive social capital may help to control individual self-serving behavior which is frequently a barrier to group goal attainment.

In summary, the cognitive dimension of social capital is built upon the idea of shared mental models. Sharing a vision enables team members to work together more effectively and leads to higher performance.

I now turn my attention to investigating more fully the multilevel nature of social capital. The translation process of social capital from the individual to the team is a primary focus of my dissertation study.

Multilevel nature of social capital. How social capital functions across multiple levels in an organization context is a question that remains relatively unexplored. As noted by Oh and colleagues (2006) in their recent theoretical paper on group social capital:

> most researchers have limited their view of social capital to discrete levels
> of analysis, including individuals (Burt, 1992), organizations (Leana &
> Van Buren, 1999), communities (Putnam, 1993), industries (Walker,
> Kogut, & Shan, 1997), and nations (Fukuyama, 1995), without taking on
> the more difficult task of integrating different levels of analysis when
> discussing social capital (Oh et al., 2004).

A small number of exceptions exist. In the paper from which the above quote is drawn, Oh and colleagues (2004) present a theoretical framework for group social capital that considers both bridging ties of individuals as well as the level of bonding within a

group. The authors conclude that social capital resources at both the individual and group levels can be beneficial for team effectiveness (Oh et al., 2004). In a second conceptual paper, Blyler and Coff (2003) postulate that while social capital is essential for the acquisition, integration, and release of resources at the core of a dynamic capability at the firm level, actors can also use social capital for personal gain. Actors may choose to appropriate the resources generated by firm social capital for self-serving purposes (Blyler & Coff, 2003). Finally, in their recent study of teacher human and social capital growth and student performance, Pil and Leana (2009) found that both horizontal and vertical social capital linkages are important. Teachers in teams with strong group ties had better performing students as did teachers with strong ties to school administrators (Pil & Leana, 2009). Clearly, more work is needed to fully understand the relationships among multiple levels of group social capital.

In the broader social network literature, multilevel phenomena have received more attention and investigation. Several prominent authors have suggested that network research can be enriched by work which considers multiple levels of analysis, and especially by work which looks at cross-level phenomenon (Brass, Galaskiewicz, Greve, & Tsai, 2004; Contractor, Wasserman, & Faust, 2006; Monge & Contractor, 2003). For example, in their review of networks and organizations, Brass and colleagues (2004) suggested that interpersonal, inter-unit, and inter-organizational levels of analysis are all important to network research and that cross-level dynamics have a significant impact on the realization of networks. As an illustration, individual job satisfaction may be a function of the network of interpersonal relations within a work unit, the position of the work unit within its organization, and the position of the organization within its industry

(Brass et al., 2004). In their multi-theoretical multilevel (MTML) framework, Monge and Contractor (2003) suggested that considering the individual, dyad, triad, and global levels of networks would both broaden and enrich the field.

There are two theoretical implications of considering multiple levels. First, scholars who advocate a cross-level approach to networks suggest that local network patterns driven by individual nodes combine to create the global structure of the entire network (Monge & Contractor, 2003; Robbins, Pattison, & Woolcock, 2005). One level influences the next level. Second, by considering networks at multiple levels, different outcomes may be observed. For example, in their study of subgroup structure among mental health agencies and their clients, Provan and Sebastian (1998) found that integration among small subsets of agencies was associated with effectiveness, yet the overall level of network integration was negatively related to effectiveness. Additionally, in their study of civic networks, Baldassarri and Diani (2007) found that both the macro level configurations and the micro level dynamics of the network contribute to understanding the phenomenon. This pattern suggests that local networks do not always combine directly to create more global networks and that the compilation process must be considered carefully when investigating phenomenon across multiple network levels. In summary, these studies provide evidence that network structures at multiple levels should be examined.

While the multi-level nature of social capital has been previously addressed in the literature, less attention has been paid to how social capital may transfer from one level to another. However, in their article on conceptualizing and conducting multilevel research, Klein and Kozlowski (2000) offer suggestions which may be of assistance. The authors

24

advise that careful and considered choices regarding construct, model, sampling, and analysis must be made in order to ensure high-quality multilevel research (Klein & Kozlowski, 2000).

When moving from the individual to the team level of analysis, Klein and Kozlowski suggest that constructs may be of three basic types: global properties, shared properties, or configural properties. Observable team characteristics which are objective in nature and which characterize the team as a whole are considered global properties (Klein & Kozlowski, 2000). Team cohesion and team climate are examples of shared properties, which are derived from the attitudes, values, and behaviors that are shared amongst the members of a team (Klein & Kozlowski, 2000). Finally, configural properties are similar to shared properties in that they also emerge from the attitudes and behaviors of team members, but differ as they capture the array, pattern, or variability of individual characteristics within a team. These have received the least attention from organizational scholars (Klein & Kozlowski, 2000).

Similar to the team performance example used in their article, the relationship between individual and group social capital might best be described as a configural property. Group social capital emerges from the complex conglomeration of individual team members' personal relationships. Group social capital may reflect any of the following, depending upon the situation: the sum of individual team members' capital; the least-well-connected team member's contribution (the team has no better resources than its weakest member); the most-well-connected team member's contribution (one team member can carry the team to a high level); the variability of team members' connections (the more varied team members' connections, the greater the number of non-

redundant resources available to the team); or some more complex combination of team member connections (Klein & Kozlowski, 2000). In this dissertation, the relationship is quite complex as both individual member connections as well as each individual's *willingness to share* these connections with teammates combine to contribute to team-level social capital.

Additionally, Kozlowski and Klein provide guidance on the elemental contribution implied by different forms of model emergence (Kozlowski & Klein, 2000). While compositional models are isomorphic, implying that a phenomenon is structurally equivalent and is essentially the same construct at different levels of analysis, configural or compilation models are discontinuous in nature. This discontinuity is based on an assumption that the kinds of contributions that individuals make to the collective are variable, not shared and consistent (Klein & Kozlowski, 2000). Configural models are not structurally equivalent, but are instead functionally equivalent, meaning that the constructs at the two levels of analysis perform the same role and function in models at different levels of analysis (Kozlowski & Klein, 2000; Morgeson & Hofmann, 1999). The elemental content comes from a common domain, but the nature of individual contributions can be quite different and variability and pattern are central to compilation (Kozlowski & Klein, 2000; Morgeson & Hofmann, 1999). Thus, in this dissertation team structural social capital is defined as the relationships which *the team* possesses that provide it with access to important informational and support resources. The pattern of relationships and how they relate to the individual team members may vary widely across teams.

Literature Review of Innovation in Teams

Innovation is a widely studied organizational phenomenon. While much of this work is at the firm level of analysis (e.g., Hoskisson, Hitt, Johnson, & Grossman, 2002; Phelps, 2010), some scholars have investigated innovation in team contexts. In his review of innovation in teams, West (2002) suggests that this work has concentrated in two broad thematic areas: the impact of the group task, and the role of diversity in knowledge and skills of individual team members.

The nature of the task provides a fundamental influence on a work group. Group membership, role definitions, and work processes are shaped by the tasks performed both collectively and individually. A number of different group task characteristics and their relationship to team innovation performance have been investigated, including task difficulty; solution multiplicity; intrinsic interest; cooperative requirements (Shaw, 1981); tasks which are unitary versus divisible, conjunctive, disjunctive, and additive (Steiner, 1972); conflict versus cooperation elements; and conceptual versus behavioral components (McGrath, 1984). Research in this segment of the field has yet to be prosperous when examining group performance and innovation in organizational situations due to the difficulty of dividing innovative work into discrete tasks and sub-tasks (Tschan & von Cranach, 1996).

Different perspectives on issues as well as a variety of knowledge, skills, and abilities often help groups to perform more innovatively (Paulus, 2000). Members create multiple viewpoints and potentially constructive conflict with their divergence of views (West, 2002). Successfully managing group conflict by using it to promote more effective decision making is especially helpful in generating improved performance and

more innovative actions (De Dreu, 1997; Paulus, 2000; Tjosvold, 1998). Also, scholars have found that groups formed from people with diverse but overlapping knowledge domains and skills are particularly creative, an importance precursor to innovation (Dunbar, 1995, 1997).

Additionally, a number of studies have considered the role of social capital and network characteristics in team innovation. In his study of new-product development projects in a large electronics firm, Hansen (1999) found that weak ties between unit members help a project team search for useful knowledge outside of their team but impede the transfer of complex knowledge, which is better facilitated by strong ties between the two individuals. Project speed is also impacted by weak ties, as weak ties improve project speed for projects using simple knowledge, but impeded it for more projects requiring more complex knowledge (Hansen, 1999). In another study set in a contract R&D firm, Reagans and McEvily (2003) found that both strong ties and social cohesion around a relationship affects the willingness and motivation of individuals to invest time, energy, and effort in sharing knowledge with others. In a related study also conducted in the contract R&D environment, Reagans and Zuckerman (2001) found that both network density and network heterogeneity are important predictors of team performance in this innovative context.

Findings regarding network characteristics and innovation have not always been consistent, however. Despite the above findings which support the value of strongly interconnected teams for innovative performance, other studies have found that sparse connections are more beneficial. For example, in his study of supply chain managers in a large electronics company, Burt (2004) found that managers whose networks bridged

28

disconnected parts of networks (structural holes) were more likely to express an idea and discuss it with colleagues, to have the idea engaged by senior management, and to have it judged as valuable. Additionally, Fleming and colleagues (2007) actually found that density or closure had a net *negative* effect on innovation, even considering the career histories and length of relationships of the individuals involved.

Thus, more work in this area is clearly necessary to determine the specific circumstances where particular network characteristics are most valuable for team innovation processes. Consistent with some prior work, in this study I expect to find that both bridging ties and strong ties become necessary for successful innovation performance. Bridging ties will allow team members to find the novel information and support necessary for their project while strong ties will create an atmosphere where this information can be successfully integrated into the team's knowledge base and used to improve performance. I now turn my attention to developing the logic and hypothesis specific to this dissertation study, which builds upon the work discussed in this literature review chapter.

Chapter 3: Hypothesis Development

The model for this dissertation study is presented in Figure 1. Through empirical investigation of this model, I hope to provide an answer to the question of how individual bridging social capital relates to team bridging social capital in an innovative context. To answer this question comprehensively, I examine the direct relationship between individual and team bridging social capital, moderators of the relationship between individual and team bridging social capital, the relationships between team bridging social capital and team innovative performance, and the role of bonding social capital and transactive memory systems as moderators of the relationship between team bridging social capital and team innovative performance.

As mentioned in the literature review, social capital is a multi-faceted construct with three separate dimensions: structural, relational, and cognitive capital (Nahapiet & Ghoshal, 1998). The structural dimension encompasses the properties of the social system and of the network of relations as a whole (Granovetter, 1992; Nahapiet & Ghoshal, 1998). In this dissertation, I drew upon several different components of structural social capital including bridging ties, bonding ties, and tie strength. *Bridging ties* refer to external ties which span gaps between disconnected people (Oh et al., 2006). *Bonding ties* refer to within-group ties which connect group members by strong, positive, multiplex, and reciprocated relationship ties (Oh et al., 2006). *Tie strength* is a combination of the amount of time, the emotional intensity, and the level of reciprocity which characterize each tie (Granovetter, 1973). Weak ties are typically between individuals who spend little time together, have low emotional investment in their relationship, and think of one another as casual acquaintances (Granovetter, 1973).

30

Strong ties, on the other hand, are between individuals who consider one another close friends or colleagues, who spend a great deal of time together, and who are highly invested emotionally in their relationship (Nelson, 1989).

Ties are imbued with a variety of different types of content and resources, such as friendship, kinship, and advice relationships. In this dissertation, *resources* are defined as "what is available to be used, or anything with a real or perceived value put to service for attaining goals" (Foa, 1971). Foa and Foa's (1974) model of resource theory suggests that several types of resources are available to be exchanged between individuals (see Figure 2). These include love, services, tools, goods, money, information, ideas, and status. Resources that are more distant from one another in their depiction in the model are less closely related and more likely to be provided by different sources (Foa & Foa, 1974). In the innovation context of this study, two types of resources seem particularly important: information and supportive behavior. Access to information is important to innovation as individuals and teams often do not have all of the knowledge they need in order to successfully meet their goals and objectives (Hansen, 1999; Hansen, Mors, & Lovas, 2005). This resource is relatively low cost to provide and thus relatively easy to obtain (Hansen, 1999; Hansen et al., 2005). On the other hand, innovation projects often also require support and championing on behalf of the project by outsiders (Howell & Higgins, 1990; Howell, Neufeld, & Avolio, 2005). In this instance, the individual providing the support is aligning themselves with the innovation project and its team members as well as potentially risking their own reputation if the project does not work out. Hence, this resource is high cost and comparably difficult to obtain.

31

Based upon the above argument, I consider two different types of resources embedded in ties: information and support. Informational resources provide a flow of unique and novel information into an individual or team (Burt, 2004; Hansen, 1999). Support resources provide individuals and groups with a sense of psychological safety for their innovation work as well as encouragement and facilitation through any obstacles the innovators may encounter (S. G. Scott & Bruce, 1994; Yuan & Woodman, 2010). I now turn my attention to describing the relationship between bridging social capital at the individual and team levels and developing the specific hypotheses for this study.

The Relationship between Individual Bridging Social Capital and Team Bridging Social Capital

The relationship between individual and team social capital has not received much attention from scholars. Social capital research tends to focus on either the individual or the group, which has caused theoretical and practical dilemmas in integrating the two levels (Ibarra, Kilduff, & Tsai, 2005). The term 'social capital' is used across several literatures to refer to the social relations and resource advantages of *both* individuals and communities (Coleman, 1988; Kilduff & Tsai, 2003). However, as stated by Ibarra and colleagues (2005, p. 360), "the nuances of the concept have tended to vary greatly, depending on whether individual or collective advantage is the focus". The individual social capital steam of research takes the perspective that social capital benefits accrue from individuals' network connections (cf. Tsai & Ghoshal, 1998). This work assumes that individuals use their network ties to pursue opportunities that benefit themselves (Bourdieu, 1985; Ibarra et al., 2005). For example, Burt (1992; Burt, 2004) suggests that individuals may use diverse information and resources from their bridging

32

connections to advance their own careers. In contrast, group social capital work takes the

perspective that connections between actors promote public goods to the benefit of the

entire network (Ibarra et al., 2005; Putnam, 1993, 1995). For example, Nelson's work

(1989) suggests that strong social ties within and between informal organizational groups

reduces the effects of negative events in organizations.

Taking a step toward resolving this dilemma is the focus of this dissertation.

Combining the individual and team levels of social capital in a single model raises a host

of potential questions including when individuals might share their networks with their

teams. Ibarra and colleagues (2005) advanced a typology of scenarios which may emerge

when individual and group social capital are juxtaposed:

Table 1

	Group social capital	
	Low	**High**
Individual social capital		
High	Tragedy of commons	Network congruence
Low	Atomized market	Total institution

The cells in this typology represent the ways in which individual and group social capital

may combine based on whether the needs of the individual or the needs of the group are

paramount in a given situation. Both individual and group social capital ties are

necessary for effective performance in a team-based innovation context. Individual team

members must have external contacts that they can access to find novel and useful

information and resources that the team needs in order to innovate successfully (Ancona,

1990; Granovetter, 1973; Hansen, 1999). However, individuals must also be willing to

share these ties with their team members so that the team receives the benefits of the ties

33

and to ensure that individuals are not withholding important information or resources for personal gain or other selfish reasons. Thus, I expect to see *network congruence* between social capital at the individual and group levels in this study. In this scenario, individual actors' self-interest in networking coincides with the collective interests of the entire network (Ibarra et al., 2005).

Additionally, compiling individual social capital to the team level is a somewhat complex process. Individual behavioral contributions to team social capital may or may not be isomorphic or converge among members (Klein & Kozlowski, 2000). Instead, these may vary in amount and type depending on a set of factors which define the team member's relationship with the team, such as task and team interdependencies. This team-level construct may be best described as a process composition model (Chan, 1998). Process composition models assume that the basic process (forming bridging ties) is homologous across levels, and thus, there is no simple algorithm (e.g., agreement across team members) that describes precisely how lower level processes compose higher level ones (Chan, 1998; Kozlowski & Klein, 2000). Rather, as Chan notes, the process is first specified at the lower level and then the analogue parameters and interrelationships are described at the higher level. Additionally, the manner in which a team member's ties aggregate to the team level depends on a process of sharing those ties and is conditional on a set of factors that define the member's relationship with the team.

This expectation is consistent with work in the strategy literature which suggests an empirical relationship between individual and group level social capital. In this line of research, Dyer and Singh (1998) found that personal ties are an important force behind the resources obtained from inter-firm networks when the relationships depend on

specific individuals. Similarly, in their study of communities of practice, Brown and

Duguid (1998) found that individuals' external social ties grant organizations access to

valuable knowledge bases. Additionally, Bouty (2000) found that intellectual resources

were more easily acquired by firms when their R&D scientists had well developed social

ties. Therefore, I propose that:

Hypothesis 1a: Individual informational resource ties are positively related to team informational resource ties.

Hypothesis 1b: Individual support resource ties are positively related to team support resource ties.

However, individuals may be more willing to share ties containing resources of

some types more so than others, as resources are not all equally valuable or easily

obtainable. As Foa and Foa (1974) describe in their theory and accompanying model,

resources of various types are available through social interactions and relationships with

others. Individuals are much more selective about exchanging certain resources

compared to others. For example, love is a resource that individuals are typically only

willing to exchange with family and friends, whereas money is a resource individuals are

likely to exchange with nearly everyone, such as store clerks and bank tellers (Goldsmith,

2005). Resources can be categorized across two axes labeled particularism and

connectedness. *Particularism* describes how selective individuals tend to be in the

exchange of a specific resource while *connectedness* describes how strong a relationship

must be in order for a specific resource to be exchanged (Foa & Foa, 1974).

Figure 2
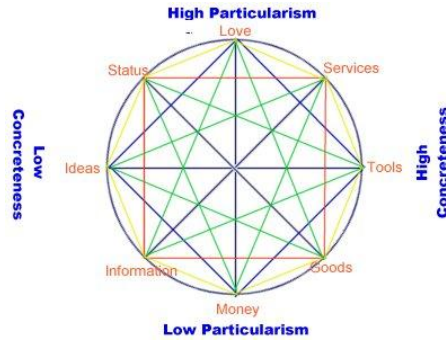
In an innovative performance context, two resources which are particularly important for success are information and support (Burt, 2004; Hansen, 1999; S. G. Scott & Bruce, 1994; Yuan & Woodman, 2010). Information ties are important because they provide a flow of unique and novel information into an individual or team (Burt, 2004; Hansen, 1999). Support ties are important because they provide individuals and groups with a sense of psychological safety for their innovation work as well as encouragement and facilitation through any obstacles the innovators may encounter (S. G. Scott & Bruce, 1994; Yuan & Woodman, 2010). On the Foa and Foa (1971) resource model, these two types of ties are quite distant from one another (information and services), indicating that the levels of particularism and connectedness required to obtain these resources are very different. Informational ties are similar to money, and are easily exchanged with others while services ties are positioned similarly to love in the Foa and Foa model and likely to be exchanged only selectively.

In the context of translating individual social capital to group social capital, I expect that individuals share their informational resource ties more freely than their support resource ties. Prior work on information sharing suggests that novel information is most effectively obtained through weak ties (e.g., Hansen, 1999) that require relatively

36

little investment of time and effort to cultivate or maintain. In contrast, support resource ties require that a trust relationship exists between the two connected actors. Trust relationships take time to form and require ongoing contact and effort to maintain. Individuals will be much more willing to share informational ties than resource ones because there is much less risk to themselves and their ongoing relationships. Thus, I hypothesize that:

Hypothesis 1c: The relationship between individual and team level informational resource ties will be stronger than the relationship between individual and team level support resource ties.

The Moderating Role of Relational and Cognitive Social Capital, *Tertius Iungens* Orientation, and Interdependence

The type of resource is not the only variable that may help explain the strength of the association between individual and team bridging social capital. They way an individual thinks and feels about his team, his orientation toward connecting others as well as the level of interdependence he shares with his team members are also important factors to consider. To assess these influences, I begin by describing how I expect the multi-dimensional nature of social capital to work in this model.

Social capital is not a one-dimensional construct. In addition to the structural form described thus far, the concept also has relational and cognitive aspects (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). The multi-dimensional nature of the construct helps to decrease inefficiencies in sharing resources, such as structural ties, across people and units (Lee, 2009). The relational dimension of social capital has been described as both the "affective aspect" and the "quality of relationships" (Nahapiet & Ghoshal, 1998)

37

and also as the "normative conditions and best practices that guide individual actor's relations" (Uzzi, 1996). Research suggests that this dimension has significant influence on an individual's willingness to share (Nahapiet & Ghoshal, 1998). Individuals with strong relational social capital have greater access to parties for resource exchange and are also more motivated to engage in sharing of resources (Nahapiet & Ghoshal, 1998).

Relational social capital can take several different forms. The most commonly researched aspect of relational social capital is *trust*. The concept of trust revolves around the expectation that others will behave in a way that is expected rather than a way that is feared (Deutsch, 1973). Trust comprises both individual's beliefs about others as well as their willingness to use knowledge of those beliefs as a foundation for action (Luhmann, 1979). Combining these ideas has led to a definition of interpersonal trust as "the extent to which a person is confident in, and willing to act on the basis of, the words, actions, and decisions of another" (McAllister, 1995).

Trust is a two-dimensional construct with an affective and a cognitive component. Affect-based trust resides in interpersonal connections (J. D. Lewis & Weigart, 1985) and captures the emotional bond between individuals. This form is most closely associated with relational social capital because it is an affective asset rooted in a social relationship; thus, I focus on affective rather than cognitive trust in this dissertation. Parties with high levels of affective trust are more likely to use their structural ties on behalf of the team and less prone to worry that they will be taken advantage of by the other party (Tsai & Ghoshal, 1998). Cooperative behavior, including tie sharing, is more probable to emerge when trust is present in a relationship (Tsai & Ghoshal, 1998).

A second important form of relational social capital is *group identification*, which is "the process through which individuals see themselves as one with another person or group of people" (Nahapiet & Ghoshal, 1998). This 'oneness' often results from an individual's membership and ongoing participation in a group (Merton, 1968; Tajfel, 1982). The probability of a relationship between individual and group ties is strengthened when group identification is strong because individuals highly value collective processes and outcomes (R. M. Kramer, Brewer, & Hanna, 1996). Identification positively influences the individual's perception of the relative value of a resource exchange as well as the motivation to participate in the exchange itself (Nahapiet & Ghoshal, 1998). In their empirical work, Lewicki and Bunker (1996) found that significant group identification increases both the perceived opportunities for sharing as well as the actual frequency of cooperation among team members. Conversely, in groups where members have distinct or contradictory identities, information sharing, learning, and knowledge creation are inhibited (Pettigrew, 1973; Simon & Davies, 1996).

In this study of team-based innovative performance, a third important form of relational social capital may be *team-member exchange* (TMX). Team-member exchange is defined as" an individual member's perceptions of the quality of his or her exchange relations within the group or team" (Seers, 1989). In this context, this seems important because teams where members have higher levels of TMX will be more likely to be able to successfully execute the exchange and combination of resources required for group-level innovation. A strong relationship is more likely to exist between individual and group bridging ties when team members view their teammates positively and believe their work together to be important and of high quality. TMX is often used to study

questions related to ideas, assistance, communication, and support within exchange relationships (Seers, 1989; Seers, Petty, & Cashman, 1995). Although no empirical work has looked specifically at TMX and tie sharing, a prior study did find that TMX predicted individual participation in organizational citizenship behaviors (Kamdar & Van Dyne, 2007), which is closely related.

The strength of the association between individual and team bridging social capital is thus dependent upon a team member's perception of relational social capital factors. When team members trust their teammates, strongly identify with their group, and have high quality relationships with other team members, the relationship between individual and team bridging social capital will be stronger. Stronger relationships occur since individuals who feel invested in working with others they feel positively about will be highly concerned with maintaining relationships that are personally important. Thus, I propose that:

Hypothesis 2: The relational social capital dimensions of trust, group identification, and TMX moderate the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences high levels of trust, group identification, and TMX.

The third dimension of social capital is the cognitive one. Cognitive social capital refers to the "meaningful contexts of communication among and between actors" (Nahapiet & Ghoshal, 1998). The creation of shared understanding between group members is dependent upon the extent to which 'meaningful communication' is present (Nahapiet & Ghoshal, 1998). Additionally, shared meaning provides cohesion and support for a group and its members (Starkey & Tempest, 2004).

40

One important form of cognitive social capital is shared vision. A shared vision provides a reference for expected behavior amongst members in a social system as well as a common understanding of collective goals (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). Shared vision represents the degree to which each team member's vision of the team's goals and aspirations is consistent with the vision of the team as a whole (Lechner, Frankenberger, & Floyd, 2010). Shared vision is beneficial because it allows team members to better understand how their individual actions facilitate the goals of the team (Lechner et al., 2010). A feeling of shared responsibility and a willingness to integrate are the result of shared vision and goals and the group values that underlie them (Coleman, 1990). Social loafing problems diminish when team members collectively hold a set of goals (Leana & Pils, 2006). Shared vision also increases a variety of important interpersonal processes including communication efficiency (Tsai & Ghoshal, 1998) and reduces the likelihood that misunderstandings will develop between group members (Lechner et al., 2010). Additionally, individuals are more likely to interact and share information with one another when they share the same vision regarding their work (Mohammed & Dumville, 2001).

The strength of the association between individual and team bridging social capital is thus dependent upon a team member's level of shared vision with the team. When team members view the goals and objectives of the team as their own, the relationship between individual and team bridging social capital will be stronger. This is because individuals will see both personal and group benefit in achieving the team's goals and objectives, and they will be willing to use their own ties to benefit the work of the team. Therefore, I posit that:

41

Hypothesis 3: The cognitive social capital dimension of shared vision moderates the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences a high level of shared vision.

The relational and cognitive dimensions of social capital are not the only potentially important moderators of the relationship between individual and team bridging social capital. Other characteristics which encourage connections between individuals may also play a significant role.

Individuals with a high *tertius iungens* orientation engage in brokerage activities which focus on facilitating coordination, collaboration, and pursuit of common goals by joining previously unconnected parties (Obstfeld, 2005). These individuals may be complete strangers or, alternatively, may have a previous connection which is unrelated to the current project or initiative. Additionally, *tertius iungens* actors operate within both sparse and dense networks (Obstfeld, 2005). Higgins suggests that the way an individual prefers to tackle problems in a social context is a "strategic orientation" (2001). The term "orientation" is used to suggest a construct which lies between a highly specific attitude and a more general personality trait (Frese & Fay, 2001).

Several empirical studies have considered the role of the *tertius iungens* orientation. In an ethnographic study of technology brokering at IDEO, Hargadon and Sutton (1997) found that engineers in the firm routinely transported ideas between unconnected industries in their innovation work. This cross-pollination allowed IDEO to maximize new combinations of old technologies taken from both inside and outside a particular client's industry, and created quicker and more innovative solutions to design

issues. In a study of 152 employees involved in automotive design, Obstfeld (2005) found that *tertius iungens* orientation significantly predicted individual involvement in innovation. Additionally, the study found that the *tertius iungens* mechanism accounts for innovation involvement independent of network density, further solidifying its importance in innovation-related research. Finally, in an in-depth case study conducted in the natural gas industry, Garriga (2009) found that a context for selective cooperation is created by network structure amongst firms. The role of each firm in the cooperative process was determined by their member's *tertius iungens* orientation, with firms with members having higher orientations more likely to engage in collaborative and joining activities.

Individuals with a strong *tertius iungens* orientation are more likely than those with a weaker orientation to see the potential benefits in sharing their personal network connections with other members of their team, especially in an innovation-related context. Individuals who are active in introducing dissimilar others and facilitating action among those in their social network will be more involved in sharing ties with others and in encouraging others to share their own ties (Obstfeld, 2005). Thus, a strong *tertius iungens* orientation will lead to more sharing of ties between individuals and their team. Therefore, I propose that:

Hypothesis 4: Tertius iungens orientation moderates the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences a high level of tertius iungens orientation.

The degree of *interdependence* team members have with their team may also play a significant role. Work which is interdependent in nature requires the input of several people in order for it to be completed successfully (Wageman, 1995). Interdependence increases both the efficiencies with which work is done as well as the motivational properties of work (Campion et al., 1993). As with social capital and trust, interdependence is a multi-faceted construct with three distinct dimensions. Task interdependence refers to the extent to which group members interact with and depend on one another in order to accomplish their assigned work (Campion et al., 1993; Wageman, 1995). Goal interdependence refers to the extent to which individual member's goals are linked to the group's goals (Campion et al., 1993; Wageman, 1995). Finally, reward interdependence refers to the extent to which individual feedback and rewards are linked to group performance (Campion et al., 1993; Wageman, 1995). High levels of interdependence amongst group members increases members' felt responsibility toward the group (Pearce & Gregersen, 1991), as well as group members' communication and information sharing (Crawford & Haaland, 1972; Johnson, 1973). Additionally, a high level of interdependence amongst group members promotes norms of cooperation, which increases the likelihood of members enacting helping behaviors (Krebs, 1970; Shaw, 1981). Most work to this point has considered interdependence as a team-level phenomenon (Campion et al., 1993; Pearce & Gregersen, 1991; Wageman, 1995). In this dissertation, I explore interdependence as an individual-level variable, thereby offering a different perspective on the role of a very well-researched construct.

Prior empirical work has demonstrated a connection between interdependence and helping behavior. In an experimental design, Allen and colleagues (2003) found that

44

helping behavior levels were highest amongst group members with high task interdependence. Lin found that outcome interdependence (similar to reward interdependence) exerted indirect influence on the helping behaviors amongst MBA students (C.-P. Lin, 2006). Finally, in an experimental study, Moser and Wodzicki (2007) found that high reward interdependence resulted in a greater willingness amongst members to help other group members as well as to share information.

I argue here that the strength of the association between individual and team bridging social capital is dependent upon a team member's perception of how interdependent he sees his work with other members of his team. When team members view the work of themselves and their teammates as highly interdependent, the relationship between individual and team bridging social capital will be stronger. Similar to cognitive social capital, this is because individuals will see both personal and group benefit in maximizing the performance of the group since their own performance and rewards are entwined with those of the group, and they will therefore be willing to use their own ties to benefit the work of the team. Thus, I hypothesize that:

Hypothesis 5: The interdependence a team member has with the other members of their team on tasks, goals, and rewards moderates the relationships between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences high levels of interdependence.

The Relationship between Group Social Capital and Team Innovative Performance

There is much research in the sociology literature on the relationship between network structure and innovation. However, most of this work focuses on the adoption or diffusion of innovation rather than the generation of innovations (Ahuja, 2000). Network

metaphors have abounded in the popular press, but only recently have scholars begun

studying the network structure-innovation generation relationship empirically. A handful

of studies have considered the association between bridging or weak ties and innovative

outcomes. For example, in a study of biotech firms, Shan, Walker, and Kogut (1994)

found that innovation output was predicted by the number of collaborative relationships

that a firm formed with other organizations. In another study conducted in the chemicals

industry, Ahuja (2000) found that firms with more direct ties (conceptualized as

connections with partner firms) have greater innovation output, measured as number of

successful patent applications. In their study of a multinational electronics company,

Tsai and Ghoshal (1998) found that social interaction (operationalized as ties between

business units) impacted product innovation based on the level of resources exchange

taking place between the two units. Finally, Hargadon and Sutton (1997) found that

IDEO's practice of having engineers share information about other projects at

brainstorming sessions was significantly related to the company's ongoing product design

success. Successful designs could be more often linked to the interactions among

engineers than to individuals' specific knowledge.

  This empirical work is consistent with related network and social capital theory.

Work on bridging ties suggests that social capital is a resource inherent in a social

network which provides a link between actors (Adler & Kwon, 2002). According to this

perspective, the differential success of individuals and groups across a variety of

performance outcomes is facilitated by their links to others in a social network (Adler &

Kwon, 2002). Bridging ties are often viewed as valuable because they allow individuals

access to novel information which typically resides outside an individual's team or regular work group (Burt, 1987).

Network theory has also considered the strength of ties and their relationship to performance outcomes. In his seminal work on the strength of weak ties, Granovetter (1973) argued that "weak ties are indispensable to individual's opportunities and to their integration into communities" (p. 1378). Strong ties, on the other hand, breed local cohesion, but can lead to fragmentation within a larger network (Granovetter, 1973). Thus, both have their uses and their value is dependent upon the context at hand. In innovative contexts, weak ties are generally thought of as more valuable because of their usefulness in searching for and locating knowledge and information needed by members of a new product development team (Hansen, 1999). Therefore, I posit that:

Hypothesis 6: Team bridging social capital in the form of weak ties is positively related to team innovative performance.

However, I do not believe that bridging social capital components will have uniform effects on a team's level of innovative performance. Specifically, I posit that a potential moderator of this relationship is the effectiveness of the team's transactive memory system. When team members are connected to others outside the team through their bridging ties, they return to the team with knowledge that needs to be imparted in order to be useful (Hansen, 1999). New knowledge will not benefit the team unless it is integrated and applied to the current complication (Alavi & Tiwana, 2002). Transactive memory systems provide a method for coordinating that knowledge and imparting it to other team members (Wegner, 1986). The idea of *transactive memory* was first introduced in experimental work investigating how pairs of people in close relationships

47

rely on one another's memory to perform a cognitive task, such as word memorization. Wegner (1986) described transactive memory as both a shared awareness of who knows what as a well as a combination of both parties' memories and knowledge. He later extended the concept of transactive memory to group settings, suggesting a system of transactive memory (TMS) (Wegner, 1986). Wegner defines a group's transactive memory system as "a set of individual memory systems" and drew upon his earlier individual memory systems theory to explain the functioning of TMS (Wegner, 1986). Group transactive memory provides both a shared awareness of who knows what as well as a combination of multiple parties' memories and knowledge (Wegner, 1986). Thus, teams with stronger transactive memory systems will be better positioned to integrate the knowledge acquired through bridging ties.

Researchers have both posited and found transactive memory to be helpful in predicting a group's ability to take diverse information and integrate it into knowledge. In a recent theoretical paper, Alavi and Tiwana (2002) posit that a knowledge management system designed to support a group's transactive memory will enhance a team's knowledge integration process and improve their performance by reducing the expenditure of resources necessary for knowledge location and retrieval. Faraj and Sproull (2000) found that teams' expertise coordination went above and beyond the presence of expertise in predicting team effectiveness. Additionally, in a recent case study Schmickl and Kieser (2008) found that the time and effort involved in complex knowledge transfer between specialists can be greatly reduced through the use of team-level transactive memory systems.

In this dissertation model, transactive memory will function as a moderator between team bridging social capital and team innovative performance. Through bridging ties, individuals collect information which may be useful for the team's performance (Hansen, 1999). Strong internal ties allow team members to share and process the information that is collected through bridging ties (Hansen et al., 2005). A strong transactive memory system enables the knowledge integration process by allowing everyone on the team to know who has which pieces of relevant information and to retrieve and eventually integrate this information in an efficient way. In contrast, teams with a weak transactive memory system might effectively acquire knowledge from outside, but their knowledge integration process would be highly inefficient as members would not know where necessary information was stored within the team or how to retrieve it. Thus, I propose that:

Hypothesis 7: The transactive memory system of the team moderates the relationship between team bridging social capital in the form of weak ties and innovative performance such that this relationship is stronger when the team transactive memory system is higher.

Bridging ties are not the only form of network structure that is important to a team's ability to innovate. Prior research suggests the importance of bonding social capital and dense networks in innovation and innovation-related tasks such as knowledge transfer. *Density* is a measure of bonding social capital that defines the general level of interconnection amongst actors in a network (J. Scott, 2000). This linkage represents the interpersonal relationships between team members, with greater density indicating stronger team bonding. Dense teams tend to benefit from greater cooperation, conformity

to agreed-upon norms, and information sharing, thereby leading to better team effectiveness and performance (Oh et al., 2006).

Prior empirical work supports the link between bonding social capital and innovation outcomes. In a study of R&D teams, Reagans and Zuckerman (2001) found that increased communication network density resulted in higher innovation team productivity. Additionally, in a study of 79 senior partners in a global management consulting firm, Mors (2010) found that when crossing both firm and geographic boundaries, partners with dense networks had higher innovation performance. The author argued that dense network interactions facilitate partners' ability to integrate the diverse information to which they are exposed when working in such heterogeneous contexts.

In related work, Uzzi (1997) and Hansen (1999) found that the fine-grained information transfer of tacit knowledge is a function of stronger, embedded ties. These kinds of ties are often found in dense social networks (Granovetter, 1973; Reagans & McEvily, 2003). Tacit knowledge sharing frequently involves not only technical knowledge transfer but also information about the social and political context in which innovations are conceived and pursued over time. Therefore, I posit that:

Hypothesis 8: Team bonding social capital, specifically the density of the team's internal network, is positively related to team innovative performance.

As mentioned in the discussion of transactive memory systems, once new knowledge has been acquired, it must be integrated and incorporated into the focal project (Hansen, 1999). Complex knowledge, such as that acquired from outside the team during innovation work, tends to be highly codified and difficult to transfer (Zander

50

& Kogut, 1995). A strong relationship between the two parties to the transfer eases this process in two ways. First, the strong ties present in dense networks allow two-way communication between the parties, thereby permitting multiple attempts at transfer and increasing the chances of success (Polanyi, 1966). Second, the strong ties provide motivation to complete the transfer based on the personal nature of the relationship (Hansen, 1999). Greater transfer of knowledge leads to more innovative performance.

This theorizing is supported by empirical evidence. In his study of 120 new-product development projects in a large electronics company, Hansen (1999) found that weak inter-unit ties help project teams search for useful knowledge in other subunits but impede the transfer of complex knowledge, which tends to require a strong tie between the two parties to a transfer. Having weak inter-unit ties speeds up projects when knowledge is not complex but slows them down when the knowledge to be transferred is highly complex. Additionally, in his longitudinal study of firms in the international chemicals industry, Ahuja (2000) found that exclusive, cohesive, and non-redundant connections can all be important forms of social capital for innovation, dependent upon the actions that the structure seeks to facilitate (Lawrence & Lorsch, 1967).

The strength of the association between team bridging social capital and innovative performance is thus dependent upon a team's level of bonding social capital. When team members have strong interconnections with one another, the relationship between team bridging social capital and innovative performance will be stronger. This is due to the increased ability of team members to disseminate the information and support gathered from their external contacts through well-established processes of coordination and communication. Thus, I posit that:

51

Hypothesis 9: Team bonding social capital in the form of network density moderates the relationship between team bridging social capital, specifically weak ties, and innovative performance such that this relationship is stronger when bonding social capital (network density) is higher.

Table 2: List of Hypotheses

Hypothesis 1a: Individual informational resource ties are positively related to team informational resource ties.

Hypothesis 1b: Individual support resource ties are positively related to team support resource ties.

Hypothesis 1c: The relationship between individual and team level informational resource ties will be stronger than the relationship between individual and team level support resource ties.

Hypothesis 2: The relational social capital dimensions of trust, group identification, and TMX moderate the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences high levels of trust, group identification, and TMX.

Hypothesis 3: The cognitive social capital dimension of shared vision moderates the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences a high level of shared vision.

Hypothesis 4: Tertius iungens orientation moderates the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences a high level of tertius iungens orientation.

Hypothesis 5: The interdependence a team member has with the other members of their team on tasks, goals, and rewards moderates the relationships between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences high levels of interdependence.

Hypothesis 6: Team bridging social capital in the form of weak ties is positively related to team innovative performance.

Hypothesis 7: The transactive memory system of the team moderates the relationship between team bridging social capital in the form of weak ties and innovative performance such that this relationship is stronger when the team transactive memory system is higher.

Hypothesis 8: Team bonding social capital, specifically the density of the team's internal network, is positively related to team innovative performance.

Hypothesis 9: Team bonding social capital in the form of network density moderates the relationship between team bridging social capital, specifically weak ties, and innovative performance such that this relationship is stronger when bonding social capital (network density) is higher.

Chapter 4: Research Methods

In order to test the foregoing hypotheses, I employed a multi-method, multilevel research design using a sample of innovation project teams. The first phase utilized a qualitative approach to gather data to refine construct measurement and to better understand the specifics of the research setting. The second phase used a quantitative approach and involved surveying respondents via questionnaire in a field setting to test the hypothesized relationships. This chapter describes my sample and its appropriateness, the data collection procedures, measures, and an overview of analytical procedures.

Sample

The core research question in this study surrounds the willingness of individuals to provide access to the resources embedded within their personal social networks to their teammates. This question is most effectively studied in teams where access to external resources is essential to job performance. Project teams working on innovative outcomes provide one such context as innovation work typically requires the support of upper levels of management (Eisenbeiss, Van Knippenberg, & Boerner, 2008; Hulsheger, Anderson, & Salgado, 2009) as well as collaboration amongst individuals from many different functional backgrounds, such as R&D, marketing, and operations (Hulsheger et al., 2009; A. Taylor & Greve, 2006). These teams also need to have high levels of autonomy, where many responsibilities are assumed by team members rather than receiving close oversight from an external manager.

Study participants were members of project teams in the merchandising displays division of a large paperboard and packaging manufacturer in the United States. The

company employs 26,000 people and posts annualized net sales of approximately $10 billion. The organization positions itself as a low-cost provider in the marketplace, and relies on creating and delivering value through innovation designed to both reduce costs and improve customer satisfaction.

The merchandising displays division works with both retail (i.e., Wal-Mart and CVS) and consumer products clients (i.e., CoverGirl and Nestlé) to design, manufacture, fulfill, and distribute corrugated product displays designed to attract consumer attention and turn shoppers into buyers. Project teams were cross-functional and, in this sample, were comprised of between five and eleven members. The teams were empowered to meet all client needs, and each team reported to an external manager. Some teams were quite longstanding, and had been working with the same client on the same type of projects for years while other teams were working with new clients, or working on displays for new products or product combinations. Teams working with well-established clients and products seemed less likely to need to access outside resources to complete their work than those working with new clients or new products. Thus, in this study I focused on the latter types of teams. Surveys were distributed to 339 individuals representing 47 teams.

Missing data is particularly troublesome when analyzing the network of team members' relationships, and can significantly alter the meaning of network indices such as density (Sparrowe & Liden, 2005). Consistent with prior studies employing a social network methodology (Oh et al., 2004; Sparrowe et al., 2001), I adopted a 80% response guideline in deciding whether a team and its members could be included in the study. Additionally, the study design required that team members complete a second survey

55

assessing more traditional variables. Responses could only be used for teams if they completed both the network and traditional measures surveys. Thus, the final sample included 263 individuals representing 38 project teams for response rates of 78% at the individual-level and 81% at the team-level.

Demographic variables were collected for all team members. Organizational tenure ranged from 0 months to 20 years, with an average of 4 years 11 months. Eighty-seven percent of respondents were male and, on average, participants were 32 years old (sd=3.51 years). Sixty-four percent of participants were Caucasian, 16% were African American, 5% were Hispanic, 4% were Asian, and 4% were of other ethnic backgrounds.

Twenty external team managers provided supervision to the 38 project teams. Demographic variables were collected for all managers. Organizational tenure ranged from 6 months to 26 years, with an average of 12 years 7 months. Ninety-two percent of respondents were male and, on average, participants were 40 years old (sd=12.08 years). Ninety percent of managers were Caucasian, 5% were African American; 2.4% were Hispanic, and 2.4% were of other ethnic backgrounds.

Data Collection Procedures

Data were collected in two phases. The first phase involved conducting interviews with project team members and team managers. These interviews created a better understanding of 1) what external resources teams typically need in order to successfully complete their project work, and 2) how innovative outcomes are encouraged and measured within the team and the organization. A qualitative first step is recommended for social network studies as it provides the researcher with a better understanding of the context in which the networks are embedded (Oh et al., 2004).

Seven teams were contacted to schedule semi-structured interviews. These teams were selected as they represented a range of projects and clients. Five project teams completed Skype interviews averaging forty-five minutes in length. Two additional teams, whose responsibilities were primarily focused on sales, did not respond to my interview requests. Although sales teams were originally identified for participation in this study, upon further investigation they did not have much need to access outside resources for their job requirements and were not actively purposed for the sample. Appendix A contains the interview protocol.

Key findings. Several important findings emerged in the qualitative portion of this dissertation that guided subsequent data collection and analysis. First, the projects that the teams worked on varied quite widely in terms of the need for external resources. For example, some teams were working on projects with long-standing clients involving well-established products. These teams described their work as relatively routine in nature, not typically requiring information or support from external others. Other teams described their work as quite challenging and unique, requiring ongoing contact with others to obtain information and resources necessary to complete their job tasks effectively.   Second, the innovation level in teams was also described as varying quite widely. For example, in some teams innovation was quite incremental in nature, often involving cost savings measures such as ink changes or paperboard thickness reductions. In other teams, members described being tasked with creating displays that were quite different from what they may have created in the past, and a much less incremental approach to innovation was often required. Finally, the interviews provided valuable

insight into slight wording changes to a small number of survey items which eased their interpretability for team members.

The second phase of data collection involved administering three questionnaires assessing the study variables of interest and began approximately three weeks after completion of the interviews. All surveys were distributed by email and were preceded by an email from a merchandising display division director explaining the survey process and asking employees to participate in the research study. Each individual received a unique link to access a survey housed on the SurveyGizmo web-based server. While respondents were assured that their answers would be handled confidentially and would not be seen by their organization, their responses were not anonymous as the research design required that individuals be matched with their teammates. This design also allowed me to send individually tailored follow-up emails to improve the response rate to all surveys.

The first survey assessed network variables including external informational and resource ties and internal ties with team members. The second survey was distributed about one week after the first. It was sent to twenty team managers who supervised an average of 1.9 teams and asked them to evaluate the level of innovativeness for each project team reporting to them. The final survey was distributed approximately two weeks later and assessed all other study variables, including individual-level moderators, transactive memory systems, and demographics.

Measures

Established items and scales were used to measure as many constructs of interest as possible. Unless otherwise noted, measures were in the form of a five-point Likert

scale. Cronbach's alpha was calculated for all scale measures in order to demonstrate acceptable levels of scale reliability. For measures that represent aggregate views of team members, rwg, ICC(1), and ICC(2) calculations were performed to demonstrate adequate levels of inter-rater agreement within teams, inter-rater reliability, and reliability of team-level means (James, Demaree, & Wolf, 1993). Measures of all study variables are listed in the Appendix B.

Independent variables Independent variables in this study included both social network questions and more traditionally assessed variables. I describe the social network questions first, followed by the more traditional variables.

Structural social capital. Structural social capital is defined as the configuration of linkages between people or units (Nahapiet & Ghoshal, 1998). In this dissertation, I was interested in both external and internal structural ties, and thus investigated ties with both individuals employed elsewhere in the organization as well as team members.

Each team member's external social network was assessed by asking individuals the following two questions developed for this study:

1. *Please list the names of up to 10 individuals outside of your team to whom you go for <u>information</u> while working on innovation projects.*

2. *Please list the names of up to 10 individuals outside of your team to whom you go for <u>resource support</u> (e.g., funds, people, political, etc.) while working on innovation projects.*

For each individual named, respondents were then asked to answer two questions designed to further assess their relationship. These questions were based on work by Leana and Pils (2006) and were designed to measure two aspects of tie strength. Using a

59

five-point Likert scale, each member rated frequency of contact and closeness with each named individual:

1. *How frequently have you spoken with X in the past month about innovation-related issues? (1=never, 2=less than once a month, 3=1 to 3 times a month, 4=1 to 3 times a week, 5=daily)*

2. *How close is your relationship with X? (1=very distant, 2=distant, 3=neither distant nor close, 4=close, 5=very close)*

Consistent with prior work using these questions (Leana & Pils, 2006), the two items were averaged to form a scale measuring tie strength (α=.73 for information ties, α=.77 for support ties).

The same two items were modified with a team referent to measure team bridging social capital. For each named individual, team members were asked to indicate:

1. *How frequently has the team spoken with X in the past month about innovation-related issues?*

2. *How close is the team's relationship with X?*

Again, the two items were averaged to form a scale of tie strength (α=.87 for information ties, α=.78 for resource ties). As this variable was also conceptualized at the team level and used a team-level referent, appropriate aggregation statistics were also calculated. Following Bliese (2000), the aggregation of the team bridging social capital responses to the team level was supported based on inter-member agreement and reliability indices; specifically, mean $rwg_{(j)}$ (using uniform expected variance distribution) was .98 for information ties and .96 for resource ties; ICC(1) was .17 ($F_{(37, 225)} = 2.45$, $p < .05$), and ICC(2) = .59 for information ties; ICC(1) was .18 ($F_{(37, 225)} = 2.51$, $p < .05$), and ICC(2) =

60

.60 for resource ties. I conducted an additional validity check for this measure. For each nominated information or resource support tie, respondents were asked "To what extent have you actively shared your tie with X with one or more members of your team (e.g., made an introduction, provided contact information, etc.)?" This item score was then correlated with team information and resource support tie sharing. The correlation between information tie sharing and team information tie strength was .69. The correlation between resource support ties sharing and team resource tie strength was .61. These strong correlations suggested that individuals were sharing their ties with their team members and that team tie strength was an appropriate measure for this study.

Individual ties in a project group were measured using a single-item roster method, which is a typical data collection method in social network studies (Marsden, 1990). The questionnaire presented an individual respondent with an alphabetical list of all group members in the respondent's work group. Using a five-point Likert scale, each member rated each of his team members on one item designed to assess communication frequency (Reagans & McEvily, 2003) and one to measure trust (Ferrin, Dirks, & Shah, 2006):

1. *How frequently do you communicate with X? (1=never, 2=less than once a month, 3=1 to 3 times a month, 4=1 to 3 times a week, 5=daily)*

2. *To what extent do you perceive that X is dependable? For example, do you perceive that X sticks to his/her word, and makes sure his/her actions and behaviors are consistent? (1=very slightly or not at all, 2=a little, 3=moderately, 4=to a great extent, 5=to a very great extent)*

Network density scores were then calculated for both the communication and trust networks. The density of a social network refers to the general level of linkage or cohesion among actors in a network (J. Scott, 2000). Density is typically expressed as a percentage of ties *present* between actors versus the number of ties *possible* between actors in a given network. The density function in UCINet 6.392 appropriate to valued (rather than dichotomous) data was used to calculate an overall measure for each network (Borgatti, Everett, & Freeman, 2002). This provided an average of all responses within the team for a valued matrix. Therefore, as consistent with other studies including team network density (e.g.,Reagans, Zuckerman, & McEvily, 2004), higher density scores were obtained for teams where members indicated they communicated frequently with and had high levels of trust in their teammates, as opposed to teams in which one or few team members indicated strong communication or trust ties. Responses of '1' to the communication network question were excluded from calculation as they were not appropriate for this study.

Individual level moderators: Confirmatory factor analyses. Before testing my hypothesized model, I first examined the discriminate validity of the individual level moderators using confirmatory factor analysis in LISREL. Results indicated that the hypothesized seven-factor measurement model fit the data well (χ^2 (df = 58) =75.74, RMSEA = .07, CFI = .95). A more constrained alternative model in which the correlations between individual level moderators were set at 1.0 fit the data significantly worse than the hypothesized seven-factor model ($\Delta\chi^2$ (Δdf = 6) = 197.48, p < .05, RMSEA = .22, CFI = .63), thus supporting the discriminant validity of these measures.

Individual level moderators: Relational social capital. Psychological

identification with the team was measured with a ten item scale (Mael & Tetrick, 1992)

with Likert anchors ranging from 1=strongly disagree to 5=strongly agree. Sample items

included: "When someone criticizes my team, it feels like a personal insult" and "I'm

very interested in what others think about my team" (α=.90).

During the interview phase of the study, team members discussed their

identification with the organization as well as with their team. Thus, I measured

psychological identification with the organization as well. The same ten item scale was

modified appropriately with sample items including "When someone criticizes my

organization, it feels like a personal insult" and "I'm very interested in what others think

about my organization" (α=.86).

Team-member exchange was measured using a nine-item scale developed by

Liden, Wayne, and Sparrowe (2000) with Likert anchors ranging from 1=strongly

disagree to 5=strongly agree. Sample items included: "When I am in a bind, my

coworkers will take on extra work to help ensure the completion of my important tasks"

and "My coworkers have asked for my advice in solving a job-relate problem of theirs"

(α=.92).

Trust was measured using the social network item described in the structural

social capital section above (Ferrin et al., 2006). Team members evaluated the degree to

which they trusted each of the other members of their team and these ratings were then

averaged to form an individual-level value for team member trust with the team. Since

this is a single item network measure, Cronbach's alpha is not an appropriate measure of

reliability. In an effort to demonstrate consistency between raters, I calculated ICC(2) using the team as the grouping variable. [ICC(2)=.66]

Individual level moderators: Cognitive social capital. Shared vision was measured using a six-item scale modified from the original developed by Leana and Pils (2006) with Likert scales ranging from 1=strongly disagree to 5=strongly agree. Sample items included: "I share the same ambitions and vision for my team as my teammates" and "My teammates and I enthusiastically pursue collective goals and mission" (α=.70).

Individual level moderators: Tertius iungens orientation. *Tertius iungens* orientation was measured using a six-item scale developed by Obstfeld (2005) with Likert anchors ranging from 1=strongly disagree to 5=strongly agree. Sample items included: "I introduce people to each other who might have a common strategic work interest" and "I will try to describe an issue in a way that will appeal to a diverse set of interests" (α=.82).

Individual level moderators: Interdependence. Interdependence was assessed with three subscales with Likert anchors ranging from 1=strongly disagree to 5=strongly agree (Campion et al., 1993). Three items measured task interdependence including: "I cannot accomplish my tasks without information or materials from other members of my team" (α=.88). Three items measured goal interdependence including: "My work goals come directly from the goals of my team" (α=.82). Three items measured reward interdependence including: "My performance evaluation is strongly influenced by how well my team performs" (α=.84). The average correlation among the nine interdependence items was .78. Therefore, I averaged them to form an overall interdependence composite (α=.94).

Transactive memory. Transactive memory was measured using a fifteen item scale (K. Lewis, 2003) with Likert anchors ranging from 1=strongly disagree to 5=strongly agree. Sample items included: "I have knowledge about an aspect of the project that no other team member has" and "Different team members are responsible for expertise in different areas" (α=.92). As this variable was conceptualized at the team level, appropriate aggregation statistics were also calculated. Following Bliese (2000), the aggregation of the transactive memory responses to the team level was supported based on inter-member agreement and reliability indices; specifically, mean $rwg_{(j)}$ (using uniform expected variance distribution) was .98; ICC(1) was .24 ($F_{(37, 224)} = 3.20$, $p <$ .05), and ICC(2) = .69.

Dependent variable. Team managers (who were not members of the teams) completed the innovative performance measure, which used a two-item scale (Vera & Crossan, 2005) with Likert anchors ranging from 1=to a very little extent to 5=to a very great extent. Items included: "The team introduced new product/service innovations frequently" and "The team introduced new product/service innovations quickly" (α=.74).

Control variables. Several additional variables had the potential to influence the focal variables and relationships in this study. For this reason, I controlled for the following measures statistically when testing my hypothesized relationships.

Self-monitoring. Self-monitoring was entered as a control variable based on prior research findings that it is predictive of the development of network ties (Oh & Kilduff, 2008; Sasovova, Mehra, Borgatti, & Schippers, 2010). Self-monitoring was assessed using the 13-item reduced scale (Lennox & Wolfe, 1984) for which higher scores indicate higher levels of self-monitoring. Respondents were asked to respond to each statement

using a scale of "True" or "False". Sample items included: "I find it hard to imitate the behavior of other people" and "My behavior is usually an expression of my true inner feelings, attitudes, and beliefs" (α=.75).

Big-5 personality. Three Big-5 personality characteristics (extraversion, agreeableness, and conscientiousness) were entered as control variables based on prior research findings that some aspects of personality are predictive of the development of network ties (Baer, 2010; Dougherty, Cheung, & Florea, 2008). Big-5 personality dimensions were assessed using the Mini-Marker scale (Saucier, 1994), where respondents were asked to respond to the accuracy of each of 24 words in describing their personality with Likert anchors ranging from 1=very inaccurate to 5=very accurate. Sample items include: "Bashful" and "Moody". Reliabilities for these three scales were as follows: extraversion (α=.65), agreeableness (α=.72), and conscientiousness (α=.58).

Organizational tenure. To control for differences attributable to length of time spent working in the team and organizational environment, each team member indicated organizational experience by responding to a single item asking "How long have you worked for this organization?" Responses across team members were averaged to form an organizational tenure composite.

Gender. Gender was entered as a control variable because prior research has shown that it influences the structure of social networks in work organizations (e.g., Brass, 1985; Ibarra, 1992). The variable gender was coded as 0 for females and as 1 for males.

Individual tie count. Individual tie count was entered as a control variable because the size of an individual's bridging tie network might be an alternative

66

explanation to bridging tie strength for that person's network influence on team bridging social capital.

Team size. Team size was entered as a control variable based on research suggesting that differences in team size may influence distribution of resources and workload requirements which may, in turn, impact team performance (Kirkman & Rosen, 1999).

Analytical Procedures

The primary statistical technique I used to test the hypotheses in this study was multiple regression. Since the data for this study came from individuals nested within teams nested within leaders, the hierarchical linear modeling (HLM) statistical package and techniques were used. HLM allowed me to test the relationships between individual-level predictors and outcomes and team-level predictors and outcomes. HLM is able to simultaneously model within-person, within-team, and between-team variance, and thus provides an advantage over ordinary least squares regression in that it is able to bypass the assumptions of homogeneity of regression slopes and independence of error terms (Raudenbush & Byrk, 2002). As HLM does not permit the testing of individual-level predictors and team-level outcomes, the dissertation model was tested in two parts: individual-level and team-level.

Chapter 5: Results

Means, standard deviations, bivariate correlations, and internal consistency reliability (alpha) coefficients of the study variables were calculated and are reported in Table 3 for individual-level variables and Table 4 for team-level variables. We should note that correlations do not take into account the non-independence issues within the data and therefore should be interpreted cautiously. All variables were standardized to z-scores prior to analysis. This was necessary as the variables were collected on a variety of different scales and might not contribute equally to the analyses in their original formats.

Missing Data

As part of the required protection for human subjects in a research study, all respondents were free to skip survey questions that they did not wish to answer. This procedure had the side effect of creating a small amount of missing data that needed to be dealt with appropriately. First, I identified whether there were any patterns in the missing data by using a rule-of-thumb of greater than 10% missing as an indication of systematic tendency. The missing data did not appear to be systematic in nature. I then proceeded to use a regression-based multiple imputation procedure to estimate the missing values (Roth & Switzer III, 1994). In this procedure, missing values for any variables are predicted using existing values from other variables. The regression-based multiple imputation was conducted using a program called NORM developed by Joe Schafer at Penn State (1999).

Results of HLM Null Models

At the individual level of analysis, null models were run for the two dependent

variables of interest, team information and resource support bridging social capital.

Resulting ICC(1) values and associated chi-square tests revealed that 17 percent of the

variance in team bridging social capital (information ties) resided between teams

($\chi^2[37]$=90.66, p <.05). For team bridging social capital (resource ties), 18 percent of the

variance resided between teams ($\chi^2[37]$=93.06, p <.05). At the team level of analysis, 14

percent of the variance in team innovative performance resided between leaders

($\chi^2[19]$=23.98, p >.05). Based on this analysis, only individual-level hypotheses required

HLM analysis, but for consistency I chose to test all hypotheses in HLM, as this provides

a more conservative statistical test, thereby lending greater credence to any significant

results obtained.

Predicting Team Bridging Social Capital

Tables 5 and 6 summarize the results of HLM analyses testing for the individual

level hypotheses. Hypothesis 1a posited that individual information resource ties were

positively related to team information resource ties. I tested this hypothesis by entering

the control variables (self-monitoring, extraversion, agreeableness, conscientiousness,

organizational tenure, gender, and individual tie count) and individual information ties as

level-1 predictors (see Model 1 in Table 5). Results did not support this hypothesis as

individual information tie strength was not significantly related to team information tie

strength (γ=-.02, ns).

Hypothesis 1b posited that individual resource support ties were positively related

to team resource support ties. I tested this hypothesis by entering the control variables

69

and individual support ties as level-1 predictors (see Model 1 in Table 6). Results supported the hypothesis as individual support tie strength was positively related to team support tie strength (γ=.40, p <.05). Collectively, the controls and individual support ties explained ~R^2= .24, p <.01 (Snijders & Bosker, 1999) of the available within-group variance in the team support ties.

Hypothesis 1c posited that the relationship between individual and team information ties would be stronger than the relationship between individual and team support ties. I tested this hypothesis by comparing the results of the previous two hypothesis tests. Results did not support hypothesis 1c as the relationship between individual and team information ties (γ=-.02, ns) was weaker than the relationship between individual and team support ties (γ=.40, p <.05).

In hypothesis 2, I predicted that the positive relationship between individual bridging social capital and team bridging social capital would be stronger when individuals experienced higher levels of relational social capital. To test this prediction, I added the relational social capital scores and the individual tie strength by relational social capital interactions to the previous equation (see Model 2 in Tables 5 and 6). Four relational social capital variables were tested: psychological identification with the team, psychological identification with the organization, team member exchange, and trust. Hypothesis 2 received partial support. For information ties, none of the alternatives were supported as interactions with psychological identification with the team (γ=-.00, ns), psychological identification with the organization (γ=.03, ns), team member exchange (γ=.02, ns), and trust (γ=.02, ns), were all non-significant. For support ties, three of the four moderators were significant. Trust (γ=.03, ns) was non-significant as a moderator.

70

However, psychological identification with the team significantly moderated the relationship between individual support tie strength and team support tie strength (γ=.08, p <.05). This set of predictors collectively explained ~R^2= .32, p<.01 of the available within-group variance in team support tie strength. Also, psychological identification with the organization significantly moderated the relationship between individual support tie strength and team support tie strength (γ=.11, p <.05). This set of predictors collectively explained ~R^2= .29, p<.01 of the available within-group variance in team support tie strength. Finally, team member exchange significantly moderated the relationship between individual support tie strength and team support tie strength (γ=.10, p <.05). This set of predictors collectively explained ~R^2= .24, p<.01 of the available within-group variance in team support tie strength.

These interactions are plotted in Figures 3, 4 and 5 and demonstrate that the positive relationship between individual support tie strength and team support tie strength becomes stronger (i.e., the positive slope become steeper) to the extent that individuals experience higher levels of relational social capital. For individuals with relatively low psychological identification with their team (i.e., one SD below the mean), the slope of the relationship between individual support tie strength and team support tie strength was less steep (γ = .00, ns). In contrast, the individual support tie strength – team support tie strength slope was significant (γ = .47, p < .05) when relational social capital was relatively high (i.e., one SD above the mean). For individuals with relatively low psychological identification with their organization (i.e., one SD below the mean), the slope of the relationship between individual support tie strength and team support tie strength was less steep (γ = -.01, ns). In contrast, the individual support tie strength –

71

team support tie strength slope was significant ($\gamma = .48$, $p < .05$) when relational social capital was relatively high (i.e., one SD above the mean). For individuals with relatively low team member exchange (i.e., one SD below the mean), the slope of the relationship between individual support tie strength and team support tie strength was less steep ($\gamma = .02$, ns). In contrast, the individual support tie strength – team support tie strength slope was significant ($\gamma = .48$, $p < .05$) when relational social capital was relatively high (i.e., one SD above the mean). In summary, while no significant interaction effects were found for information ties, three variables (psychological identification with team, psychological identification with organization, and team member exchange) significantly moderated the relationship between individual support resource ties and team support resource ties.

Hypothesis 3 posited that the positive relationship between individual bridging social capital and team bridging social capital would be stronger when individuals experience higher levels of cognitive social capital. To test this prediction, I added the cognitive social capital scores and the individual tie strength by cognitive social capital interaction to the previous equation (see Model 3 in Tables 5 and 6). Shared vision was tested as the operationalization of cognitive social capital. Hypothesis 3 received partial support. For information ties, the interaction with shared vision was not supported ($\gamma=.05$, ns). For support ties, shared vision significantly moderated the relationship between individual support tie strength and team support tie strength ($\gamma=.11$, $p <.05$). This set of predictors collectively explained $\sim R^2= .28$, p<.01 of the available within-group variance in team support tie strength.

This interaction is plotted in Figure 6 and demonstrates that the positive

relationship between cognitive social capital and team support tie strength becomes

stronger (i.e., the positive slope become steeper) to the extent that individuals experience

higher levels of cognitive social capital. For individuals with relatively low cognitive

social capital (i.e., one SD below the mean), the slope of the relationship between

individual support tie strength and team support tie strength was less steep ($\gamma = .00$, ns).

In contrast, the individual support tie strength – team support tie strength slope was

positive and significant ($\gamma = .46$, $p < .05$) when cognitive social capital was relatively

high (i.e., one SD above the mean).

In hypothesis 4, I predicted that the positive relationship between individual

bridging social capital and team bridging social capital would be stronger when

individuals experienced high levels of *tertius iungens* orientation. To test this prediction,

I added the *tertius iungens* orientation scores and the individual tie strength by *tertius

iungens* orientation interaction to the previous equation (see Model 4 in Tables 5 and 6).

For information ties, the interaction with *tertius iungens* orientation was not supported

($\gamma = .01$, ns). Additionally, for support ties, the interaction with *tertius iungens* orientation

was not supported ($\gamma = .02$, ns). Thus, hypothesis 4 received no support.

Hypothesis 5 posited that the positive relationship between individual bridging

social capital and team bridging social capital would be stronger when individuals

experienced high levels of interdependence. To test this prediction, I added the

interdependence score and the individual tie strength by interdependence interactions to

the previous equation (see Model 5 in Tables 5 and 6). Hypothesis 5 was not supported.

For information ties, interdependence did not significantly moderate the relationship

73

between information ties at the individual and team levels (γ=.08, ns). For support ties, the interaction with interdependence was also not supported (γ=.04, ns).

Predicting Team Innovative Performance

Table 7 summarizes the results of HLM analyses testing for the team level hypotheses. In hypothesis 6, I predicted that team information and support ties were positively related to team innovative performance. I tested this hypothesis by entering the control variables (team size and organizational tenure) and team information and support tie strength as level-1 predictors of team innovative performance (see Model 6 in Table 7). Hypothesis 6 received partial support. Individual information tie strength was positively related to team innovative performance (γ=.39, p <.05). Collectively, the controls and individual information ties explained ~R^2= .21, p <.05 of the available within-group variance in team innovative performance. Additionally, individual resource support tie strength was marginally positively related to team innovative performance (γ=.29, p =.07).

Hypothesis 7 predicted that the positive relationship between team bridging social capital and team innovative will be stronger when the team's transactive memory system is stronger. To test this prediction, I added the transactive memory scores and the team tie strength by transactive memory interactions to the previous equation (see Model 7 in Table 7). This hypothesis was not supported for either information (γ=-.02, ns) or resource support (γ=-.05, ns) ties.

In hypothesis 8, I posited that team bonding social capital was positively related to team innovative performance. This hypothesis was not supported (see Model 8 in

Table 7) for either trust network density (γ=.04, ns) or communication network density (γ=.12, ns).

Hypothesis 9 predicted that the positive relationship between team bridging social capital and team innovative will be stronger when the team's bonding social capital is stronger. To test this prediction, I added the network density scores and the team tie strength by network density interactions to the previous equation (see Model 4 in Table 7). This hypothesis was not supported. Neither the interaction of team information tie strength and trust network density (γ= -.04, ns) or communication network density (γ=.04, ns) was significantly related to team innovative performance. Additionally, neither the interaction of team resource support tie strength and trust network density (γ=.06, ns) or communication network density (γ=-.13, ns) was significantly related to team innovative performance. A summary of findings by study hypothesis is provided in Table 8.

TABLE 3

Descriptive Statistics and Correlations

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Indv Tie Strength (Info)	3.98	.81	(.73)																		
2. Indv Tie Strength (Sup)	3.79	.80	.77*	(.77)																	
3. Identification with Team	3.74	.58	.44*	.41*	(.90)																
4. Identification with Org	3.44	.89	.42*	.39*	.81*	(.86)															
5. Team Member Exchange	3.86	.69	.52*	.51*	.70*	.69*	(.92)														
6. Trust	3.65	.74	.56*	.61*	.47*	.40*	.37*	--													
7. Shared Vision	3.85	.38	.45*	.42*	.47*	.47*	.51*	.39*	(.70)												
8. *Tertius Iungens* Orient	3.82	.70	.50*	.48*	.46*	.48*	.59*	.40*	.47*	(.82)											
9. Interdependence	3.33	.81	.57*	.61*	.57*	.61*	.50*	.79*	.46*	.53*	(.94)										
10. Team Tie Strength (Info)	4.04	.63	.31*	.35*	.30*	.24*	.39*	.34*	.34*	.47*	.33*	(.87)									
11. Team Tie Strength (Sup)	3.61	.83	.52*	.54*	.47*	.42*	.43*	.67*	.43*	.47*	.79*	.33*	(.78)								
12. Self-Monitoring	0.77	.42	.28*	.22*	.32*	.25*	.44*	.11	.11	.22*	.11	.18*	.12	(.75)							
13. Extraversion	3.73	.66	.47*	.49*	.45*	.43*	.65*	.28*	.39*	.53*	.41*	.48*	.38*	.25*	(.65)						
14. Agreeableness	3.85	.68	.44*	.45*	.40*	.40*	.56*	.28*	.42*	.56*	.39*	.50*	.37*	.18*	.63*	(.72)					
15. Conscientiousness	3.83	.62	.45*	.51*	.37*	.31*	.47*	.41*	.30*	.42*	.47*	.44*	.42*	.22*	.58*	.53*	(.58)				
16. Organizational Tenure	58.92	54.92	.05	-.01	-.10	-.03	-.03	-.02	-.08	-.06	-.03	-.04	-.01	.12	.00	-.07	-.03	--			
17. Gender	0.86	.34	.05	.05	-.05	-.02	.01	-.04	.11	.12	-.00	.04	.03	.03	-.04	.02	.03	.08	--		
18. Indv Tie Count (Info)	3.91	.69	.73*	.71*	.38*	.35*	.48*	.54*	.46*	.38*	.38*	.39*	.51*	.20*	.45*	.48*	.51*	.01	.05	--	
19. Indv Tie Count (Sup)	3.85	.94	.68*	.69*	.38*	.32*	.46*	.51*	.39*	.38*	.35*	.33*	.51*	.23*	.46*	.51*	.46*	.04	.06	.72*	--

Note. N=263 individuals, *p <.05; Reliability estimates (coefficient alpha) are on the diagonal.

TABLE 4

Descriptive Statistics and Correlations

Variable	Mean	s.d.	1	2	3	4	5	6	7	8
1. Team Tie Strength (Info)	4.04	.34	(.87)							
2. Team Tie Strength (Support)	3.63	.46	.47*	(.78)						
3. Trust Network Density	0.76	.10	.43*	.37*	--					
4. Communication Network Density	0.64	.12	.36*	.38*	.65*	--				
5. Transactive Memory	4.06	.32	.55*	.71*	.52*	.58*	(.92)			
6. Team Innovative Performance	4.16	.53	.35*	.31	.26	.26	.43*	(.74)		
7. Organizational Tenure	60.40	37.01	-.10	.09	.10	.35*	-.07	.16	--	
8. Team Size	7.00	1.30	-.02	-.11	-.50*	-.42*	-.30	-.32*	-.18	--

Note. N=38 teams, *p <.05; Reliability estimates (coefficient alpha) are on the diagonal.

TABLE 5

HLM results: Hypotheses 1-5 (Fixed effects predicting team bridging social capital)

	DV: team information tie strength							
	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 3	Model 4	Model 5
Self-monitoring	.06	.05	.06	.06	.07	.07	.04	.07
Extraversion	.23*	.23*	.23*	.23*	.24*	.22*	.18*	.24*
Agreeableness	.21*	.20*	.22*	.21*	.21*	.19*	.14*	.20*
Conscientiousness	.12+	.13+	.12+	.12+	.10	.13+	.12+	.11
Organizational tenure	-.02	-.02	-.03	-.02	-.02	-.02	-.00	-.02
Gender	.01	.01	.00	.00	.02	.00	-.03	.00
Individual info tie count	.15*	.15*	.15*	.15*	.12	.14*	.14*	.13+
Individual info tie strength (H1)	-.02	-.07	-.04	-.05	-.11	-.08	-.12	-.05
Psych identification w/team		.05						
PIwT x info tie strength (H2)		-.00						
Psych identification w/organization			-.01					
PIwO x info tie strength (H2)			.03					
Team member exchange				.01				
TMX x info tie strength (H2)				.02				
Trust					.15*			
Trust x info tie strength (H2)					.02			
Shared vision						.10+		
Shared vision x info tie strength (H3)						.05		
Tertius iungens orientation							.24*	
TI orient x info tie strength (H4)							.01	
Interdependence								.07
Interdependence x info tie strength (H5)								.08
~R$_2$	.26*	.26*	.26*	.26*	.27*	.27*	.30*	.26*

Note. * $p < .05$, + $p < .10$; N=263 Individuals

TABLE 6

## HLM results: Hypotheses 1-5 (Fixed effects predicting team bridging social capital)

|	DV: team resource support tie strength							
	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 3	Model 4	Model 5
Self-monitoring	-.03	-.07	-.05	-.06	.00	-.01	-.04	.02
Extraversion	.06	.02	.02	.01	.11+	.04	.01	.04
Agreeableness	.09	.04	.05	.06	.09	.04	.01	.04
Conscientiousness	.13+	.12+	.14*	.13+	.02	.13+	.12+	.00
Organizational tenure	.00	.02	-.00	.01	-.02	.01	.02	.00
Gender	-.00	-.01	-.03	-.02	.03	-.02	-.04	.00
Individual support tie count	.01	.01	.01	-.00	-.03	-.05	.02	-.04
Individual support tie strength (H1)	.40*	.34*	.36*	.38*	.13+	.38*	.34*	.10
Psych identification w/team		.29*						
PIwT x support tie strength (H2)		.08*						
Psych identification w/organization			.23*					
PIwO x support tie strength (H2)			.11*					
Team member exchange				.19*				
TMX x support tie strength (H2)				.10*				
Trust					.55*			
Trust x support tie strength (H2)					.03			
Shared vision						.21*		
Shared vision x support tie strength (H3)						.11*		
Tertius iungens orientation							.25*	
TI orient x support tie strength (H4)							.02	
Interdependence								.77*
Interdependence x support tie strength (H5)								.04
~R_2	.24*	.32*	.29*	.24*	.46*	.28*	.27*	.59*

Note. * $p < .05$, + $p < .10$; N=263 Individuals

79

FIGURE 3

Moderating Effect of Psychological Identification with the Team on the

Relationship between Individual Resource Tie Strength and
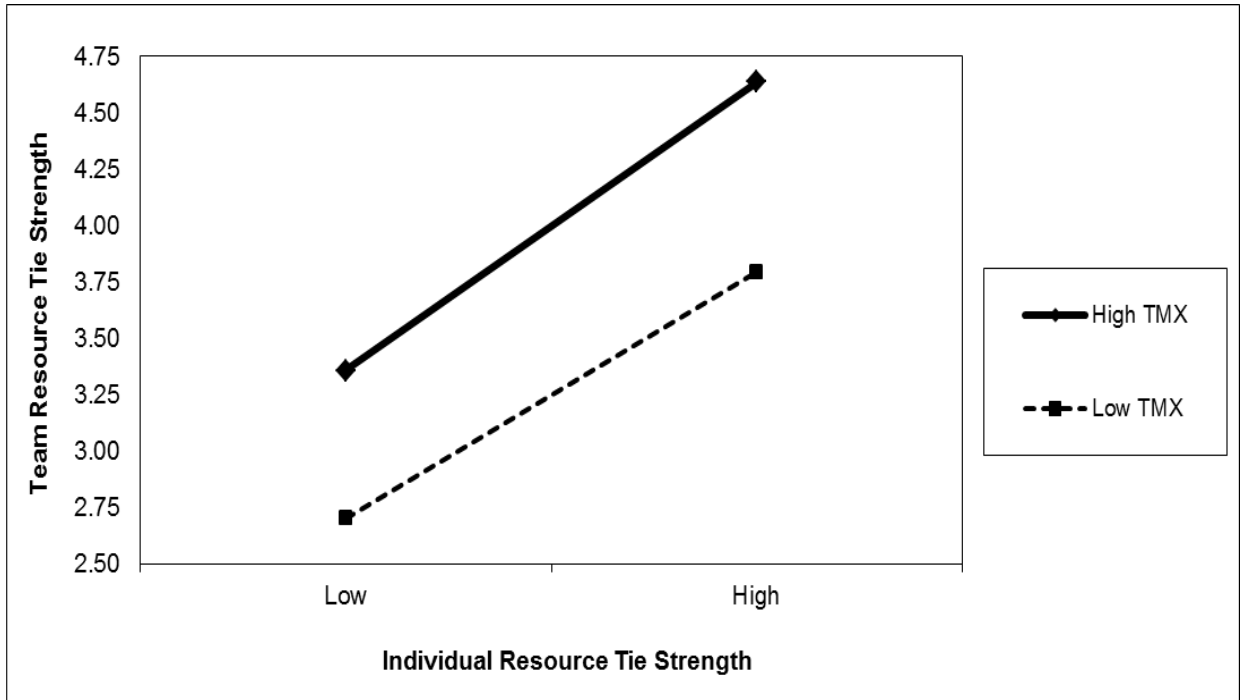
Team Resource Tie Strength
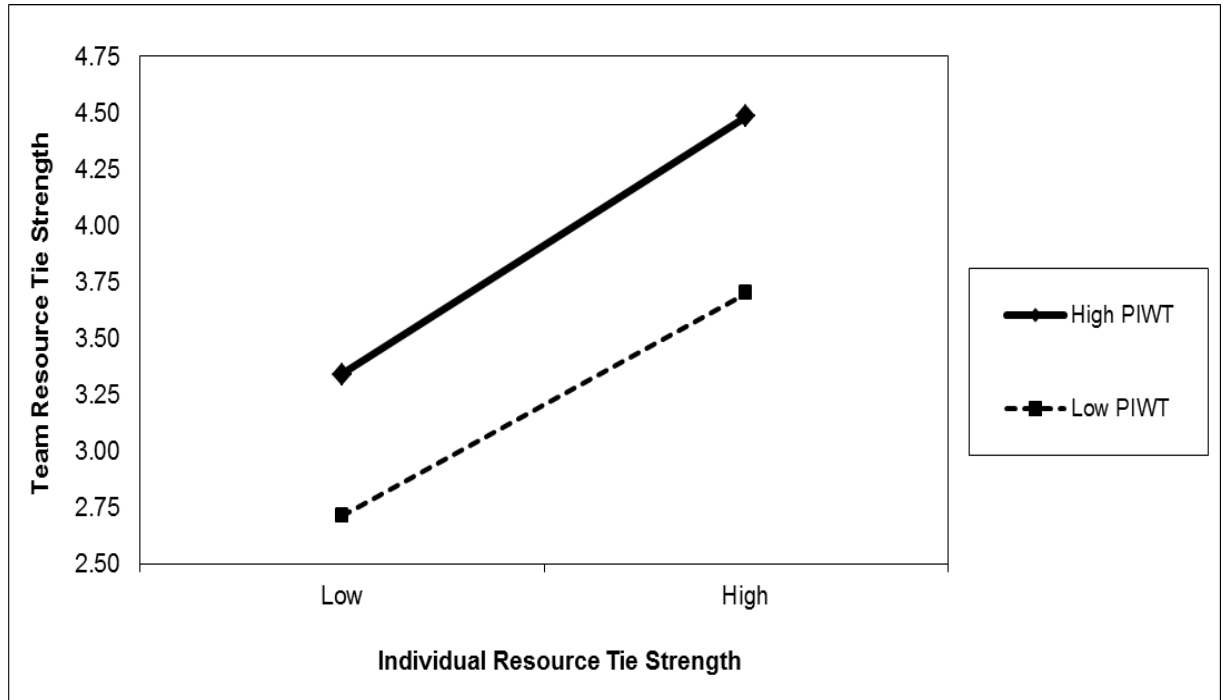
FIGURE 4

Moderating Effect of Psychological Identification with the Organization on

the Relationship between Individual Resource Tie Strength and

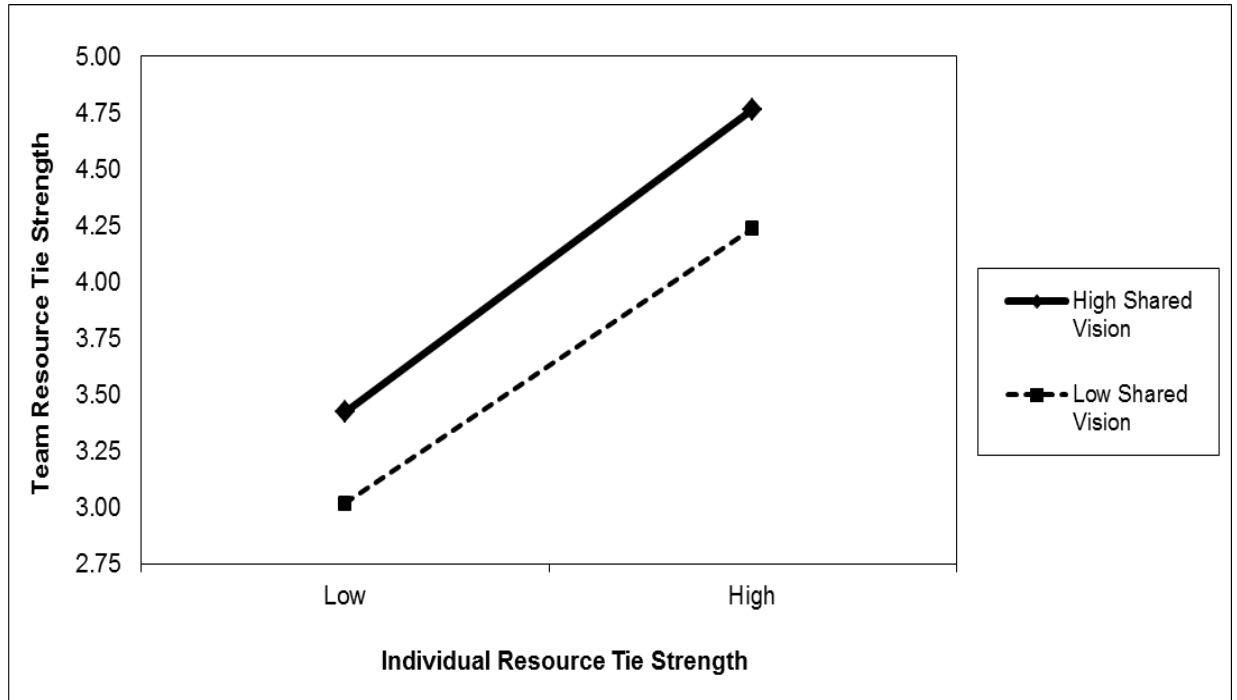**Team Resource Tie Strength**
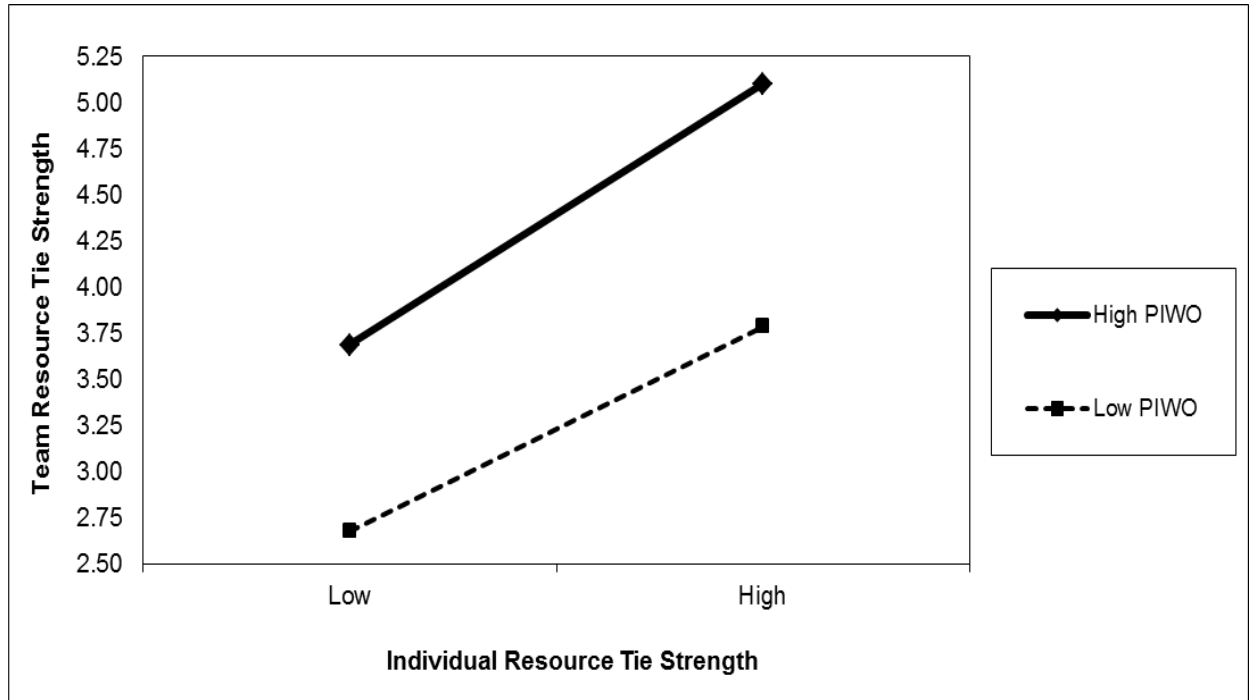
FIGURE 5

Moderating Effect of Team Member Exchange on the Relationship

Between Individual Resource Tie Strength and Team Resource Tie Strength

FIGURE 6

Moderating Effect of Shared Vision on the Relationship

between Individual Resource Tie Strength and Team Resource Tie Strength

TABLE 7

HLM results: Hypotheses 6-9 (Fixed effects predicting team innovative performance)

	DV: team innovative performance									
	Model 6a	Model 6b	Model 7a	Model 7b	Model 8a	Model 8b	Model 9a	Model 9b	Model 9c	Model 9d
Organizational tenure	-.05	-.15	-.08	-.13	-.12	-.18	-.06	-.13	-.07	-.15
Team size	-.34*	-.30+	-.27	-.21	-.24	-.23	-.38	-.27	-.31	-.27
Team information tie strength (H6)	.39*		.26				.42*		.37*	
Team support tie strength (H6)		.29+		.07				.28		.23
Transactive memory system			.21	.32						
TMS x team info tie strength (H7)			-.02							
TMS x team support tie strength (H7)				-.05						
Trust network density (H8)					.16		-.07	.04		
Communication network density (H8)						.24			.05	.10
Trust density x team info tie strength (H9)							-.04			
Trust density x team support tie strength (H9)								.06		
Comm density x team info tie strength (H9)									.04	
Comm density x team support tie strength (H9)										-.13
~R$_2$	.21*	.00	.12	.00	.00	.00	.18*	.00	.15*	.00

Note. * $p <.05$, + $p <.10$; N=38 Teams

84

TABLE 8

Summary of Study Findings by Hypothesis

H1a	Individual informational resource ties are positively related to team informational resource ties	Not supported
H1b	Individual support resource ties are positively related to team support resource ties	Supported
H1c	The relationship between individual and team level informational resource ties will be stronger than the relationship between individual and team level support resource ties	Not supported
H2	The relational social capital dimensions of trust, group identification, and TMX moderate the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences high levels of trust, group identification, and TMX	Partially supported
H3	The cognitive social capital dimension of shared vision moderates the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences a high level of shared vision	Partially supported
H4	*Tertius iungens* orientation moderates the relationship between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences a high level of tertius iungens orientation	Not supported
H5	The interdependence a team member has with the other members of their team on tasks, goals, and rewards moderates the relationships between individual bridging social capital and team bridging social capital such that the relationship is stronger when the individual experiences high levels of interdependence	Not supported
H6	Team bridging social capital in the form of weak ties is positively related to team innovative performance	Partially supported
H7	The transactive memory system of the team moderates the relationship between team bridging social capital in the form of weak ties and innovative performance such that this relationship is stronger when the team transactive memory system is higher	Not supported
H8	Team bonding social capital, specifically the density of the team's internal network, is positively related to team innovative performance	Not supported
H9	Team bonding social capital in the form of network density moderates the relationship between team bridging social capital, specifically weak ties, and innovative performance such that this relationship is stronger when bonding social capital (network density) is higher	Not supported

Chapter 6: Discussion

In this dissertation, I sought to investigate three specific aspects of social capital within an innovative context. First, I proposed that the personal social capital of a team's members is an important predictor of the group's social capital. I found that individual resource support ties predict the development of team resource support ties, but that individual information ties do not predict team information ties. Second, I suggested that relational, cognitive, and task components influence an individual's willingness to share resources. There were no significant findings related to information ties. Four relational and cognitive social capital variables (psychological identification with team, psychological identification with organization, team member exchange, and shared vision) significantly moderate the relationship between individual resource support ties and team resource support ties. Finally, I investigated how internal and external social capital connections interact and the role of transactive memory systems in explaining the relationship between group social capital and team innovative performance. Team information tie strength was significantly related to team innovative performance, but team support ties strength was not. None of my proposed interactions were significantly related to team innovative performance. Taken together, my findings provide some evidence for the important role individual social capital plays in the development of group social capital and moderators that influence these relationships.

Characteristics of the data collection site may have significantly impacted the results of this study. This organization competes in the marketplace based on a low cost strategy. Therefore, innovation work they do and the ties that their employees need in order to innovative successfully may be different than what would be found in a less cost-

86

focused organization. In this sample, contrary to my expectations, the relationship

between individual resource support ties and team resource support ties was much

stronger than that between individual information resource ties and team information

resource support ties. This surprise finding may be related to how these teams innovate.

Since innovation in this organization is more incremental than radical, gathering new

information through bridging ties may not be as important as it would be in other

organizations. Additionally, given the focus on reducing costs, securing support and

funding for projects can be very challenging. Thus, cultivating useful resource support

ties becomes more important than it might be in other organizations. I now turn my

attention to discussing implications of these findings, limitations of the present study, and

avenues for future research.

Theoretical Implications

This dissertation provides several important contributions to theory and should

serve as a foundation for further work examining the social capital of individuals and

teams. In this section I highlight what I believe to be the most important of these

contributions.

First, this study provides an initial look into the relationship between individual

and team structural social capital. The development of team social capital is a relatively

under-researched area of study (Burt, 2000, p. 410) and we know very little about the role

individual social capital plays in the development of group social capital (Kilduff &

Krackhardt, 2008). The findings from this dissertation begin to illuminate this

relationship. Resource support ties are significantly related to their team counterparts.

This suggests that the development of team social capital is at least partially dependent

upon the willingness of individuals to use their personal ties on behalf of or share their personal ties with their team members.

Second, this dissertation provides novel insights into the inter-dimensional nature of the facets of social capital. Social capital has long been described as multi-dimensional in nature (Nahapiet & Ghoshal, 1998), but empirical research on this theoretical assertion was largely missing. This dissertation provides empirical support for the conceptualization of social capital as being comprised of the structural, relational and cognitive dimensions. The relationship between individual and team structural social capital was moderated by aspects of relational and cognitive social capital, namely psychological identification with the team and organization, team-member exchange, and shared vision. Considering network structure in isolation misses the important relationships between the three social capital dimensions.

Finally, this study investigates the role of both bridging and bonding social capital in an innovative context. In this area, findings from past studies have been somewhat confusing and contradictory. Some studies have found that strongly interconnected teams achieve greater levels of performance (Hansen, 1999; Reagans & McEvily, 2003; Reagans & Zuckerman, 2001; Tsai & Ghoshal, 1998). On the other hand, teams with weak bridging connections are more effective at searching for useful knowledge (Hansen, 1999) and at having their ideas judged as valuable by senior management (Burt, 2004). While the small team-level sample size in this study may have reduced the possibility of finding statistically significant results, correlational analysis suggests that both bridging and bonding ties may be important contributors to innovative performance. Perhaps the appropriate question is not which type of tie is more important, but rather how they work

in combination to improve innovation work in teams. Oh, Labianca, and Chung (2006) suggest this same approach in their theoretical paper on group social capital. They propose that an optimal configuration of moderate bonding ties and diverse bridging ties will provide the most group social capital resources and, ultimately, the maximum group effectiveness. Certainly this idea warrants further investigation.

Practical Implications

In addition to these contributions to theory, the findings from this dissertation have practical implications for both individuals and managers working in innovative contexts. First, although it may seem intuitive that groups will have access to the social capital connections of their members, this process may not be as automatic or simple as it first appears. Managers need to understand that individuals will make *choices* about whether to use their ties on behalf of others or to allow others to have direct access to their ties. Managers can increase the likelihood of this occurring by ensuring that relational and cognitive social capital components (such as identification with the group, quality of relationships with team members, and level of shared vision) as well as interdependence levels are strong so that team members feel that the team's successes are an integral part of their own success.

Additionally, managers supporting teams working on innovation projects should assist their teams to develop strong transactive memory systems. In this study, transactive memory was significantly related to bridging ties, bonding ties, trust network density, communication network density, and innovative performance. Although preliminary, these findings suggest that TMS is a highly important factor for team innovation performance. Its development is integral to helping teams encode and access

89

the diverse information brought into the team through bridging social capital ties. To develop strong transactive memory systems, managers should ensure that teams frequently meet in face-to-face situations (e.g., meetings, activities), even if the teams are mature, as personable interaction is essential for helping a TMS emerge and capitalizing on a TMS that is already built (K. Lewis, 2004).

Limitations and Future Research Directions

As with any research, this study is not without limitations. First, my study provides a static, snapshot view of social capital in teams. While this approach is common in network research, the cross-sectional design prevented me from determining causality in my relationships. Additionally, more comprehensively understanding how social capital develops in teams will require a longitudinal study design. The development of anything (including social capital) is a process and, as such, will need to be studied over time. Future studies may find that individual influences on team social capital development are more impactful during specific phases of the team's lifecycle. Furthermore, bridging and bonding social capital may be more or less important at specific points in a team's growth.

Second, the team sample size in this study was small (n=38). For adequate power, Hofmann, Griffin and Gavin (2000) recommend 30 groups of 10 members for multi- and cross-level research. My 38 teams had an average size of 7 members, which does not meet the recommended threshold. The lack of significant findings at the team level may be more due to limited statistical power rather than poor theorizing. This idea is supported by the data as many of the hypothesized relationships were in the right directions, but failed to meet the standard of significance. Future work should continue

90

to investigate the relationships between bridging social capital, bonding social capital, and team innovative performance with larger samples.

Finally, the teams studied in this dissertation may not be the ideal teams with which to investigate these research questions. The innovation work within this cost-focused manufacturing setting is likely not as radical as what is being done in a design firm or a management consulting firm. Therefore, these teams may have had less need to seek outside information or support resources than would teams in more radical innovation settings. Scholars conducting future work in this area should seek out a setting with teams for whom bridging ties are essential to their day-to-day work.

In addition to these future research suggestions designed to overcome limitations in this study, there are other interesting ways in which this study might be expanded. First, I am interested in investigating the attributes which predict the development of individual bridging ties. Little work has been done to determine the individual traits and characteristics that help to shape social networks aside from self-monitoring (Mehra, Kilduff, & Brass, 2001; Oh & Kilduff, 2008) and aspects of Big-Five personality (Baer, 2010; Dougherty et al., 2008). Proactive personality seems likely to be an important individual difference factor related to the development of individual level bridging ties. Individuals with a strong proactive personality will be more likely than their less proactive counterparts to perceive their surroundings as an environment in which they can actively search for opportunities to enact change. Another potentially important predictor of individual structural social capital might be boundary spanning behavior, especially ambassadorial and scouting activities. These behaviors enable team members to gain problem- or project-specific expertise as well as to understand the general

environment they operate within (Marrone, 2010) and may help them develop useful bridging ties.

I am also interested in investigating the relationship between team bridging social capital, knowledge, and team innovative performance in more detail. While transactive memory systems are clearly important to team innovation, knowledge integration is also likely to be essential for optimal performance. The bridging ties of team members serve as inputs to bring valuable external knowledge into the team. The team's ability to integrate knowledge acts as the process through which the knowledge is made available to all team members and is then applied to the group's task. Thus, successful knowledge integration will likely lead to improved team innovative performance.

Conclusion

In conclusion, this dissertation takes a significant step toward a greater understanding of the role of individual social capital in the development of team social capital. Contributions to the social capital and team innovation literatures were offered by considering the influence of individual bridging ties on team bridging ties, the moderating role of relational and cognitive social capital on that relationship, and the influence of team bridging and bonding social capital on team innovative performance. However, much work remains to be done before we fully understand the development and use of social capital in work teams and how it relates to team innovation.

Appendix A: Interview Protocol

<u>*Team Networks, Knowledge Sharing, and Innovation*</u>

External resources and social networks

1. Who are the members of your team and what functional areas of expertise are they drawn from?

2. How long have you been working together on your current project? What did you each work on before this assignment?

3. How closely does your team work together in the tasks you are doing currently?

   a. If closely, please give a recent example of a time when you have relied on one another to accomplish an important task.

4. What resources do you need from outside your team in order to be successful with your current project?

   a. Do you need information from outside the team?

   b. Do you need support from outside the team (i.e., project championing, financial resources, human resources, etc.)?

5. When your team needs outside resources, to whom do you turn?

   a. Colleagues within Company X?

   b. Management within Company X?

   c. Colleagues or friends outside of Company X?

6. How often does your team seek resources from individuals outside of the team?

7. Do all team members have connections outside the team that are helpful to completing the team's work?

Moderators of tie sharing

1. When members of your team actively share their ties, what do you think their reasons

   are for doing so?

   a. Strong feelings for group?

   b. High levels of trust with group members?

   c. Shared vision or belief in the work the group is doing?

   d. Sharing is necessary to complete our tasks?

   e. Sharing helps us attain group rewards?

Knowledge sharing

1. How does your team manage new knowledge once you have captured it?

   a. How do you share it across team members?

   b. How do you retrieve it when you need it?

   c. How do you know who on the team has what pieces of information?

2. What do you do when you have new knowledge that you're not sure how to use?

   a. Who do you go to for help?

Innovative outcomes

Innovation is defined here to include new products, services, market opportunities, and

   processes

1. What innovation project are you working on currently?

   a. How big a change is this from the current product/service/process?

   b. Where are you in the innovation process?

      i. Are you working to refine your idea?

      ii. Are you mobilizing resources or working on a prototype?

        iii.   Are you conducting testing or moving the project to market soon?

2. What obstacles are you facing in moving your innovation project forward?

3. How do you know that innovation is valued at Company X?

    a.   What encouragement are you given to be innovative?

    b.   How is innovative performance assessed?

    c.   How are you rewarded for being innovative?

4. What happens at Company X when an innovative idea fails?

Appendix B: Study Measures

Individual Bridging Social Capital (Developed for this study; Leana & Pils, 2006)

1. Please list the names of individuals outside of your team to whom you go for information while working on innovation projects.
2. Please list the names if individuals outside of your team to whom you go for resource support (i.e., funds, people, political, etc.) while working on innovation projects.

For each of the above named individuals:
3. How frequently have you spoken with X in the past month about innovation-related issues?
4. How close is your relationship with X?

Team Bridging Social Capital (Leana & Pils, 2006)

For each of the above named individuals:
1. How frequently has the team spoken with X in the past month about innovation-related issues?
2. How close is the team's relationship with X?

Team Bonding Social Capital (Reagans & McEvily, 2003; Ferrin et al., 2006)

1. How frequently do you communicate with X?
2. To what extent do you perceive that X is dependable? For example, do you perceive that X sticks to his/her word, and makes sure his/her actions and behaviors are consistent?

Psychological identification with team (adapted from Mael & Tetrick, 1993)

1. When someone criticizes my team, it feels like a personal insult. (When someone criticizes (this organization), it feels like a personal insult.)
2. I'm very interested in what others think about my team. (I'm very interested in what others think about (this organization)).
3. When I talk about my team, I usually say "we" rather than "they". (When I talk about this organization, I usually say "we" rather than "they".)
4. My team's successes are my successes. (This organization's successes are my successes.)
5. When someone praises my team, it feels like a personal compliment. (When someone praises this organization, it feels like a personal compliment.)
6. I act like other members of my team to a great extent. (I act like a (name of organization) person to a great extent.)
7. If a story in the media criticized my team, I would feel embarrassed. (If a story in the media criticized the organization, I would feel embarrassed.)

8. I don't act much like other members of my team.   (I don't act like a typical (name of organization) person.) (R)
9. I have a number of similar qualities to other members of my team. (I have a number of qualities typical of (name of organization) people.)
10. I have similar weaknesses to other members of my team. (The limitation associated with (name of organization) people apply to me also.)

Psychological identification with organization (adapted from Mael & Tetrick, 1993)

1. When someone criticizes Company X, it feels like a personal insult.
2. I'm very interested in what others think about Company X.
3. When I talk about Company X, I usually say "we" rather than "they".
4. Company X's successes are my successes.
5. When someone praises Company X, it feels like a personal compliment.
6. I act like other members of Company X to a great extent.
7. If a story in the media criticized Company X, I would feel embarrassed.
8. I don't act much like other people at Company X. (R)
9. I have a number of similar qualities to other Company X people.
10. I have similar weaknesses to other Company X people.

TMX (Liden, Wayne, & Sparrowe, 2000)

1. When I am in a bind, my team members will take on extra work to help ensure the completion of my important tasks.
2. My team members have asked for my advice in solving a job-relate problem of theirs.
3. I would come to a team member's defense if he/she were being criticized.
4. I respect my team members as professionals in our line of work.
5. My team members create an atmosphere conducive to accomplishing my work.
6. My team members are the kind of people one would like to have as friends
7. Even when they disagree with me, my team members respect the value of my judgments and decisions
8. I feel that I am loyal to my team members
9. My team members value the skills and expertise that I contribute to our work group.

Trust (Ferrin et al., 2006)

1. To what extent do you perceive that X is dependable? For example, do you perceive that X sticks to his/her word, and makes sure his/her actions and behaviors are consistent?

Shared vision (adapted from Leana & Pils, 2006)

1. I share the same ambitions and vision for my team as my teammates. (Teachers share the same ambitions and vision for the school.)

2. My teammates and I enthusiastically pursue collective goals and mission. (Teachers enthusiastically pursue collective goals and mission.)
3. I perceive a commonality of purpose among members of my team. (There is a commonality of purpose among teachers at this school.)
4. My teammates and I are committed to the goals of the school. (Teachers at this school are committed to the goals of the school.)
5. My teammates and I view ourselves as partners in charting the team's direction. (Teachers view themselves as partners in charting the school direction.)
6. My teammates and I are in total agreement on our team's vision. (Everyone is in total agreement on our school's vision.)

Tertius iungens orientation (Obstfeld, 2005)

1. I introduce people to each other who might have a common strategic work interest.
2. I will try to describe an issue in a way that will appeal to a diverse set of interests.
3. I see opportunities for collaboration between people.
4. I point out the common ground shared by people who have different perspectives on an issue.
5. I introduce two people when I think they might benefit from becoming acquainted.
6. I forge connections between different people dealing with a particular issue.

Interdependence (Campion et al., 1993)

Task
1. I cannot accomplish my tasks without information or materials from other members of my team.
2. Other members of my team depend on me for information or materials needed to perform their tasks.
3. Within my team, jobs performed by team members are related to one another.

Goal
4. My work goals come directly from the goals of my team.
5. My work activities on any given day are determined by my team's goals for that day.
6. I do very few activities on my job that are not related to the goals of my team.

Reward
7. Feedback about how well I am doing my job comes primarily from information about how well the entire team is doing.
8. My performance evaluation is strongly influenced by how well my team performs.
9. Many rewards from my job (e.g., pay, promotion, etc.) are determined in large part by my contributions as a team member.

Transactive memory (Lewis, 2003)

1. Each team member has specialized knowledge of some aspect of our project.

2. I have knowledge about an aspect of the project that no other team member has.
3. Different team members are responsible for expertise in different areas.
4. The specialized knowledge of several different team members was needed to complete the project deliverables.
5. I know which team members have expertise in specific areas.
6. I was comfortable accepting procedural suggestions from other team members.
7. I trusted that other members' knowledge about the project was credible.
8. I was confident relying on the information that other team members brought to the discussion.
9. When other members gave information, I wanted to double-check it for myself. (reversed)
10. I did not have much faith in other members' "expertise." (reversed)
11. Our team worked together in a well-coordinated fashion.
12. Our team had very few misunderstandings about what to do.
13. Our team needed to backtrack and start over a lot. (reversed)
14. We accomplished the task smoothly and efficiently.
15. There was much confusion about how we would accomplish the task. (reversed)

Level of innovativeness in teams (Vera & Crossan, 2005)

1. The team introduced new product/service innovations frequently.
2. The team introduced new product/service innovations quickly.

Big-5 personality (Saucier, 1994)

Please indicate how accurately each of the following traits describe you, using the following scale:

1. Bashful _____
2. Bold _____
3. Careless _____
4. Cold _____
5. Cooperative _____
6. Disorganized _____
7. Efficient _____
8. Energetic _____
9. Extroverted _____
10. Harsh _____
11. Inefficient _____
12. Kind _____
13. Organized _____
14. Practical _____
15. Quiet _____
16. Rude _____
17. Shy _____
18. Sloppy _____
19. Sympathetic _____
20. Systematic _____
21. Talkative _____
22. Unsympathetic _____
23. Warm _____
24. Withdrawn _____

Self-monitoring (Lennox & Wolfe, 1984)

1. In social situations, I have the ability to alter my behavior if I feel that something else is called for.
2. I have the ability to control the way I come across to people, depending on the impression I wish to give them.
3. When I feel that the image I am portraying isn't working, I can readily change it to something that does.
4. I have trouble changing my behavior to suit different people and different situations.
5. I have found that I can adjust my behavior to meet the requirements of any situation I find myself in.
6. Even when it might be to my advantage, I have difficulty putting up a good front.
7. Once I know what the situation calls for, it's easy for me to regulate my actions accordingly.
8. I am often able to read people's true emotions correctly through their eyes.
9. In conversations, I am sensitive to even the slightest change in the facial expression of the person I'm conversing with.
10. My powers of intuition are quite good when it conies to understanding others' emotions and motives.
11. I can usually tell when others consider a joke to be in bad taste, even though they may laugh convincingly.
12. I can usually tell when I've said something inappropriate by reading it in the listener's eyes.
13. If someone is lying to me, I usually know it at once from that person's manner of expression.

References

Adler, Paul S., & Kwon, Seok-Woo. (2002). Social capital: Prospects for a new concept. *Academy of Management Review, 27*(1), 17-40.

Ahuja, Gautam. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly, 45*, 425-455.

Alavi, Maryam, & Tiwana, Amrit. (2002). Knowledge integration in virtual teams: The potential role of KMS. *Journal of the American Society for Information Science and Technology, 53*, 1029-1037.

Allen, Belinda C., Sargent, Leisa D., & Bradley, Lisa M. (2003). Differential effects of task and reward interdependence on perceived helping behavior, effort, and group performance. *Small Group Research, 34*, 716-740.

Ancona, Deborah G. (1990). Outward bound: Strategies for team survival in an organization. *Academy of Management Journal, 33*, 334-365.

Anderson, N., De Dreu, C. K. W., & Nijstad, B. A. (2004). The routinization of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organizational Behavior, 25*, 147-173.

Andrews, R. (2010). Organizational social capital, structure, and performance. *Human Relations, 63*(5), 583-608.

Baer, Markus. (2010). The strength-of-weak-ties perspective on creativity: A comprehensive examination and extension. *Journal of Applied Psychology, 95*, 592-601.

Baldasarri, Delia, & Diani, Mario. (2007). The integrative power of civic networks. *American Journal of Sociology, 113*, 735-780.

Blau, P. M. (1968). Interaction: Social exchange. In D. L. Sills (Ed.), *International Encyclopedia of the Social Sciences* (pp. 452-458). New York.

Blyler, Maureen, & Coff, Russell W. (2003). Dynamic capabilities, social capital, and rent appropriation: Ties that split pies. *Strategic Management Journal, 24*, 677-686.

Borgatti, Steven P., Everett, M.G., & Freeman, L.C. (2002). *UCInet 6 for Windows: Software for social network analysis*. Harvard: Analytic Technologies.

Bourdieu, P. (1985). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241-258). New York: Greenwood.

Bouty, Isabelle. (2000). Interpersonal and interaction influences on informal resource exchanges between R&D researchers across organizational boundaries. *Academy of Management Journal, 43*, 50-65.

Brass, Daniel J. (1984). Being in the right place: A structural analysis of individual influence in an organization. *Administrative Science Quarterly, 29*, 518-539.

Brass, Daniel J. (1985). Men's and women's networks: A study of interaction patterns and influence in an organization. *Academy of Management Journal, 28*, 327-343.

Brass, Daniel J., Butterfield, K. D., & Skaggs, B. C. (1998). Relationships and unethical behavior: A social network perspective. *Academy of Management Review, 23*(1), 14-31.

Brass, Daniel J., Galaskiewicz, Joseph, Greve, Henrich R., & Tsai, Wenpin. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 47*(6), 795-817.

Brown, J. S., & Daguid, P. (1991). Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation. *Organization Science, 2*(1), 40-57.

Brown, John S., & Duguid, Paul. (1998). Organizing knowledge. *California Management Review, 40*, 90-111.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Burt, R. S. (2001). Structural holes versus network structure as social capital. In N. Lin, K. Cook & R. S. Burt (Eds.), *Social capital: Theory and research* (pp. 31-56). New York: Aldine de Gruyter.

Burt, R.S. (1987). Social contagion and innovation: Cohesion versus structural equivalence. *American Journal of Sociology, 92*, 1287-1335.

Burt, R.S. (2000). The network structure of social capital. In R. I. Sutton & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 22, pp. 345-423). Greenwich, CT: JAI Press.

Burt, R.S. (2004). Structural holes and good ideas. *American Journal of Sociology, 110*, 349-399.

Burt, R.S. (2005). *Brokerage and closure: An introduction to social capital*. Oxford: Oxford University Press.

Campion, M.A., Medsker, G.J., & Higgs, A.C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology, 46*, 823-850.

Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology, 83*, 234-246.

Cicourel, A. V. (1973). *Cognitive sociology*. Harmondsworth, England: Penguin Books.

Coleman, J.S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94*, S95-S120.

Coleman, J.S. (1990). *Foundations of social theory*. Cambridge, MA: Harvard University Press.

Contractor, Noshir S., Wasserman, Stanley, & Faust, Katherine. (2006). Testing multitheoretical, multilevel hypotheses about organizational networks: An analytic framework and empirical example. *Academy of Management Review, 31*(3), 681-703.

Crawford, J. L., & Haaland, G. A. (1972). Predecisional information-seeking and subsequent conformity in the social influence process. *Journal of Personality and Social Psychology, 23*, 112-119.

De Dreu, Carsten K. W. (1997). Productive conflict: The importance of conflict management and conflict issue. In C. K. W. De Dreu & E. Van De Vliert (Eds.), *Using conflict in organizations* (pp. 9-22). London: Sage.

Deutsch, M. (1973). *The resolution of conflict: Constructive and destructive processes*. New Haven: Yale University Press.

Dirks, K. T., & Ferris, D. L. (2002). Trust in leadership: Meta analytical findings and implications for research and practice. *Journal of Applied Psychology, 87*(4), 611-628.

Dougherty, Thomas W., Cheung, Yu Ha, & Florea, Liviu. (2008). The role of personality in employee developmental networks. *Journal of Managerial Psychology, 23*, 653-669.

Dunbar, K. (1995). How scientists really reason: Scientific reasoning in real-world laboratories. In R. J. Sternberg & J. E. Davidson (Eds.), *The nature of insight* (pp. 365-395). Cambridge, MA: MIT Press.

Dunbar, K. (1997). How scientists think: On-line creativity and conceptual change in science. In T. B. Ward, S. M. Smith & J. Vaid (Eds.), *Creative thought: An investigation of conceptual structures and processes* (pp. 461-493). Washington, DC: American Psychological Association.

Dyer, Jeffrey H., & Singh, Harbir. (1998). Competitive advantage. *Academy of Management Review, 23*, 660-679.

Eisenbeiss, S. A., Van Knippenberg, D., & Boerner, S. (2008). Transformational leadership and team innovation: Integrating team climate principles. *Journal of Applied Psychology, 93*, 1438-1446.

Faraj, S., & Sproull, L. (2000). Coordinating expertise in software development teams. *Management Science, 46*, 1554-1568.

Faraj, S., & Xiao, Y. (2005). Coordination in fast-response organizations. *Management Science, 52*(8), 1155-1169.

Fayol, Henri. (1949). *General and industrial management*. London: Pitman.

Ferrin, D. L., Dirks, K. T., & Shah, P. P. (2006). Direct and indirect effects of third-party relationships on interpersonal trust. *Journal of Applied Psychology, 91*(4), 870-883.

Field, J. (2008). *Social capital: Second edition*. London: Routledge.

Fleming, L., Mingo, S., & Chen, David. (2007). Collaborative brokerage, generative creativity, and creative success. *Administrative Science Quarterly, 52*, 443-475.

Foa, U. G. (1971). Interpersonal and economic resources. *Science, 171*, 345-351.

Foa, U. G., & Foa, Edna B. (1974). *Societal structures of the mind*. Springfield, IL: Thomas.

Frese, M., & Fay, D. (2001). Personal initiative: An active performance concept for work in the 21st century. In B. M. Staw & R. I. Sutton (Eds.), *Research in Organizational Behavior* (Vol. 23, pp. 133-187). New York: Elsevier/JAI.

Fukuyama, F. (1995). *Trust: Social virtues and the creation of prosperity*. London: Hamish Hamilton.

Fulk, J., & DeSanctis, G. (1999). Articulation of communication technology and organizational form. In G. DeSanctis & J. Fulk (Eds.), *Shaping organizational form: Communication, connection and community* (pp. 5-32). Newbury Park, CA: Sage.

Garriga, E. (2009). Cooperation in stakeholder networks: Firms' 'tertius iungens' role. *Journal of Business Ethics, 90*, 623-637.

Goldsmith, Elizabeth B. (2005). *Resource management for individuals and families* (3rd ed.): Thomson Learning.

Granovetter, M.S. (1973). The strength of weak ties. *American Journal of Sociology, 91*, 481-510.

Granovetter, M.S. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*, 481-510.

Granovetter, M.S. (1992). Problems of explanation in economic sociology. In N. Nohria & R. Eccles (Eds.), *Networks and organizations: Structure, form, and action* (pp. 25-56). Boston: Harvard Business School Press.

Hansen, Morten T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organizational subunits. *Administrative Science Quarterly, 44*, 82-111.

Hansen, Morten T., Mors, Marie Louise, & Lovas, Bjorn. (2005). Knowledge sharing in organizations: Multiple networks, multiple phases. *Academy of Management Journal, 48*(5), 776-793.

Hargadon, Andrew, & Sutton, Robert I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly, 42*, 716-749.

Higgins, T. (2001). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 30, pp. 1-46). San Diego: Academic Press.

Hofmann, D. A., Griffin, M. A., & Gavin, M. B. (2000). The application of hierarchical linear modeling to organizational research. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 467-511). San Francisco: Jossey-Bass.

Hoskisson, Robert E., Hitt, Michael A., Johnson, Richard A., & Grossman, Wayne. (2002). Conflicting voices: The effects of institutional ownership heterogeneity and internal governance on corporate innovation strategies. *Academy of Management Jounal, 45*, 697-716.

Howell, Jane M., & Higgins, Christopher A. (1990). Champions of change: Identifying, understanding, and supporting champions of technological innovations. *Organizational Dynamics, 19*, 40-55.

Howell, Jane M., Neufeld, Derrick J., & Avolio, Bruce J. (2005). Examining the relationship of leadership and physical distance with business unit performance. *Leadership Quarterly, 16*, 273-285.

Hulsheger, U. R., Anderson, N., & Salgado, J. E. (2009). Team-level predictors of innovation at work: A comprehensive meta-analysis spanning three decades of research. *Journal of Applied Psychology, 94*, 1128-1145.

Ibarra, H. (1992). Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative Science Quarterly, 37*, 422-447.

Ibarra, H., Kilduff, M., & Tsai, W. (2005). Zooming in and out: Connecting individuals and collectivities at the frontiers of organizational network research. *Organization Science, 16*, 359-371.

Ingram, P., & Roberts, P. W. (2000). Friendship among competitors in the Sydney hotel industry. *American Journal of Sociology, 106*, 387-423.

Jacobs, J. (1961). *The death and life of great American cities*. London: Penguin Books.

James, Lawrence R., Demaree, Robert G., & Wolf, Gerrit. (1993). r_{wg}: An assessment of within-group interrater agreement. *Journal of Applied Psychology, 78*, 306-310.

Johnson, D. W. (1973). Communication in conflict situations: A critical review of the research. *International Journal of Group Tensions, 3*, 46-67.

Jones, G. R., & George, J. M. (1998). The experience and evolution of trust: Implications for cooperation and teamwork. *Academy of Management Review, 23*(3), 531-546.

Kamdar, Dishan, & Van Dyne, Linn. (2007). The joint effects of personality and workplace social exchange relationships in predicting task performance and citizenship performance. *Journal of Applied Psychology, 92*, 1286-1298.

Kilduff, Martin, & Krackhardt, David. (1994). Bringing the individual back in: A structural analysis of the internal market for reputation in organizations. *Academy of Management Journal, 37*(1), 87-108.

Kilduff, Martin, & Krackhardt, David. (2008). *Interpersonal networks in organizations: Cognition, personality, dynamics and culture*. New York: Cambridge University Press.

Kilduff, Martin, & Tsai, Wenpin. (2003). *Social networks and organizations*. London: Sage Publications.

Kirkman, Bradley L., & Rosen, Benson. (1999). Beyond self-management: The antecedents and consequences of team empowerment. *Academy of Management Journal, 42*, 58-74.

Klein, Katherine J., & Kozlowski, Steve W. J. (2000). From micro to meso: Critical steps in conceptualizing and conducting multilevel research. *Organizational Research Methods, 3*, 211-237.

Klimoski, R., & Mohammed, S. (1994). Team mental model: Construct or metaphor? *Journal of Management, 20*(2), 403-437.

Kozlowski, Steve W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman & D. R. Ilgen (Eds.), *Comprehensive handbook of psychology:*

Industrial and organizational psychology (Vol. 12, pp. 333-375). New York: Wiley.

Kozlowski, Steve W. J., & Klein, Katherine J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3-90). San Francisco: Jossey-Bass.

Krackhardt, David, & Porter, L. W. (1985). When friends leave: A structural analysis of the relationship between turnover and stayers' attitudes. *Administrative Science Quarterly, 30*(2), 242-261.

Kramer, R. M., Brewer, M. B., & Hanna, B. A. (1996). Collective trust and collective action: The decision to trust as a social decision. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research* (pp. 357-389). Thousand Oaks, CA: Sage.

Kramer, R.M. (1999). Trust and distrust in organizations: Emerging perspectives, enduring questions. In J. T. Spence (Ed.), *Annual review of psychology* (Vol. 50, pp. 569-598). Palo Alto, CA: Annual Reviews.

Krebs, D. L. (1970). Altruism--an examination of the concept and a review of the literature. *Psychological Bulletin, 73*, 258-302.

Lane, P., Salk, J. E., & Lyles, M. A. (2001). Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal, 22*(12), 1139-1161.

Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex

    organizations. *Administrative Science Quarterly, 12*, 1-47.

Leana, Carrie R., & Pils, Frits K. (2006). Social capital and organizational performance:

    Evidence from urban public schools. *Organization Science, 17*, 353-366.

Leana, Carrie R., & Van Buren, H. J. III. (1999). Organizational social capital and

    employment practices. *Academy of Management Review, 24*, 538-555.

Lechner, Christoph, Frankenberger, Karolin, & Floyd, Steven W. (2010). Task

    contingencies in the curvilinear relationships between intergroup networks and

    initiative performance. *Academy of Management Journal, 53*, 865-889.

Lee, Robert. (2009). Social capital and business and management: Setting a research

    agenda. *International Journal of Management Reviews, 11*, 247-273.

Lennox, R. D., & Wolfe, R. N. (1984). Revision of the self-monitoring scale. *Journal of

    Personality and Social Psychology, 46*(6), 1349-1364.

Lewicki, R. J., & Bunker, B. B. (1996). Developing and maintaining trust in work

    relationships. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations:

    Frontiers of theory and research* (pp. 114-139). Thousand Oaks, CA: Sage.

Lewis, J. D., & Weigart, A. (1985). Trust as a social reality. *Social Forces, 63*, 967-985.

Lewis, Kyle. (2003). Measuring transactive memory systems in the field: Scale

    development and validation. *Journal of Applied Psychology, 88*(4), 587-604.

Lewis, Kyle. (2004). Knowledge and performance in knowledge-worker teams: A

    longitudinal study of transactive memory systems. *Management Science, 50*(11),

    1519-1533.

Liden, Robert C., Wayne, Sandy J., & Sparrowe, Raymond T. (2000). An examination of
the mediating role of psychological empowerment on the relations between the
job, interpersonal relationships, and work outcomes. *Journal of Applied
Psychology, 85*, 407-416.

Lin, Chieh-Peng. (2006). To help or not to help: Understanding the helping intentions
from a mediating perspective of social network ties. *Journal of Business Ethics,
63*, 175-182.

Lin, Nan. (1999). Social networks and status attainment. *Annual Review of Sociology, 25*,
467-487.

Luhmann, N. (1979). *Trust and power*. Chichester: Wiley.

Mael, F. A., & Tetrick, L. E. (1992). Identifying organizational identification.
Educational & Psychological Measurement, 52, 813-825.

Marrone, Jennifer A. (2010). Team boundary spanning: A multilevel review of past
research and proposals for the future. *Journal of Management, 36*, 911-940.

Marsden, P. V. (1990). Network data and measurement. In W. R. Scott & J. Blake (Eds.),
Annual review of sociology (Vol. 16). Palo Alto, CA: Annual Reviews.

Mathieu, J.E., Heffner, T.S., Goodwin, G.F., Salas, E., & Cannon-Bowers, J.A. (2000).
The influence of shared mental models on team processes and performance.
Journal of Applied Psychology, 85, 273-283.

Mathieu, J.E., Maynard, M. T., Rapp, T. L., & Gilson, L. L. (2008). Team effectiveness
1997-2007: A review of recent advancements and a glimpse into the future.
Journal of Management, 34, 410-476.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *academy of Management Review, 20*, 709-734.

McAllister, Daniel J. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal, 38*, 24-59.

McGrath, Joseph E. (1984). *Groups, interaction, and performance*. Englewood Cliffs, NJ: Prentice-Hall.

Mehra, Ajay, Dixon, Andrea L., Brass, Daniel J., & Robertson, Bruce. (2006). The social network ties of group leaders: Implications for group performance and leader reputation. *Organization Science, 17*(1), 64-79.

Mehra, Ajay, Kilduff, Martin, & Brass, Daniel J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly, 46*, 121-146.

Menor, L. J., Kristal, M. M., & Rosenzweig, E. D. (2007). Examining the influence of operational intellectual capital on capabilities and performance. *Manufacturing and Service Operations Management, 9*(4), 559-578.

Merton, R. K. (1968). *Social theory and social structure*. New York: Free Press.

Mohammed, S., & Dumville, B. (2001). Team mental models in a team knowledge framework: Expanding theory and measurement across discipline boundaries. *Journal of Organizational Behavior, 22*, 89-106.

Monge, Peter R., & Contractor, Noshir. (2003). *Theories of Communication Networks*. New York: Oxford University Press.

Morgeson, Frederick P., & Hofmann, David A. (1999). The structure and function of collective constructs: Implications for multilevel research and theory development. *Academy of Management Review, 24*, 249-265.

Moser, Karin S., & Wodzicki, Katrin. (2007). The effect of reward interdependence on cooperation and information-sharing intentions. *Swiss Journal of Psychology, 66*, 117-127.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review, 23*(2), 242-266.

Nelson, R. E. (1989). The strength of strong ties: Social networks and intergroup conflict in organizations. *Academy of Management Journal, 32*, 377-401.

O'Reilly, C., & Chatman, J. (1996). Cultures as social control: Corporations, cults, and commitment. In L. Cummings & B. Staw (Eds.), *Research in Organizational Behavior* (Vol. 18, pp. 157-200). Greenwich, CT: JAI Press.

Obstfeld, D. (2005). Social networks, the *tertius iungens* orientation, and involvement in innovation. *Administrative Science Quarterly, 50*(1), 100-130.

Oh, Hongseok, Chung, Myung-Ho, & Labianca, Giuseppe. (2004). Group social capital and group effectiveness: The role of informal socializing ties. *Academy of Management Journal, 47*, 860-875.

Oh, Hongseok, & Kilduff, Martin. (2008). The ripple effect of personality on social structure: Self-monitoring origins of network brokerage. *Journal of Applied Psychology, 93*, 1155-1164.

Oh, Hongseok, Labianca, Giuseppe, & Chung, Myung-Ho. (2006). A multilevel model of group social capital. *Academy of Management Review, 31*(3), 569-582.

Paulus, P. B. (2000). Groups, teams and creativity: The creative potential of idea-

    generating groups. *Applied Psychology: An International Review, 49*, 237-262.

Pearce, J. L., & Gregersen, H. B. (1991). Task interdependence and extrarole behavior: A

    test of the mediating effects of felt responsibility. *Journal of Applied Psychology,*

    76, 838-844.

Pettigrew, Andrew M. (1973). *The politics of organizational decision making*. London:

    Tavistock.

Phelps, Corey C. (2010). A longitudinal study of the influence of alliance network

    structure and composition on firm exploratory innovation. *Academy of*

    Management Jounal, 53, 890-913.

Pil, Frits K., & Leana, Carrie R. (2009). Applying organizational research to public

    school reform: The effects of teacher human and social capital on student

    performance. *Academy of Management Jounal, 52*, 1101-1124.

Polanyi, M. (1966). *The tacit dimension*. Garden City, NY: Doubleday.

Poole, M. S. (1999). Group communication theory. In L. F. Frey, D. S. Gouran & M. S.

    Poole (Eds.), *The handbook of group communication theory and research* (pp. 88-

    165). Thousand Oaks, CA: Sage.

Provan, Keith G., & Sebastian, Juliann G. (1998). Networks within networks: Service

    link overlap, organiztional cliques, and network effectiveness. *Academy of*

    Management Jounal, 41, 453-463.

Putnam, R. D. (1993). The prosperous community: Social capital and public life.

    American Prospect, 13, 35-42.

116

Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy, 6*, 65-78.

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon and Schuster.

Raudenbush, S. W., & Byrk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Newbury Park, CA: Sage.

Reagans, Ray, & McEvily, W. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly, 48*, 240-267.

Reagans, Ray, & Zuckerman, Ezra. (2001). Networks, diversity, and productivity: The social capital of corporate R&D teams. *Organization Science, 12*(4), 502-517.

Reagans, Ray, Zuckerman, Ezra, & McEvily, Bill. (2004). How to make the team: Social networks vs. demography as criteria for designing effective teams. *Administrative Science Quarterly, 49*, 101-133.

Richardson, J. G. (1986). *Handbook of theory and research for the sociology of education*. New York: Greenwood Press.

Robbins, Garry, Pattison, Philippa, & Woolcock, Jodie. (2005). Small and other worlds: Global network structures from local processes. *American Journal of Sociology, 110*, 894-936.

Roth, P. L., & Switzer III, F. S. (1994). A Monte Carlo analysis of missing data techniques in a HRM setting. *Journal of Management, 21*(5), 1003-1023.

Rouse, W. B., & Morris, N. M. (1986). On looking into the black box: Prospects and limits in the search for mental models. *Psychological Bulletin, 100*, 349-363.

Salas, E., Dickinson, T. L., Converse, S. A., & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance* (pp. 3-29). Westport, CT: Ablex Publishing.

Sasovova, Zuzana, Mehra, Ajay, Borgatti, Stephen P., & Schippers, Michaela C. (2010). Network churn: The effects of self-monitoring personality on brokerage dynamics. *Administrative Science Quarterly, 55*, 639-670.

Saucier, G. (1994). Mini-Markers: A brief version of Goldberg's unipolar Big-Five markers. *Journal of Personality Assessment, 63*, 506-516.

Schmickl, Christina, & Kieser, Alfred. (2008). How much do specialists have to learn from each other when they jointly develop radical product innovations? *Research Policy, 37*, 1148-1163.

Scott, John. (2000). *Social Network Analysis: A Handbook* (Second ed.). Los Angeles: Sage Publications.

Scott, Susanne G., & Bruce, Reginald A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal, 37*(3), 580-608.

Seers, Anson. (1989). Team-member exchange quality: A new construct for role-making research. *Organizational Behavior and Human Decision Processes, 43*, 118-135.

Seers, Anson, Petty, M. M., & Cashman, James F. (1995). Team-member exchange under team and traditional management. *Group and Organization Management, 20*, 18-38.

Shan, Weijian, Walker, Gordon, & Kogut, B. (1994). Interfirm cooperation and startup innovation in the biotechnology industry. *Strategic Management Journal, 15*, 387-394.

Shaw, M. E. (1981). *Group dynamics: The psychology of small group behavior*. New York: Harper.

Simon, L., & Davies, G. (1996). A contextual approach to management learning. *Organization Studies, 17*, 269-289.

Smith, E. R., & Mackie, D. M. (2000). *Social Psychology* (2nd ed.). Philadelphia, PA: Psychology Press.

Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis: An introduction to basic and advanced level multilevel modeling*. London: Sage.

Sparrowe, Raymond T., Liden, R.C., Wayne, S.J., & Kraimer, M.L. (2001). Social networks and the performance of individuals and groups. *Academy of Management Journal, 44*, 316-325.

Sparrowe, Raymond T., & Liden, Robert C. (2005). Two routes to influence: Integrating leader-member exchange and social network perspectives. *Administrative Science Quarterly, 50*, 505-535.

Starkey, K., & Tempest, S. (2004). Bowling along: Strategic management and social capital. *European Mangement Review, 1*, 78-83.

Steiner, I. D. (1972). *Group process and productivity*. New York: Academic Press.

Subramaniam, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal, 48*(3), 450-463.

Tajfel, H. (Ed.). (1982). *Social relations and intergroup relations*. Cambridge, MA: Cambridge University Press.

Taylor, A., & Greve, Henrich R. (2006). Superman or the Fantastic Four? Knowledge combination and experience in innovative teams. *Academy of Management Journal, 49*, 723-740.

Taylor, Frederick W. (1911). *The principles of scientific management*. New York: Harper Bros.

Tjosvold, Dean. (1998). Co-operative and competitive goal approaches to conflict: Accomplishments and challenges. *Applied Psychology: An International Review, 47*, 285-342.

Tsai, Wenpin, & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal, 41*, 464-478.

Tschan, F., & von Cranach, M. (1996). Group task structure, processes and outcome. In M. A. West (Ed.), *Handbook of work group psychology* (pp. 95-121). Chichester: John Wiley.

Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review, 61*, 674-698.

Uzzi, B. (1997). Social structure and competition in inter-firm networks: The paradox of embeddedness. *Administrative Science Quarterly, 42*, 35-67.

Vera, D., & Crossan, M. (2005). Improvisation and innovative performance in teams. *Organization Science, 16*(3), 203-224.

Wageman, R. (1995). Interdependence and group effectiveness. *Administrative Science Quarterly, 40*, 145-180.

Walker, G., Kogut, B., & Shan, W. (1997). Social capital, structural holes and the formation of an industry network. *Organization Science, 8*, 109-125.

Weber, Max. (1947). *The theory of social and economic organization* (A. M. Hendersen & T. Parsons, Trans.): The Free Press.

Wegner, D. M. (1986). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185-208). New York: Springer-Verlag.

West, Michael A. (2002). Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups. *Applied Psychology: An International Review, 51*, 355-424.

Yuan, Feirong, & Woodman, Richard W. (2010). Innovative behavior in the workplace: The role of performance and image outcome expectations. *Academy of Management Journal, 53*, 323-342.

Zander, U., & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization Science, 6*, 76-92.