ALFRED P. SLOAN FOUNDATION
Industry Studies
2008
Annual Conference | May 1 - 2, 2008 | Boston, MA
http://web.mit.edu/is08/program

When Do Organizations Learn From Each Other? Interorganizational Learning in Health Care

Ingrid M. Nembhard, Ph.D., M.S.
Assistant Professor
Yale University School of Medicine - Public Health
Yale University School of Management

Mailing address:
60 College Street, P.O. Box 208034
New Haven, CT 06520-8034
Phone: 203-785-3778
Fax: 203-785-6287
Email: ingrid.nembhard@yale.edu

BECOME A SLOAN AFFILIATE → http://www.sloan.org/programs/affiliates.shtml

When Do Organizations Learn From Each Other?
Interorganizational Learning in Health Care

Ingrid M. Nembhard, Ph.D., M.S.
Assistant Professor
Yale University School of Medicine - Public Health
Yale University School of Management

Mailing address:
60 College Street, P.O. Box 208034
New Haven, CT 06520-8034
Phone: 203-785-3778
Fax: 203-785-6287
Email: ingrid.nembhard@yale.edu

When Do Organizations Learn From Each Other?

Interorganizational Learning in Health Care

Abstract

Interorganizational relationships (IORs, e.g. alliances) have become increasingly popular across industries – particularly in knowledge-intensive industries - as organizations seek ways to learn and innovate at a faster pace. Health care organizations have been especially inclined to form IORs recently, with many joining quality improvement collaboratives, in which multidisciplinary teams from multiple institutions work together to improve practices around a specific topic (e.g. decreasing infection rates). This research capitalizes on the prevalence of collaboratives to study interorganizational learning in health care, a process that has received scant attention in both organizational learning theory and the health care management literature. The questions of when do organizations move beyond mere collaborative membership to become active learning partners, and what the outcomes of such a transition are remain under-theorized. This study addresses this knowledge gap by proposing and testing a model of antecedents and consequences of interorganizational learning activity (ILA). Survey data collected from 53 teams in four collaboratives suggests that organizational, collaborative and task characteristics all influence the use of ILA. In particular, organizational support, perceived organizational similarity and task simplicity are positively associated with ILA, which in turn increases organizations' process improvement. The data also show that collaborative identification and team functioning play important mediating and moderating roles, respectively. The implications of these findings for theory and practice are discussed.

When Do Organizations Learn From Each Other?
Interorganizational Learning in Health Care

Organizations that learn – consistently improving their processes and products by integrating new insights and knowledge – perform well in a changing environment (Garvin, 1993). This premise has led to considerable scholarly investigation of organizational learning. Much of the research pertains to organizations learning from their own experience to gain competitive advantage (Argote & Ophir, 2002). In recent years however, changes in knowledge, technology and regulation, along with rising expectations for innovation and improvement have made it difficult for organizations to rely only on intraorganizational learning (Ring & Van de Ven, 1994). Across industries – and particularly in knowledge-intensive fields such as health care, product development and national intelligence - organizations have increasingly formed interorganizational relationships (IORs) as an alternative approach to learning faster at less cost and risk (Greve, 2005a; Kilo, 1999; Powell, Koput, & Smith-Doerr, 1996). Performance results following IOR membership are mixed (Ernst & Bleeke, 1993). This raises the question when and how do organizations benefit from participation in IORs.

Knowledge-based theories of the firm that argue knowledge is a critical competitive advantage (Kogut & Zander, 1992), organizational learning theories that argue the importance of learning from others (Argote & Ophir, 2002), network theories describing the knowledge acquisition virtues of various ties (Hansen, 1999) and team learning theories that attribute performance to external learning (Ancona & Caldwell, 1992a; Choi, 2002) all suggest that the answer is: when participants actively share knowledge, thereby engaging in *inter*organizational learning – the process by which "one organization causes a change in the capacities of another, either through experience sharing, or by somehow stimulating innovation" (Ingram, 2002: 642).

Little empirical research exists on interorganizational learning (Larsson, Bengtsson,

Henriksson, & Sparks, 1998). What research does exist describes the experience of firms partnering to learn and innovate in competitive, usually production industries (Hamel, 1991; Powell et al., 1996). Parallel research focused on not-for-profit firms or industries where knowledge is a public good is scarce by comparison (Battilana & Sengul, 2006), with the notable exceptions of such work by Galaskiewicz and Bielefeld (1998) and Goes and Park (1997). This may be because such learning is taken for granted in these sectors. However, large differences in evidence-based care provided by different health care providers (Institute of Medicine, 2001) and failures of communication between U.S. intelligence agencies prior to September 11, 2001 (Greve, 2005a), indicates that interorganizational learning does not occur naturally, even when there is a clear imperative. Current theory has not illuminated the challenges, catalysts and range of outcomes from interorganizational learning in such "public good" contexts. It also has not examined the process from the team perspective, even though teams are often the primary participants in IORs. The aim of the present research is to address this knowledge gap by advancing theory of team-based interorganizational learning in public good contexts.

In the sections that follow, I develop and test a model of team-based interorganizational learning. In the model, participation in interorganizational learning activity (ILA) – defined here as the set of activities in which organizations through designated teams participate with the intent of acquiring, sharing and combining knowledge with teams from other organizations – is related to an under-studied organizational performance outcome: process improvement. The model identifies critical antecedents of ILA, namely organizational support, perceived organizational similarity and task complexity, and examines the process by which these antecedents influence interorganizational learning efforts. The construct of collaborative identification is introduced as a mediator, while team functioning is hypothesized to moderate key relationships. This model

thus integrates team, organizational, IOR and task characteristics to explain ILA. Additionally, it offers a process-based account of such learning, currently absent in the literature (Ingram, 2002; Simonin, 1999). I test the model in the health care setting, therefore before further discussion, I review interorganizational learning efforts in health care.

INTERORGANIZATIONAL LEARNING IN HEALTH CARE

In the wake of recent reports documenting widespread quality problems in the U.S. health care industry (e.g., Institute of Medicine, 2001), many health care organizations have begun to form or join IORs with the hope that collaboration will enable them to develop new practices that address current problems and improve the care they deliver to patients. One type of IOR has been particularly popular: quality improvement collaboratives. In a collaborative, teams from multiple health care institutions (usually, 15 to 40) work together for six to 24 months on a specific topic (e.g. decreasing infection rates, reducing waits and delays in the emergency room, etc.). Teams include administrators and health professionals (e.g. physicians) whose departments or functions are affected by or instrumental for change in the topic area.

Teams attend multiple two-day all-collaborative meetings, called "Learning Sessions," where they learn improvement techniques from experts and share their experiences around implementing new practices with one another. Between Learning Sessions, teams implement changes in their home organizations using rapid cycle (plan-do-study-act) improvement projects and continue to learn from one another by participating in a variety of ILA, including monthly conference calls, monthly exchange of written reports detailing improvement activities, monthly posting of performance data to the collaborative extranet for viewing by others, listserv discussions and site visits. After the collaborative ends, teams summarize their results and lessons learned, and present them to non-participating organizations at conferences.

Until recent, such collaboration in health care was rare due to competition, productivity requirements and conflicting incentive structures (Kilo, 1999). Now, collaboratives are being widely adopted as a part of the movement to spread knowledge about how to deliver quality care (Mittman, 2004). The U.S. Health Resources and Services Administration, United Kingdom's National Health Service, Russian Health Service, and numerous organizations are sponsoring and/or participating in these IORs. The existence of collaboratives offers an ideal opportunity to study interorganizational learning. That is their purpose. Moreover, specific examples of ILA (e.g., conference calls) are built into the collaborative model, facilitating study. Finally, the health care context is a constructive one because its organizations are representative of many complex service organizations contending with inappropriate process variation, rapid increases in knowledge and technology and external demands for improvement that require coordination across multiple parties, making findings from this context potentially applicable elsewhere.

Prior research on collaboratives has focused on whether collaboratives are effective. Like the results for other industries' IORs, the results are mixed (Mittman, 2004). This suggests that a more appropriate research question is: when – or under what conditions – are collaboratives effective? This study proposes and tests participation in ILA as a key determinant of collaborative effectiveness, and thus an explanation for past research's inconsistent findings. Therefore, in addition to contributing to organizational learning theory, this research advances theory in health care management on quality improvement.

THEORY AND HYPOTHESES

Interorganizational Learning and Process Improvement

External activities and communication have been linked to a variety of organizational performance outcomes such as profitability (Ingram & Simons, 2002) and innovation (Goes &

Park, 1997). These outcomes are important across industries. However, an immediate concern for health care and other public sectors is whether the investment in collaboratives or other IORs results in process improvement, an outcome that has received no attention. Existing theory attributing the relationship between external communication and other performance outcomes to the acquisition of new knowledge (Ancona & Caldwell, 1992b; Hansen, 1999; Powell et al., 1996) suggests the answer is yes. By participating in ILA, teams and their organizations have the opportunity to learn of the successes and failures of their fellow collaborators in the improvement area. Success stories reveal possible practices worth adopting, while failure stories save teams from implementing practices that would stall or reverse their improvement efforts. Both types of knowledge are valuable for teams and organizations striving to implement new and better processes in a timely manner (Cannon & Edmondson, 2005). Additionally, the depth of implementation knowledge shared via ILA, which is likely greater than that obtained in publications, increases understanding of successful practices and how to implement them effectively. Therefore, I hypothesize:

Hypothesis 1: ILA is positively associated with organization's process improvement.

Characteristics of the Organization, IOR and Task: Antecedents of ILA

In any IOR, there are three components: (1) the organizations that participate, (2) the new entity formed by the IOR and (3) the task for which the IOR was formed to accomplish. Drawing upon the IOR formation, knowledge transfer and organizational learning literatures, characteristics of all three components influence participant behavior and the success of the IOR itself (Argote & Ophir, 2002; Ingram, 2002; Szulanski, 1996). In this work, I consider just three factors – organizational support, perceived organizational similarity and task complexity. All are highly salient in an IOR and thus likely to affect the behavior at the heart of this research, ILA.

Organizational support. One of the most salient considerations for teams charged with carrying out the implementation of new work practices in their home organization is feasibility given the organizational context – the "overarching structures and systems external to the team that facilitate or inhibit its work" (Denison, Hart, & Kahn, 1996: 1006). What will work given the organization's staff, technology, service population, financial constraints, regulations as well as the culture and practices of the institution (e.g. rewards)? Navigating all of these concerns is easier in the presence of organizational support, reflected in the receipt of needed time, resources, information and assistance with institutional barriers (Hackman, 1987).

In general, research on teams and organizational context indicates that a supportive organizational context facilitates team learning behavior (Edmondson, 1999; Zellmer-Bruhn & Gibson, 2006) and ultimately team performance (Ancona & Caldwell, 1992a; Hackman, 1987). However, studies conducted in the health care industry vary in their support of this relationship. While some studies reinforce the importance of organizational support on performance showing positive effects of management support and organizational culture (Bradley et al., 2003; Shortell, Bennett, & Byck, 1998), others show no association. For example, Mills and Weeks (2004) in a study of teams participating in collaboratives sponsored by the Veterans Health Administration found no significant difference in resources, time, senior leader support and organizational emphasis placed on improvement between high- and low-performing teams. Similarly, in a study of surgical teams implementing a new technology, Edmondson (2003) found no effect of senior management support for change on team learning. The absence of a positive relationship in these studies may be related to the study populations. Edmondson speculated that management support was less relevant for implementing the technology she studied, therefore its use and effects were less observable. Mills and Weeks' sample of teams all originating from the same organization

likely served as a limitation for the purposes of examining the effects of variability in context.

In most IORs however, each team represents a different organization and so the organizational context does differ with implications for how teams behave. If an organization shows genuine support for learning and process improvement efforts, the team is more likely to believe that it is acceptable and desirable to utilize all learning opportunities available including ILA. In contrast, if an organization fails to provide support to its team (e.g., not allowing attendance at monthly conference calls), the team may infer that the organization does not truly value the project, therefore the team should not make the effort. Thus, I hypothesize:

Hypothesis 2: Organizational support is positively associated with ILA.

Perceived organizational similarity. One of the central findings in social psychology research is that feelings or perceptions of others drive our interactions with them. In particular, the interpersonal attraction literature reveals that we not only act favorably towards individuals who are similar to us, but also to those who we think are similar to us in attitudes, values and circumstances (Byrne, 1971; Wexley, Alexander, Greenwalt, & Couch, 1980). In fact, perceived similarity is a stronger predictor of interpersonal relations than actual similarity. Prior work, largely from studies of individual dyads, shows that we exchange information, provide support and facilitate the work completion of those we perceive as similar (Pukalos & Wexley, 1983).

Recent research by Lee, Pae and Wong (2001) also shows that organizations that perceive similarities between themselves and potential partners formed closer relationships and exchanged favors. No mention of knowledge-sharing was made, however such close relationships likely involved information transfer as Darr and Kurtzberg (2000) showed that similarity motivates knowledge transfer. Although Darr and Kurtzberg (2000) investigated actual not perceived similarity, combined with Lee and colleagues' (2001) results and individual-level results (Byrne,

1971; Wexley et al., 1980) showing that perception can be as influential as reality, there is reason to believe that perceived organizational similarity, defined as the belief that organizations share common characteristics, may also foster deliberate knowledge-sharing among organizations.

There is great incentive to engage in ILA with teams from organizations that seem similar. They likely possess information relevant to the task and appropriate to the recipient organization (Borgatti & Cross, 2003; Greve, 2005b). After all, if it worked there, should it not work here? Furthermore, getting it to work here should be easier because of the "similarity" in structure and knowledge base (Darr & Kurtzberg, 2000; Greve, 2005b). This line of reasoning by IOR participants should lead those that perceive organizational similarity to be receptive to interfirm learning (Hamel, 1991) and thus willing to participate in ILA. Therefore, I hypothesize:

Hypothesis 3: Perceived organizational similarity is positively associated with ILA.

Task complexity. Definitions of task complexity abound (see Campbell, 1988 for a review). Largely consistent across all is the notion that task complexity is a function of the skill required for the task, number of routines that must be altered and uncertainty surrounding the task. The knowledge management literature has further identified that the degree of uncertainty is related often to knowledge properties of the task (Szulanski, 1996; Zander & Kogut, 1995). Some tasks are difficult because their execution involves tacit knowledge that is difficult to codify (Zander & Kogut, 1995). Some tasks are more challenging because they require the implementation of practices that are casually ambiguous or have little knowledge base, making it hard to know what to implement and how to do it (Simonin, 1999; Szulanski, 1996).

In such instances, when the task is complex, social interaction becomes important (Davenport & Prusak, 1998; Hansen, 1999). Tyre and von Hippel (1997) showed that engineers had to leave their laboratories and engage in "collaborative inquiry" with others in the field to

solve problems with new technologies. Similarly, Olson and colleagues (1995) showed that as product development teams encountered difficulty, they began communicating more with functional units in the organization. These studies reveal a willingness for information-seeking and knowledge sharing when faced with a complex task. However, in both cases, the challenged confined their search and share activities within the organizational boundaries.

Many institutions though do not possess all of the knowledge needed to implement quality-improving work practices, a complex task, quickly within their walls (Goes & Park, 1997). Completely self-reliant efforts are likely to miss ever-evolving knowledge, be more time-consuming and fall short of goals. When that happens, behavior theory argues that organizations will seek new approaches (Cyert & March, 1992). ILA is a new approach and provides opportunities to discover new approaches, thus I hypothesize that ILA will be an attractive option for teams that find their task (e.g. improving patient care) difficult.

Hypothesis 4: Task complexity is positively associated with ILA.

Task complexity, along with organizational support and perceived organizational similarity, are all salient factors to teams in IORs, and as I argue, therefore likely to be critical variables as teams consider whether to participate in ILA. What is less apparent is the process by which salient antecedents create interest in ILA. I propose that identification is the missing mechanism.

Collaborative Identification as a Mediator

The concept of identification has a long history in social science literature. It has been researched at the individual (Tajfel, 1981), team (Van der Vegt & Bunderson, 2005), organizational (Albert & Whetten, 1985), and recently, network level (Huemer, Becerra, & Lunnan, 2004). Across levels, identification describes the subjective, psychological process of a focal party feeling and claiming an affiliation with a larger group.

Dyer and Nobeoka (2000) in their study of the Toyota knowledge-sharing network were among the first to observe network identification, noting a shared sense of purpose existed not just within Toyota but also within its supplier network. All IORs do not have a supplier network or consist of enduring ties, two properties that scholars cite when defining the networks in which identification may occur (Huemer et al., 2004). Therefore, rather than inappropriately use "network identification," I introduce the term "collaborative identification" to widen the scope of network identification to include relatively short-lived peer relationships like collaboratives. Collaborative identification refers to a sense of purpose, commitment and belonging to any interorganizational entity. It reflects a transformation of thinking in terms of "we" and "them" to "us" (Huemer et al., 2004). The influence of such collective identification on behavior has been well argued and documented (Tyler & Blader, 2001; Van der Vegt & Bunderson, 2005). Identification is a powerful motivator of cooperative behavior. Dyer and Nobeoka (2000) found this to be true in Toyota's knowledge sharing network, where network identification motivated active knowledge-sharing and cooperative problem-solving.

I therefore expect that collaborative participants that identify with the collaborative will be more likely to engage in ILA, a form of cooperative behavior. The identification creates a willingness to participate in the activities of the collaborative, allows participants to see the value of knowledge-sharing, and stimulates a desire for "us" to work together (Huemer et al., 2004). Previous research shows that identification is more likely to occur when individuals believe significant similarities exist between themselves and the focal party (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Whether the similarities are real is inconsequential to the feeling of identification. Individuals need only perceive that similarities are present to identify. The understanding, empathy and attraction that derive from perceived similarity creates the sense of

oneness and commitment that define identification. This relationship begins to clarify how perceived organizational similarity affects ILA in IORs. The more a team sees similarities between its organization and other organizations in the IOR, the greater the collaborative identification. Once that feeling is present, teams are more inclined to interact with others in the IOR. Therefore, it is not perceived organizational similarity that directly motivates ILA; rather it is the collaborative identification that evolves from the perception of similarity among organizations that motivates the sharing of knowledge and experiences. Thus, I hypothesize:

Hypothesis 5a: Collaborative identification mediates the relationship between perceived organizational similarity and ILA.

Additionally, collaborative identification may explain the link between task complexity and ILA. When teams experience difficulty implementing new practices, a unifying rallying point may develop. A superordinate goal emerges ("We will conquer infections together.") and simultaneously a sense of oneness – characteristic of identification – surfaces. Intra-team studies show that the presence of a superordinate goal inspires the sharing of knowledge and resources (Pinto, Pinto, & Prescott, 1993). It enables the transcendence of differences and facilitates cooperation. Olson and colleagues (1995) found that product development teams that experienced difficulty began to feel a greater sense of interdependence with functional units, which led them to exchange more information. Based on these results, I hypothesize:

Hypothesis 5b: Collaborative identification mediates the relationship between task complexity and ILA.

The Moderating Role of Team Functioning

Given that teams do the work in many IORs, it is important to understand the effect of

internal team functioning on their learning efforts. Team functioning refers to how well team members work together (Dreu & Vianen, 2001). In a well-functioning team, members communicate, cooperate and coordinate their efforts with respect for one another (Hackman, 1987). Prior research shows that members of these teams regard the team as a satisfying, productive experience so much so that they increase the amount of time and attention they dedicate to the team and its task (Klein & Kleinhanns, 2003).

In contrast, members of poorly functioning teams in which frustration, personal conflict, distrust and dysfunctional processes are the norm are more likely to either disengage from the team or become so preoccupied with the internal tension that they neglect the task. Janis (1982) showed that groups that become too internally focused frequently fail to explore information and options relevant to the task. They especially ignored the external environment. Therefore, I predict that poorly functioning teams are less likely to be influenced by perceived organizational similarity and task complexity. The former requires teams to be externally attentive in order to notice similarity, while the latter requires teams to be deeply engaged in the task to notice when task-related difficulties are being encountered. Poorly functioning teams are more likely to be too distracted to notice either. The opposite should be true for well functioning teams. Their enthusiasm for the team and its work motivates them to explore the internal and external environment for all task-relevant information; thus they will notice organizational similarity and try to capitalize upon it. Additionally, their engagement with the task increases the probability that they will see task complexities and attempt to appropriately respond. Thus, I hypothesize:

Hypothesis 6a: Team functioning moderates the relationship between perceived organizational similarity and ILA such that the relationship is strongest when team functioning is high.

Hypothesis 6b: Team functioning moderates the relationship between task complexity and ILA such that the relationship is strongest when team functioning is high.

Lastly, combining Hypothesis 5 with Hypotheses 6a and 6b, team functioning should moderate the relationship between collaborative identification and ILA:

Hypothesis 6c: Team functioning moderates the relationship between collaborative identification and ILA such that the relationship is strongest when team functioning is high.

METHODS

Sample and Data Collection

The Institute for Healthcare Improvement (IHI) is the world's best-known sponsor of collaboratives. I tested the above hypotheses with data on participants in four of its 2004-2005 collaboratives: Improving Access and Efficiency in Primary Care (ACCESS), Reducing Complications from Ventilators and Central Lines in the ICU (ICU), Reducing High Hazard Adverse Drug Events (ADE) and Reducing Surgical Site Infections (SSI). A total of 78 teams from 70 organizations in the United States and Canada comprised the initial sample. The teams consisted of nurses, physicians, administrators and other professionals with expertise related to the collaborative topic, for example, respiratory therapists, pharmacists, clerical staff and infection specialists for the ADE, ICU, ACCESS and SSI collaboratives, respectively.

I invited team members in all four collaboratives to participate in this study. A letter, distributed via collaborative listserv, explained that a survey would be distributed to all team members present at the final Learning Session of the collaborative, and offered the opportunity for online or paper completion of the survey to those unable to attend that meeting. Following the session, five surveys with self-addressed stamped envelopes were mailed to the key contact

for each team that did not attend. A reminder email to complete the survey with "thank you" to those who had participated was then sent to all team members within two weeks of the session.

In total, I obtained survey data from 253 members of 67 teams from 60 organizations, for a team response rate of 86 percent. However, because the team was the intended unit of analysis, I only retained the data of the 53 teams (n = 217 individuals) for which three or more members offered responses (c.f. Van der Vegt & Bunderson, 2005). In this final sample, on average, there were 13 teams from each collaborative and 4 respondents per team (range: 3 to 10). This subset did not differ significantly from non-study teams in organizational size as measured by number of beds, geography, setting (urban versus rural), teaching responsibilities, health system memberships, ownership status, or performance improvement, suggesting that the final sample was not systematically different from the sample as a whole. Data on performance and records of participation in IHI-organized activities were obtained from IHI. I did not collect demographic information on team members to offer greater assurance of confidentiality and anonymity.

Measures

Survey questions, a combination of some adapted from existing scales and some newly created for this research, were framed as informant items; individuals were asked to report the team's perceptions and behaviors instead of their own, using a seven-point agreement scale (1 = strongly disagree, 7 = strongly agree) unless otherwise noted. I included all survey items in a principal axis factor analysis with promax rotation to discover which items combined to form discriminant scales. Applying the criteria of retaining only those factors with eigenvalues above one and only those items with factor loadings of .40 or greater to the results, six factors or scales were retained, one more than expected. The additional factor resulted from a split in the task complexity scale. The factor that most closely captured task complexity retained that construct

name, while the second factor was termed "knowledge transferability" and tested alongside task complexity. The remaining four factors captured the other study variables: organizational support, perceived organizational similarity, collaborative identification, and team functioning.

Organizational support was evaluated by using five items adapted from prior research (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Edmondson, 1999; Scott & Bruce, 1994). Sample items are "This team gets all the information and help it needs from the hospital/clinic leadership to do its work and plan its activities" and "People are encouraged to solve problems creatively in this hospital/clinic." Because the level of analysis was the team, following Klein and colleagues (2001), I calculated Chronbach's alpha at the team-level, but also calculated the typical individual-level measure. Team-level Chronbach's alpha was .92; individual-level was .87, satisfying Nunnally's (1978) criterion of .70 for reliability.

Perceived organizational similarity was assessed using one item adapted from (Pukalos & Wexley, 1983), and a single item created for this research: "The other hospital/clinics in this Collaborative are similar to ours" and "There appear to be more differences than similarities between our hospital/clinic and others in this Collaborative" (reverse-scored). Team-level Chronbach's alpha was .74; individual-level was .60.

Task complexity was measured by a single item from Sarin and McDermott's (2003) complexity scale: "The practices developed by our team were technically complex to develop." ***Knowledge transferability*** was measured by two items adapted from Simonin's knowledge scales (1999): "The practices this team developed are easily transferable to other hospital/clinics" and "The practices this team developed are easily codified (in instructions, protocols, etc.)." Team-level Chronbach's alpha for this untended scale was .80; individual-level was .58.

Collaborative identification was assessed using responses to three items from existing

identification scales (Allen & Meyer, 1990; Stamper & Masterson, 2002). Respondents indicated how much they agreed that their team "feels very much a part of this collaborative," "has a strong sense of belonging to the collaborative," and "does not feel included in this collaborative" (reverse-scored). Team-level Chronbach's alpha was .92; individual-level was .86.

Team functioning was measured using five items adapted from preexisting scales (Edmondson, 1999; Shortell, Rousseau, Gillies, Devers, & Simons, 1991; Wageman, Hackman, & Lehman, 2005). These items asked whether "certain individuals in this team lack the special skills needed for good teamwork" (reverse-scored), "people in this team sometimes reject others for having different ideas" (reverse-scored), "there is a lot of unpleasantness among members of this team (reverse-scored)," and "overall, this team worked very well together." Additionally, I asked if "all team members share a common vision and rationale for the changes being made." Team-level Chronbach's alpha was .85; individual-level was .80.

ILA was measured in two ways. First, it was computed as the mean of team member responses to a survey question asking "the extent to which your team used the following during the course of the 10-month collaborative:" (1) monthly conference calls, (2) telephone calls to other teams in the collaborative, (3) listserv communications, (4) monthly exchange of printed reports, (5) collaborative extranet, and (6) interactions with other teams at Learning Sessions. Respondents used a 5-point scale (1 = never, 5 = a lot) to report their team's use of these activities. This first measure was called *Team-Reported ILA*. The second measure of ILA, termed *Sponsor-Recorded ILA* and computed using data obtained from IHI, was calculated as the percentage of a team's attendance or participation in the knowledge-sharing activities organized by IHI. Those activities were Learning Sessions (max = 3), monthly conference calls (max = 7 or 8 depending on the collaborative), monthly exchange of printed reports (max = 8), and monthly

submission of performance data to the collaborative extranet (max = 8). Collecting and using both measures of ILA allowed me to examine the consistency and strength of results.

Process improvement was assessed by an expert in the collaborative topic area, the IHI Director assigned to each collaborative. Based on their review of organization-submitted data on specified metrics, directors classified the level of improvement made by each organization as: no improvement, modest improvement, improvement or significant improvement. Because significant improvement was the IHI goal, I created a indicator variable to indicate achievement of that goal. By IHI guidelines, to be classified as "significant improvement", an organization had to have implemented the majority of the recommended practices, demonstrated evidence of breakthrough improvement in specified outcome measures (e.g., SSI breakthrough goal: double the number of surgical cases between surgical site infections), been at least 50 percent toward accomplishing its goals, and established plans for spreading improved practices throughout the organization. Fifty-one percent of organizations in the sample made significant improvement.

Control Variables. Team size, collaborative topic and prior collaborative experience were included as control variables because research and/or conventional wisdom suggested they would affect other variables in the model, namely ILA, collaborative identification and process improvement. Other demographic variables collected - geography, setting (urban versus rural), teaching responsibilities, health system membership, ownership status, and size as measured by number of beds – were excluded as statistical controls after hypothesis testing revealed they had no effect in models except to reduce the degrees of freedom available for testing.

ANALYSES AND RESULTS

Preliminary Analyses

Preliminary analyses of the data provided justification for aggregating individual

responses to the team-level. The within-group agreement coefficient ($r_{wg(j)}$; James et al., 1984) for all survey measures was above .60, indicating adequate homogeneity of responses within team (Glick, 1985). Additionally, intraclass correlation coefficients (ICC[1]]) for all measures were greater than zero and had significant ANOVA F-statistics ($p<.01$), indicating team membership's influence on responses and heterogeneity between teams (Kenny & LaVoie, 1985). ICC[2] values exceeding .50 also suggested the reliability of group means (Bliese, 2000).

Tests conducted to examine the independence of teams originating from the same organization showed no effect of organizational membership warranting multilevel models. Organization was an insignificant predictor of process improvement in component of variance analysis ($z = 56$, $p = .57$). Also, entering a set of indicator variables for organizations with multiple teams in regression equations did not increase the explanatory power of control variable only models. The logistic regression equation with process improvement as the dependent variable was insignificant ($X(11) = 16.70$, $p = .12$). The most significant organization indicator had a p-value of .29. Likewise, for OLS regressions performed with team-reported ILA and sponsor-recorded ILA as dependent variables, the models were not significant ($F(10, 42) = .63$, $p = .78$; $F(10, 42) = .81$, $p = .62$). Given the absence of an organizational membership effect across all tests, I retained the team as the unit of analysis (N=53) and did not utilize multilevel modeling nor adjust estimates for design effects (deff) of clustering since design effects for all measures were approximately one. Table 1 presents the means, standard deviations and correlations for the team-level dataset. It also shows the statistics supporting aggregation of individual data to the team-level and design effect scores.

Insert Table 1 about here

Hypotheses Testing Analysis and Results

I tested all hypotheses twice, once with team-reported ILA and then with sponsor-recorded ILA to allow comparison of results across two related, but distinct measures.

ILA and Process Improvement. To test Hypothesis 1 that ILA is positively associated with organization's process improvement, I conducted binary logistic regression, controlling for collaborative topic, team size and prior collaborative experience. The results for both measures of ILA supported Hypothesis 1. The odds of being an organization that showed significant improvement were greater if the collaborative team engaged in ILA (for team-recorded ILA: OR = 14.05, X(6) = 16.36, $p \leq .01$, Nagelkerke $R^2 = .35$; for sponsor-recorded ILA: OR = 1.23, X(6) = 12.49, $p \leq .05$, Nagelkerke $R^2 = .28$).

ILA and Perceptions of the Organization, IOR and Task. Hypotheses 2 through 4 stated that organizational support, perceived organizational similarity and task complexity would be positively associated with ILA. To test these hypotheses, I regressed team-reported ILA on these variables, as well as the emergent variable of knowledge transferability. See Table 2, Model 1. The coefficients for organizational support and perceived organizational similarity were positive and significant as predicted, offering support for Hypotheses 2 and 3. Hypothesis 4 was not supported. Although the coefficient for task complexity was significant, it was opposite the direction predicted. The more difficult the task, the less teams used ILA. Paralleling this result, the coefficient for knowledge transferability was positive, but insignificant.

In a second test of Hypotheses 2, 3 and 4 using sponsor-recorded ILA as the dependent variable, the directional pattern of results was the same (Table 2, Model 2). However, with the exception of organizational support, the relationships were weaker (i.e. task complexity: $p = .06$; perceived organizational similarity: $p = .19$). In summary then, both sets of results provided

greatest support for organizational support and task complexity as positive and negative predictors of ILA, respectively. Perceived organizational similarity and knowledge transferability each received partial support as a predictor – from one test, but not the other.

Insert Table 2 about here

Collaborative Identification as a Mediator. Hypothesis 5a and 5b predicted that collaborative identification mediates the relationship between perceived organizational similarity and ILA and between task complexity and ILA. To test these hypotheses, I assessed whether the three conditions for mediation were satisfied (Baron & Kenny, 1986). The first condition that the independent variables significantly affect the mediator was tested by regressing collaborative identification on the two independent variables and knowledge transferability. Model 3 of Table 2 shows that perceived organizational similarity and knowledge transferability were significantly associated with collaborative identification, but task complexity was not, therefore collaborative identification could not be a mediator between task complexity and ILA. However, since collaborative identification remained a possible mediator for the other two variables, I proceeded to examine fulfillment of the second condition for mediation: the independent variables must predict the dependent variable. The results of the earlier testing of Hypotheses 2 through 4 showed this condition to be satisfied (Models 1 and 2). Finally, the third condition is that the independent variable decrease in significance or become insignificant when included in the same regression equation as the mediator. With team-reported ILA as the dependent variable (Model 4), collaborative identification was found to be a full mediator for perceived organizational similarity but not for knowledge transferability. With sponsor-reported ILA as the dependent variable (Model 5), collaborative identification was shown to mediate the effect of knowledge transferability, but not of perceived organizational similarity. Unexpectedly, the effect of

organizational support on ILA was mediated by collaborative identification in both ILA tests.

In sum, the results were mixed with regards to mediation for perceived organizational similarity (Hypothesis 5a) and knowledge transferability. One ILA test but not the other showed support for mediation, although in both cases the p-value of these variables declined considerably in the presence of the collaborative identification, as would be expected for mediation. No evidence for mediation of task complexity's relationship to ILA was found, thus Hypothesis 5b was unsupported.

Team Functioning as a Moderator. Hypotheses 6a-c contended that team functioning is a moderator. To test these hypotheses, I performed two-step OLS regression for each of the predictor variables for which team functioning was predicted to moderate the relationship to ILA. In step 1, I entered the predictor variables and team size. Prior collaborative experience was excluded from these analyses because it had no effect on any of the regression equations except to reduce the degrees of freedom available for hypothesis-testing. In step 2, I entered the interaction term for each predictor in separate equations. As an additional test of the stability of results, I also created a "full model" in which interactions terms for perceived organizational similarity and both task variables were simultaneously entered in step 2. To adjust for the potential multicollinearity of interaction terms and facilitate interpretation of coefficients, all variables were mean-centered prior to regression analyses.

Insert Table 3 about here

Table 3 shows there was consistency in findings for both measures of ILA with respect to Hypothesis 6a and 6b. Figure 2a-b illustrates the relationships found. Contrary to Hypothesis 6a, the positive effect of perceived organizational similarity on ILA was strongest for poorer functioning teams while there was no significant effect for well-functioning teams. In other

words, poorer functioning teams varied their ILA depending on perceptions of similarity with more feelings of similarity leading to more ILA, while well-functioning teams were relatively unwavering in their ILA. In contrast, the graphs for task complexity and knowledge transferability, Figures 2b and 2c, show that well-functioning teams varied their ILA depending on task characteristics. Consistent with Hypothesis 6b, well-functioning teams increased their ILA as a function of task complexity. For poorer functioning teams, task complexity had the opposite effect; the more complex the task, the less these teams used ILA. These relationships were only marginally significant when the interaction term for task complexity was entered in its own equation ($p \leq .10$) and not at all significant in the full model. Thus, Hypothesis 6b was not supported. Results for knowledge transferability though did offer significant support for a team functioning-task moderation theory ($p \leq .05$). Similar to task complexity, the relationship between knowledge transferability and ILA was positive for well-functioning teams. However, unlike task complexity results, the effect remained positive for poorer functioning teams, but less so.

The results in the last two columns of Table 7 also show partial support for team functioning as a moderator of the relationship between collaborative identification and ILA (Hypothesis 6c). With sponsor-recorded ILA as the dependent variable, a significant relationship existed, but it was not found using team-reported ILA. Figure 2d illustrates the significant relationship that was found. Contrary to Hypothesis 6c, collaborative identification exhibited only a modest effect on ILA for well-functioning teams, but displayed a strong positive effect for poorer functioning teams. Thus, it seems that collaborative identification generated interest in ILA for poorly functioning teams, while it offered little additional motivation for well-functioning teams which were relatively stable in their ILA.

Insert Figure 1 about here

DISCUSSION

Prior research on collaboratives sought to answer the question of whether collaboratives are effective in enabling quality improvement; the results of this quest have been inconsistent. The present research, seeking to understand causes of these mixed results, asked a different question: How, and under what conditions, are collaboratives effective? The answer provided by the current study is that collaboratives are effective when participants use the knowledge-sharing infrastructure that a collaborative provides to engage in ILA. Thus, it is not collaborative membership itself that determines collaborative effectiveness, which prior work implicitly assumed; rather it is participation in the learning activities facilitated by the collaborative that is essential to achieving results.

In this study, teams that actively used ILA led their organizations to significant process improvement, while improvement was modest for teams that did not. This variation suggests that the collaborative experience must include management strategies for overcoming the propensity of some teams to focus internally and thus not capitalize on collaborative learning opportunities. Moreover, it highlights the need for scholars and practitioners to attend to the conditions that enable and motivate collaborative participants to engage in ILA. This study identified three such conditions: organizational support for the teams leading the improvement efforts, internal team functioning and collaborative identification, which is spurred by perceptions of organizational similarity and knowledge transferability. Other factors undoubtedly also contribute to ILA, organizational improvement and ultimately collaborative effectiveness. Future research should seek to uncover these factors. This research validated the importance of pursuing these more nuanced investigations of collaboratives - rather than holistic “are they effective” evaluations - for understanding and advancing collaborative effectiveness, and more broadly, quality

improvement in health care.

The findings from this study also support the claim that team-based models of interorganizational learning are useful mechanisms for process improvement. The advantage of these models is that they more accurately depict the interorganizational learning process. Teams are the vehicles through which many organizations seek to address their learning needs in IORs. Studies conducted on these models advance organizational learning and team learning theory, and build bridges between them. The existing organizational learning literature devotes little attention to relational processes in IORs. Yet, this study revealed collaborative identification, a relational factor, as the underlying mechanism for various antecedents of learning behavior. Notably, it showed that relational processes that motivate learning need not be rooted in other relational variables. Collaborative identification derived from perceived organizational similarity, a relational property, and from knowledge transferability, a task-related property. Thus, the sources of relational processes are not uniform. Future research should consider other relational influences, investigate their sources and their effects on organizational learning.

In addition to providing insights for organizational learning theory, this study's team-level conceptualization of interorganizational learning also contributes to the team learning literature by offering insight into how teams overcome poor internal functioning to learn in the context of IORs. The most surprising finding of this research was that the positive relationship between collaborative identification and ILA was stronger for teams with poor internal dynamics than for well-functioning teams; the latter actually experienced little effect of collaborative identification on ILA. These results suggest that poor teamwork need not lead teams to become so internally focused on internal conflict that they fail to capitalize on opportunities for interorganizational learning that may benefit the organization, which prior research suggested

would be the case (Keller, 2001). Quite the contrary, if team members are committed to the IOR and the organizations' process improvement goals, poor internal dynamics may not be a complete hindrance. Poorer functioning teams that identify are resourceful. The data suggest that their members use ILA as a substitute and aide - using learning from outside to compensate for the absence of productive internal functioning and/or to obtain ammunition to defend their position in team debates. The finding of this compensatory role of identification is not unlike Van der Vegt and Bunderson's (2005) finding that team identification helped multidisciplinary teams overcome diversity issues inhibiting team learning. However, it departs from that research by suggesting that an alternative level of identification in IORs, collaborative identification, can substitute for team identification as learning catalyst in poorly functioning teams.

Beyond the contributions to organizational and team learning, this study's virtue lies in its provision of context-specific research (Rousseau, 2001). The results showed that applying interorganizational learning theories derived from the study of competitive, R&D contexts to health care would be mis-guided. While the positive effects of some factors such as organizational support may exist in both, this research showed that all conditions do not have the same effect across contexts. Prior studies of external learning activities focused on teams conducting complex tasks (Ancona & Caldwell, 1992a) as well as studies of IOR formation in knowledge-intensive industries (Powell et al., 1996) suggest a positive relationship between task complexity and external learning. However, task complexity did not spur greater use of ILA in this health care study; there was a weak, negative effect of task complexity. One explanation is that the effect of task complexity on ILA in health care is moderated by another variable (but not team functioning, which was tested here). Another explanation is that the complexity the health care teams faced was related to figuring out how to implement new practices in their home

organization, which is different from the complex task of developing a new innovation, the focus of past research most of which was performed in the biotechnology industry (Powell et al., 1996) and other R&D settings (Ancona & Caldwell, 1992a). The differences in the nature of task complexity between health care and R&D may be responsible for the contrasting results. Future research should assess both explanations for task complexity's effect on learning behavior in health care.

Limitations of the Study

Although this study contributes to theory in many ways, it is limited in its ability to offer a definitive, comprehensive model of ILA by its design. First, this study was conducted in one industry (health care), on one form of IOR (a collaborative) sponsored by one organization (IHI) in one time period (2004-2005). Each of these characteristics or parameters reduces the potential generalizeability of the research findings. For example, the health care delivery industry may be a special case; it is difficult to think of many other industries that (1) have a social mission where the stakes are life-and-death, (2) regard knowledge as a public good *not* intellectual property, (3) are largely composed of not-for-profit, complex service organizations and (4) face a national mandate for quality improvement. The facilitators and consequences of ILA may be different in other public good contexts that vary in the degree of these qualities. For example, in the national intelligence industry post the World Trade Center attacks, team functioning may still matter, but task complexity may be more important than perceived agency similarity. Thus, future research in other industries *and* on other types of IORs in health care and beyond is needed to determine the full applicability of these findings. Future studies might also explore ILA between pairs or subgroups of organizations within IORs and across IORs to understand ILA at these levels.

The second set of limitations relates to measurement. Expert ratings were used as the

measure of process improvement. However, the expert differed by collaborative topic, with each of two experts rating process improvement for participants in only two collaboratives. Although their ratings were based on review of data for sponsor-specified metrics and the checks of collaborative-level significant improvement rates showed that experts' ratings did not diverge significantly, the threat of subjectivity and unreliability remains a possibility. The threat could have been eliminated by limiting the sample to collaboratives reviewed by the same expert, but that would have resulted in a sample too small to test the study's hypotheses. Future studies are advised to obtain multiple expert reviewers to minimize concerns about reliability. This will not eliminate the concerns that arise from using a qualitative, summary measure like "significant improvement," which creates some distance between actual measure and final measure. This approach solved the methodological challenge for this study sample in which the final outcome measures for collaboratives were in otherwise incompatible units (e.g. time to third next available appointment for ACCESS and infection rates for ICU) and the sample size per collaborative topic (14-25) was too small for reliable hypothesis-testing using a single collaborative. However, future research should develop other approaches to combining data that allows comparison across topics and conversion back to the original data for meaningful interpretation. This advancement would greatly enable large-scale study of collaboratives and IORs more generally. Future research is also encouraged to develop more reliable measures for perceived organizational similarity and task complexity/knowledge transferability, whose individual-level Chronbach's alpha fell below .70. Additionally, it should extend this work by examining which perceptions of similarity (e.g. status, location and customer base (Choi, 2002; Darr & Kurtzberg, 2000)) most determine the use of ILA.

Finally, the cross-sectional design of this study is a limitation. While the results reveal

significant associations between the variables in the model, no causal inference can be made. It is possible that over time, the relationships are reciprocally causal. For example, it may be that greater collaborative identification leads to greater ILA, which in turn fosters greater identification. Future research using a randomized controlled design and/or longitudinal data is needed to establish causality. A randomized control design would also address the possible effects of selection bias present in this study, including whether selection explains the unexpected results for task complexity. Additionally, longitudinal research would allow study of the relative importance of collaborative, organization, team and task characteristics on ILA at different times in the collaborative. It may be that task and team properties matter most at the start of the collaborative, while collaborative and organization qualities become important later. This knowledge would help those seeking to improve the collaborative learning process.

Conclusion

This research provides reassurance that creating conditions that motivate ILA is important for process improvement. IORs do provide such a forum; however membership alone does not ensure significant improvement. Rather, active participation in ILA is needed to gain the benefits of IOR membership. This finding is noteworthy and promising because, as done in this study, we can identify factors that motivate ILA, and therefore develop strategies for positively altering them. This study suggest that strategies focused on increasing perceptions of organizational similarity, framing knowledge as transferable, creating healthier team dynamics, fostering greater collaborative identification and visible organizational support would help teams involved in IORs become active learning partners and maximize the benefits of IOR membership.

REFERENCES

Albert, S., & Whetten, D. A. 1985. Organizational identity. In L. L. Cummings, & B. M. Staw (Eds.), ***Research in organizational behavior***, Vol. 7: 263-295. Greenwich, CT: JAI.

Allen, N. J., & Meyer, J. P. 1990. The measurement and antecedents of affective, continuance and normative commitment to the organization. ***Journal of Occupational Psychology***, 63(1): 1-18.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. 1996. Assessing the work environment for creativity. ***Academy of Management Journal***, 39: 1154-1184.

Ancona, D. G., & Caldwell, D. F. 1992a. Bridging the boundary: External activity and performance in organizational teams. ***Administrative Science Quarterly***, 37(4): 634-665.

Ancona, D. G., & Caldwell, D. F. 1992b. Demography and design: Predictors of new product team performance. ***Organization Science***, 3(3): 321-341.

Argote, L., & Ophir, R. 2002. Intraorganizational learning. In J. A. C. Baum (Ed.), ***The blackwell companion to organizations***: 181-207. Malden, MA: Blackwell Publishers Ltd.

Baron, R. M., & Kenny, D. A. 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. ***Journal of Personality and Social Psychology***, 51(6): 1173-1183.

Battilana, J., & Sengul, M. 2006. Interorganizational cooperation between non-for profit organizations: A relational analysis. In O. Kyriakidou, & M. F. Özbilgin (Eds.), ***Relational perspectives in organization studies: A research companion***: 197-220. Cheltenham, U.K.: Edward Elgar Publishing.

Bliese, P. D. 2000. Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein, & S. W. J. Kozlowski (Eds.), ***Multilevel***

theory, research, and methods in organizations: Foundations, extensions and new directions: 349-381. San Francisco: Jossey-Bass.

Borgatti, S. P., & Cross, R. 2003. A relational view of information seeking and learning in social networks. ***Management Science***, 49: 432-445.

Bradley, E. H., Holmboe, E. S., Mattera, J. A., Roumanis, S. A., Radford, M. J., & Krumholz, H. M. 2003. The roles of senior management in quality improvement efforts: What are the key components? ***Journal of Healthcare Management***, 48(1): 15-28.

Byrne, D. 1971. ***The attraction paradigm***. New York: Academic Press.

Campbell, D. J. 1988. Task complexity: A review and analysis. ***Academy of Management Review***, 13: 40-51.

Cannon, M. D., & Edmondson, A. C. 2005. Failing to learn and learning to fail (intelligently) how great organizations put failure to work to innovate and improve. ***Long Range Planning***, 38: 299-319.

Choi, J. N. 2002. External activities and team effectiveness: Review and theory development. ***Small Group Research***, 33: 181-208.

Cyert, R. M., & March, J. G. 1992. ***A behavioral theory of the firm*** (2 ed.). Cambridge, MA: Blackwell Business.

Darr, E. D., & Kurtzberg, T. R. 2000. An investigation of partner similarity dimension on knowledge transfer. ***Organizational Behavior and Human Decision Processes***, 82: 28-44.

Davenport, T. H., & Prusak, L. 1998. ***Working knowledge: How organizations manage what they know***. Boston: Harvard Business School Press.

Denison, D. R., Hart, S. L., & Kahn, J. A. 1996. From chimneys to cross-functional teams: Developing and validating a diagnostic model. ***Academy of Management Journal***, 39(4):

1005-1024.

Dreu, C. K. W. D., & Vianen, A. E. M. V. 2001. Managing relationship conflict and the effectiveness of organizational teams. ***Journal of Organizational Behavior***, 22: 309-328.

Dyer, J. H., & Nobeoka, K. 2000. Creating and managing a high-performance knowledge-sharing network: The toyota case. ***Strategic Management Journal***, 21: 345-367.

Edmondson, A. C. 1999. Psychological safety and learning behavior in work teams. ***Administrative Science Quarterly***, 44(2): 350-383.

Edmondson, A. C. 2003. Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. ***The Journal of Management Studies***, 40(6): 1419-1452.

Ernst, D., & Bleeke, J. 1993. ***Collaborating to compete: Using strategic alliances and acquisitions in the global marketplace***. New York: John Wiley.

Galaskiewicz, J., & Bielefeld, W. 1998. ***Nonprofit organizations in an age of uncertainty***. New York, NY: Aldine de Gruyter.

Garvin, D. A. 1993. Building a learning organization. ***Harvard Business Review***, 71(4): 78-91.

Glick, W. H. 1985. Conceptualizing and measuring organizational and psychological climate: Pitfalls in multilevel research. ***Academy of Management Review***, 10: 601-616.

Goes, J. B., & Park, S. H. 1997. Interorganizational links and innovation: The case of hospital services. ***Academy of Management Journal***, 40: 673-696.

Greve, H. R. 2005a. Interorganizational learning before 9/11. ***International Public Management Journal***, 8(3): 383-390.

Greve, H. R. 2005b. Interorganizational learning and heterogeneous social structure. ***Organization Studies***, 26: 1025-1047.

Hackman, J. R. 1987. The design of work teams. In J. W. Lorsch (Ed.), ***Handbook of***

organizational behavior: 315-342. Englewood Cliffs, NJ: Prentice-Hall.

Hamel, G. 1991. Competition for competence and inter-partner learning within international strategic alliances. ***Strategic Management Journal***, 12(Summer Special Issue): 83-103.

Hansen, M. T. 1999. The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. ***Administrative Science Quarterly***, 44(1): 82-111.

Huemer, L., Becerra, M., & Lunnan, R. 2004. Organizational identity and network identification: Relating within and beyond imaginary boundaries. ***Scandinavian Journal of Management***, 20(1-2): 53-73.

Ingram, P. 2002. Interorganizational learning. In J. A. C. Baum (Ed.), ***The Blackwell companion to organizations***: 642-663. Malden, MA: Blackwell Publishers Ltd.

Ingram, P., & Simons, T. 2002. The transfer of experience in groups of organizations: Implications for performance and competition. ***Management Science***, 48: 1517-1533.

Institute of Medicine. 2001. ***Crossing the quality chasm: A new system for the 21st century***. Washington, D. C.: National Academy Press.

Janis, I. L. 1982. ***Groupthink***. New York: Houghton-Mifflin.

Keller, R. T. 2001. Cross-functional project groups in research and new product development: Diversity, communications, job stress, and outcomes. ***Academy of Management Journal***, 44(3): 547-555.

Kenny, D. A., & LaVoie, L. 1985. Separating individual and group effects. ***Journal of Personality and Social Psychology***, 48(2): 339-448.

Kilo, C. M. 1999. Improving care through collaboration. ***Pediatrics***, 103(1): 384-393.

Klein, J., & Kleinhanns, A. 2003. Closing the team gap in virtual teams. In C. B. Gibson, & S. G. Cohen (Eds.), ***Virtual teams that work: Creating conditions for virtual team***

effectiveness: 381-400. San Francisco: Jossey-Bass.

Klein, K. J., Conn, A. B., & Sorra, J. S. 2001. Implementing computerized technology: An organizational analysis. ***Journal of Applied Psychology***, 86(5): 811-824.

Kogut, B., & Zander, U. 1992. Knowledge of the firm: Combinative capabilities, and replication of technology. ***Organization Science***, 3(3): 383-397.

Larsson, R., Bengtsson, L., Henriksson, K., & Sparks, J. 1998. The interorganizational learning dilemma: Collective knowledge development in strategic alliances. ***Organization Science***, 9: 285-305.

Lee, D., Pae, J. H., & Wong, Y. H. 2001. A model of close business relationships in china. ***European Journal of Marketing***, 35: 51-69.

Mills, P. D., & Weeks, W. B. 2004. Characteristics of successful quality improvement teams: Lessons from five collaborative projects in the vha. ***Joint Commission Journal on Quality Improvement***, 30: 152-162.

Mittman, B. S. 2004. Creating the evidence base for quality improvement collaboratives. ***Annals of Internal Medicine***, 140: 897-901.

Nunnally, J. 1978. ***Psychometric theory*** (2 ed.). New York: McGraw-Hill.

Olson, E. M., Walker, O. C., Jr., & Ruekert, R. W. 1995. Organizing for effective new product development: The moderating role of product innovativeness. ***Journal of Marketing***, 59(1): 48-62.

Pinto, M. B., Pinto, J. K., & Prescott, J. E. 1993. Antecedents and consequences of project team cross-functional cooperation. ***Management Science***, 39(10): 1281-1297.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. 1996. Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. ***Administrative Science***

Quarterly, 41: 116-145.

Pukalos, E. D., & Wexley, K. N. 1983. The relationship among perceived similarity, sex and performance ratings in manager-subordinate dyads. ***Academy of Management Journal***, 26: 129-139.

Ring, P. S., & Van de Ven, A. H. 1994. Development processes of cooperative interorganizational relationships. ***Academy of Management Review***, 19: 90-118.

Rousseau, D. M. 2001. Location, location, location: Contextualing organizational research. ***Journal of Organizational Behavior***, 22: 1-13.

Sarin, S., & McDermott, C. 2003. The effects of team leader characteristics on learning, knowledge application and performance of cross-functional new product development teams. ***Decision Sciences***, 34(4): 707-739.

Scott, S. G., & Bruce, R. A. 1994. Determinants of innovative behavior: A path model of individual innovation in the workplace. ***Academy of Management Journal***, 37: 580-607.

Shortell, S. M., Rousseau, D. M., Gillies, R. R., Devers, K. J., & Simons, T. L. 1991. Organizational assessment in intensive care units: Construct development, reliability, and validity of icu nurse-physician questionnaire. ***Medical Care***, 29: 709-726.

Shortell, S. M., Bennett, C. L., & Byck, G. R. 1998. Assessing the impact of continuous quality improvement on clinical practice: What will it take to accelerate progress. ***The Milbank Quarterly***, 76: 593-624.

Simonin, B. L. 1999. Ambiguity and the process of knowledge transfer in strategic alliances. ***Strategic Management Journal***, 20: 595-623.

Stamper, C. L., & Masterson, S. S. 2002. Insider or outsider? How employee perceptions of insider status affect their work behavior. ***Journal of Organizational Behavior***, 23: 875-894.

Szulanski, G. 1996. Exploring internal stickiness: Impediments to the transfer of best practice within the firm. ***Strategic Management Journal***, 17(Special Winter Issue: Knowledge and the Firm): 27-43.

Tajfel, H. 1981. ***Human groups and social categories: Studies in social psychology***. Cambridge, England: Cambrige University Press.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. 1987. ***Rediscovering the group: A self-categorization theory***. Oxford: Blackwell.

Tyler, T. R., & Blader, S. L. 2001. Identity and cooperative behavior in groups. ***Group Processes & Intergroup Relations***, 4(3): 207-226.

Tyre, M. J., & von Hippel, E. 1997. The situated nature of adaptive learning in organizations. ***Organization Science***, 8(1): 71-83.

Van der Vegt, G. S., & Bunderson, J. S. 2005. Learning and performance in multidisciplinary teams: The importance of collective team identification. ***Academy of Management Journal***, 48(3): 532-547.

Wageman, R., Hackman, J. R., & Lehman, E. 2005. Team diagnostic survey: Development of an instrument. ***Journal of Applied Behavioral Science***, 41: 373-398.

Wexley, K. N., Alexander, R. A., Greenwalt, J. P., & Couch, M. A. 1980. Attitudinal congruence and similarity as related to interpersonal evaluations in manager-subordinate dyads. ***Academy of Management Journal***, 23: 320-330.

Zander, U., & Kogut, B. 1995. Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. ***Organization Science***, 6: 76-91.

Zellmer-Bruhn, M., & Gibson, C. 2006. Multinational organization context: Implications for team learning and performance. ***Academy of Management Journal***, 49: 501-518.

TABLE 1

Descriptive Statistics and Corelations for Team-level Measures (N=53)

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Organizational support[a]	5.12	.90										
2. Perceived org. similarity[a]	4.80	1.00	.16									
3. Task complexity[a]	4.08	1.13	.14	.10								
4. Knowledge transferability[a]	5.57	.67	.38**	.15	.16							
5. Collaborative identification[a]	6.01	.66	.49**	.33*	-.01	.39**						
6. Team functioning[a]	5.88	.84	.38**	-.19	.04	.34**	.30*					
7. Team-reported ILA[b]	3.57	.45	.40**	.32*	-.13	.31*	.66**	.21				
8. Sponsor-recorded ILA[c]	.82	.18	.41**	.16	-.14	.33*	.48**	.15	.55**			
9. Organizational improvement[c]	.51	.50	.17	.24†	-.19	.37**	.50**	.37**	.37**	.25†		
10. Team size	12.45	7.18	.22	.24†	.05	.11	.10	-.04	.22	-.17	-.001	
11. Prior collaborative experience	.75	.43	.09	.16	-.11	.02	-.14	-.16	-.05	<.001	-.12	.10
Aggregation Statistics and Design Effects												
Median $r_{wg.}$			.88	.79	.60	.88	.95	.85	.97		.77	
F			2.84	3.09	1.73	2.13	3.24	3.85	2.58		4.08	
p			<.001	<.001	.005	<.001	<.001	<.001	<.001		<.001	
ICC[1]			.35	.38	.25	.25	.40	.45	.33		.51	
ICC[2]			.65	.68	.42	.53	.69	.74	.62		.75	
Design effect scores			.99	1.05	.96	1.02	1.03	1.01	1.06		1.05	

† indicates $p \leq .10$; * $p \leq .05$; ** $p \leq .01$.

[a] Measured on a 7-point scale; [b] Measured on a 5-point scale; [c] Measured as a percent (0-1).

TABLE 2

Results of Regression Analyses for Hypotheses 2 through 5

	Model				
	1	**2**	**3**	**4**	**5**
	Dependent Variables				
Predictor Variable	**Team-Reported ILA**	**Sponsor-Recorded ILA**	**Collaborative Identification**	**Team-Reported ILA**	**Sponsor-Recorded ILA**
Team size	.10	-.31*	-.06	.13	-.29*
Prior collaborative experience	-.17	-.06	-.24*	-.04	<.01
Organizational support	.31*	.40**	.41**	.09	.29*
Perceived org. similarity	.27*	.17	.30*	.11	.09
Task complexity	-.25*	-.24†	-.15	-.16	-.20
Knowledge transferability	.19	.22†	.23†	.06	.16
Collective identification				.54**	.27†
F	3.78**	4.11**	5.55**	6.45**	4.11**
R^2	.33	.35	.38	.50	.39
Adjusted R^2	.24	.26	.34	.42	.30

† p indicates ≤ .10; * p ≤.05; ** p ≤ .01

TABLE 3

Results of Moderated Regression Analyses for Hypothesis 6

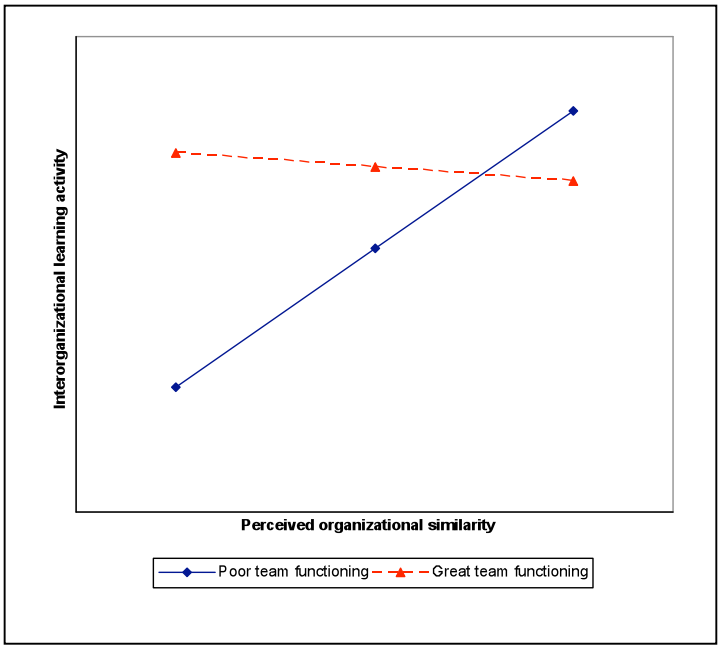
	Dependent Variable: 1 = Team-Reported ILA, 2 = Sponsor-Recorded ILA									
	Hypothesis 6a: Perc. Similarity		Hypothesis 6b: Task Complexity		Transferability		Full Model		Hypothesis 6c: Identification	
Predictor Variable	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Step 1: Main effects										
Team size	.12	-.28*	.15	-.24†	.13	-.25†	.09	-.29*	.16	-.25*
Perceived org. similarity	.36*	.26†	.33*	.21	.23†	.15	.29*	.22		
Task complexity	-.23†	-.24†	-.18	-.18	-.16	-.18	-.18	-.19		
Knowledge transferability	.24†	.38*	.25†	.37**	.32*	.40**	.37*	.47**		
Team functioning	.24†	.12	.21	.07	.25†	.10	.28*	.15	.02	-.02
Collaborative identification									.65**	.52**
Step 2: Interaction effects										
Perceived org. similarity x Team functioning	-.18	-.26†					-.22†	-.27*		
Task complexity x Team functioning			.21†	.24†			.10	.16		
Knowledge transferability x Team functioning					.39**	.25†	.39**	.24†		
Collaborative identification x Team functioning									-.10	-.24*
R^2	.30	.28	.31	.28	.39	.27	.45	.37	.47	.33
F	3.25**	2.99*	3.45**	2.90*	4.98**	2.85*	4.50**	3.19**	10.73**	5.89**
ΔR^2 (from Step 1 to Step 2)	.03	.06	.04	.05	.13	.05	.18	.15	.01	.06
ΔF (from Step 1 to Step 2)	1.91	2.84†	2.77†	3.42†	9.51**	3.16†	4.83**	3.93*	.52	4.06*

† p indicates $\leq .10$; * $p \leq .05$; ** $p \leq .01$

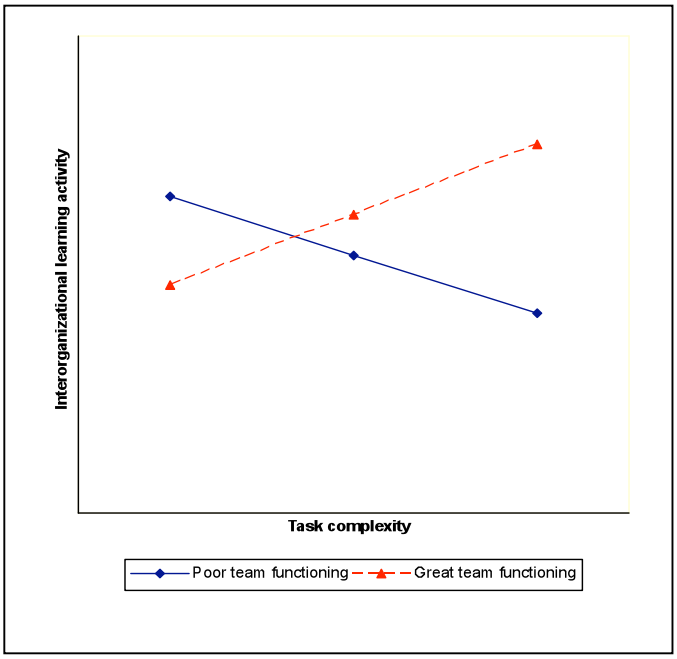
FIGURE 1

The Moderating Effect of Team Functioning

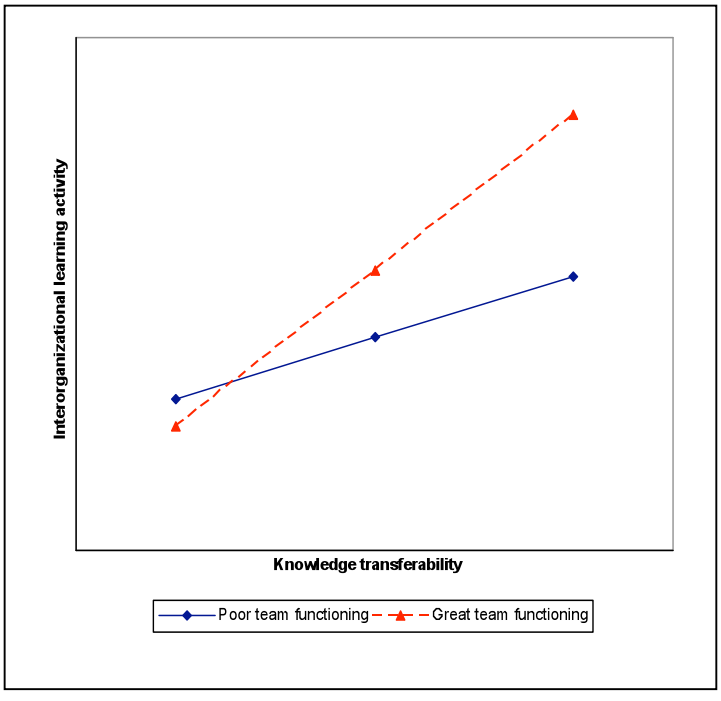
(a)



(b)



(c)



(d)