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Dynamic Teams:

Exploring the Enabling Conditions and Outcomes of Coordination

by

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ABSTRACT

Organizational structures are increasingly dynamic, boundaryless, and fluid. One example of this trend is the use of highly dynamic teams—teams with short lifespans and permeable team boundaries. These conditions can offer the promise of flexible, adaptive work, but simultaneously undercut the characteristics of teams that were considered definitional in the past and are thought to be critical for facilitating coordination. Dynamic teams thus should face serious coordination challenges, and we are just beginning to understand the conditions needed for them to be effective. I begin by asking, "What are the conditions necessary for dynamic teams to operate effectively?" and derive theory from qualitative observations coupled with existing literature. I then test two interventions focused on putting some of those conditions in place in a field experiment, and I examine their implications for both individual learning and team effectiveness.

The emergent grounded theory and field experiment results suggest that team launches, conducted only with a dynamic team's core team members, can serve as cognitive scaffolds to anchor core team members' attention either toward core team members or periphery team members. While initial attention to fellow core members and the clarification of roles can promote more emergent interdependence among those core members, initial attention to periphery members and expansion of the definition of the team can promote more integration of those periphery members into the work. That is, while dynamic teams lack the structure afforded by stability and an impermeable boundary, they can still rely on cognitive scaffolding to enable coordination. Finally, the combination of these two coordination behaviors, together, is what enhances core team members' learning; and, counter to beliefs that individual learning and team efficiency present a tradeoff to be balanced, individual learning is shown to facilitate team efficiency. I conclude by discussing implications of these findings for theory and research related to team beginnings, organizational design and scaffolds, learning, and the management of dynamic teams.

CHAPTER I: INTRODUCTION

> It's Monday morning. You have been assigned to work this week as a medical intern on the "blue" team in the Kids' Hospital General Pediatric Inpatient Unit. Your team is tasked with making and executing decisions about patient care for a set of patients—it has both the authority to do this and the expectation that it will.
>
> You receive a message stating that you should meet your team at 9am at a patient's room. When you get there, you note that you've never worked with the other blue team members. Your supervising physician is worried about the first patient you are planning to see and before you know it your team is heading into the patient's room. As you are walking in, you realize you aren't sure who is going to input the medical orders that your team decides on as you discuss what to do for this patient—should you be doing that? Last week the senior resident input orders, but this senior resident is busy talking with the patient family.
>
> Just as your team decides on a care plan and leaves the patient's room, the patient's nurse sees you and shares information he heard from the consulting Infectious Disease group that leads to completely revising the care plan.

This scenario above is based on observations of medical inpatient teams, and it highlights some realities of much work today—realities that stem from a broad shift to organizing work in forms that are increasingly dynamic and decentralized (Malone, 2004; Powell, 1987). In particular, the scenario highlights how the shift toward dynamic organizations has come with a common distribution of authority to teams (Moreland & Argote, 2003; Thomas-Hunt & Phillips, 2003), with often constantly changing membership. More specifically, teams are often temporary in nature (e.g., Klein, Ziegert, Knight, & Xiao, 2006; Valentine & Edmondson, 2015) and face permeable membership boundaries (Cummings & Pletcher, 2011; Mortensen & Haas, 2018). These two dimensions—short lifespans and highly permeable boundaries—are definition to what I refer to as dynamic teams. (See Figure 1.1 for a visual display of how dynamic teams relate to other team forms.) As discussed more fully in Chapter 2, dynamic teams often exhibit a core-periphery network structure, whereby the team's core members (those more central to the work and decision making, Humphrey, Morgeson, & Mannor, 2009) work together for a brief amount of time, and during that time must manage a permeable boundary that allows for more periphery members to join the work transiently as their expertise is needed.

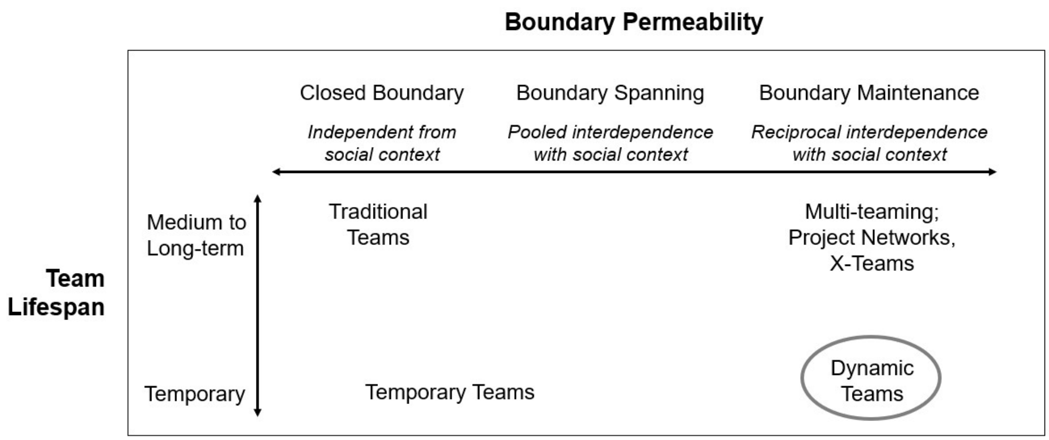

Figure 1.1 Team Designs Across Dimensions of Team Lifespan and Boundary Permeability

Researchers are increasingly acknowledging the existence of dynamic teams in contexts ranging from healthcare to consulting, product development, and disaster response (Arrow, McGrath, & Berdahl, 2000; Edmondson, 2012; Edmondson & Harvey, 2018; Hackman & Wageman, 2005; Majchrzak, Jarvenpaa, & Hollingshead, 2007; Mathieu, Maynard, Rapp, & Gilson, 2008; Mortensen & Haas, 2018). This trend toward more fluid collaborations can offer more adaptive, flexible work that can meet the demands of a changing environment (Mortensen & Haas, 2018). Yet, the conditions of an extremely short lifespan and a highly permeable boundary undercut the characteristics of teams that were considered definitional in the past and are thought to be critical for facilitating coordination. As hinted at in the opening scenario, the short lifespans of teams can create uncertainty about how to work with teammates, while boundary permeability can create uncertainty about with whom to work. And both of these challenges are likely to undermine emergent coordination (Mortensen & Haas, 2018; Okhuysen

& Bechky, 2009). In other words, while team stability and boundary impermeability have been acknowledged as providing structure that can guide attention and facilitate coordination (e.g., Hackman, 2011), their absence is likely to inhibit coordination.

Current research on overcoming the challenges inherent to dynamic teams suggests that temporary teams can rely on impermeable boundaries to guide work (e.g., Valentine & Edmondson, 2015), while teams with permeable boundaries can rely on some membership stability among core team members (e.g., O'Leary, Mortensen, & Woolley, 2011). But neither of those solutions will work for dynamic teams as they are both temporary and have permeable boundaries. Moreover, research suggests that current theories of team coordination may need to be adapted in such dynamic contexts (Majchrzak et al., 2007). As elaborated on in Chapter 2, this gap in our understanding is a critical one given the prevalence of highly dynamic teams in organizations today. In this dissertation, I, therefore, explore conditions that can enable coordination in dynamic teams.

In Chapter 2, I begin by asking "What are the conditions necessary for dynamic teams to coordinate effectively?" Using qualitative observations and interviews in the setting of medical inpatient teams, coupled with existing literature, I derive grounded theory of conditions that enable dynamic teams to coordinate. Given the fluid nature of membership in these teams, I adopt a hybrid team-network perspective to identify the team in terms of core and periphery members. I find that key to effective coordination is a team launch, conducted with only the core team members, that directs their initial attention in ways that develop team cognition and thereby enable emergent coordination. Findings also point to potential benefits of this emergent coordination: both individual learning and team efficiency. In sum, these findings suggest that, although dynamic teams lack the structure afforded by stability and an impermeable boundary, they can rely on attentional scaffolding to enable effective coordination.

In Chapter 3 (work conducted with Anita Woolley, Liny John, Christine March, Selma Witchel, and Andrew Nowalk), we build on that qualitative work and use a field experiment to test two interventions focused on putting into place some of the cognitive scaffolding that is theorized to anchor core team members' attention and thus facilitate coordination in dynamic teams. Continuing in the context of medical inpatient teams, we find support for our prediction that team launches that direct attention to core team members' roles lead to greater emergent interdependence among those core members. At the same time, we also find support for the prediction that team launches that direct attention to the team's permeable boundary and expand core members' view of who is on the team lead to greater integration of periphery members. In this way, we find empirical evidence to support the theory that attentional scaffolds can foster coordination in dynamic teams. Further, we find that it is the combination of the two coordination behaviors—emergent interdependence and periphery integration, together—that most enhances core members' learning. Finally, contrary to expectations that individual learning and team efficiency present a trade-off, we find that the two go hand-in-hand.

In Chapter 4, I conclude by considering the qualitative study and the field experiment as a whole to offer a general discussion of the resulting developing theory of dynamic team coordination. I discuss implications of this research for theory related to team beginnings, organizational design and scaffolds, learning, and the management of dynamic teams.

CHAPTER II: TEAM LAUNCHES AND INITIAL ATTENTION: ENABLING COORDINATION IN DYNAMIC TEAMS

Organizational structures have evolved dramatically from the centralized forms that became predominant centuries ago (Chandler Jr, 1962; Malone, 2004). While researchers have developed a canon of knowledge around what is needed for these centralized organizations, and the teams within them, to operate effectively (Mathieu, Hollenbeck, Knippenberg, & Ilgen, 2017), organizational structures today reflect a different landscape. In the face of changing environments that demand adaptation, and with the rise of specialization, knowledge-based work, and communication technology that allows for sharing and gathering information rapidly, organizational structures have evolved into “hybrid organizational forms” (Shane, 1996),“boundaryless organizations” (Ashkenas, Ulrich, Jick, & Kerr, 2002) and “dynamic organizations” (e.g., Brown & Eisenhardt, 1997). In short, organizational forms have shifted toward a decentralization of authority (Malone, 2004; Powell, 1987) and less hierarchical organizing (Lee & Edmondson, 2017) that can allow for more flexible, adaptive work.

The use of organizational teams offers one example of this shift toward a distribution of authority and flexible organizing, particularly the use of teams that are themselves dynamic entities (Moreland & Argote, 2003; Thomas-Hunt & Phillips, 2003). Research has argued for giving attention to dynamic team processes (e.g., Cronin, Weingart, & Todorova, 2011); yet as dynamic entities, teams also face less static inputs in the form of unclear, unstable and fluctuating team membership (Wageman, Gardner, & Mortensen, 2012). Organizations increasingly rely on self-managing teams (Bunderson & Boumgarden, 2010; Langfred, 2007) that can self-select team members (Harrison & Humphrey, 2010), temporary teams that can be formed quickly to address a need then disband entirely (Bechky, 2006; Klein et al., 2006; Thomas-Hunt & Phillips, 2003), and “unbounded” teams whose membership evolves over time (Bedwell, Ramsay, & Salas, 2012; Bernstein, Leonardi, & Mortensen, 2017; Edmondson, 2012). The collective impact of these trends is that team membership is highly fluid. That is, teams have dynamic inputs: a shifting set of people working to accomplish a task (Humphrey & Aime, 2014; Mortensen & Haas, 2018).

Membership dynamics can vary on a range of dimensions (Arrow & McGrath, 1993), and in this chapter I focus on temporality and members’ movement into/out of the group; specifically, I focus on the increasing presence of both temporary team lifespans that bring team members together for short amounts of time and the boundary permeability of teams that allows for individuals to join and leave the team over time. The combination of these conditions reflect what I refer to as dynamic teams and are prevalent across contexts ranging from healthcare to consulting, product development, and disaster response (Arrow et al., 2000; Edmondson, 2012; Edmondson & Harvey, 2018; Hackman & Wageman, 2005; Majchrzak et al., 2007; Mathieu et al., 2008; Mortensen & Haas, 2018). The structure of dynamic teams may afford flexibility, but the lack of stability and the presence of permeable boundaries run counter to the conditions typically thought to facilitate team coordination (Hackman, 2011). These conditions are therefore expected to create coordination challenges; temporary lifespans create uncertainty about how to work together (Ginnett, 2010), while boundary permeability creates uncertainty about with whom to work (Mortensen & Haas, 2018; Mortensen & Hinds, 2002).

Emerging research suggests current theories related to coordination may need to be adapted to fit more dynamic contexts (e.g., Majchrzak et al., 2007), and in general we are just beginning to grapple with the conditions needed to enable effective coordination in highly dynamic teams that lack those stable structures (Mathieu et al., 2017). At the same time organizations are increasingly relying on fluid collaboration structures, heightening the importance of understanding how unstable teams can coordinate.

Given our limited understanding of coordination in highly dynamic teams, research calls for qualitative investigations and grounded theory building (Cronin et al., 2011; Edmondson & McManus, 2007; Mathieu et al., 2017). Accordingly, this chapter reports a qualitative study of a type of highly dynamic team, medical inpatient teams—teams that are both extremely temporary and have highly permeable boundaries—and develops grounded theory on conditions that enable coordination in highly dynamic teams.

Additionally, given the challenge of defining the team in such fluid contexts (Wageman et al., 2012), I build on an emerging focus on teams as networks. For example, recent perspectives have called for refocusing on "organizing activities" and "teaming" instead of teams (Edmondson, 2012; Humphrey & Aime, 2014), and even described teams as networks of individuals (Edmondson, 2012, p. 2) or hubs of participants (Mortensen & Haas, 2018). In the next section, I review extant literature relevant to dynamic teams, and I highlight how current work suggests taking a hybrid team-network perspective, a perspective that guided the subsequent qualitative inquiry.

Coordination in Highly Dynamic Teams

Many organizations today employ teams with highly dynamic membership. While some may argue that the best way to facilitate effective coordination involves establishing a stable and clearly defined team (Hackman, 2011; Hackman & Wageman, 2005), many organizations are constrained and cannot limit the amount of membership dynamics that teams experience. What are these organizations to do to foster effective coordination? Multiple research areas speak to this question, including that on membership change and turnover, temporary teams, multiple-team membership, fluid teams, and boundary spanning (both from a teams and social network analysis perspective). These areas of research highlight key challenges faced when membership is in flux.

First, when team lifespans are brief, as in dynamic teams, team members typically lack familiarity, which can lead to uncertainty about how to work together (Levine & Choi, 2004; Summers, Humphrey, & Ferris, 2012). Accordingly, research has explored conditions that can enable an understanding of how to work together in temporary collaborations. Research to this end suggests that temporary teams and teams that experience frequent membership reconstitution can rely on standardized procedures that make clear who should do what (Cox et al., 2017; Haynes et al., 2009; Ton & Huckman, 2008), a clear communication structure that informs individuals about with whom to coordinate (Argote, Aven, & Kush, 2018) or formal roles (Katz & Kahn, 1966) that provide an understanding of how individuals can work together (Bechky, 2006; Valentine & Edmondson, 2015). The use of roles, in particular, appears to be most helpful when there is a clear organization of those roles, such as through a hierarchy of roles (Klein et al., 2006) or a bounded set of roles (Valentine & Edmondson, 2015). That is, when teams experience membership change, teams might benefit from clarifying the set of roles on the team, which effectively creates a clear team boundary and expectations for how to work together.

Yet the reviewed suggestions to rely on structures such as roles may not be sufficient. Teams may struggle despite the presence of expectations (e.g., derived from roles) meant to guide the work, as the expectations may not be clear. For example, research has suggested that much work today is characterized by structural interdependence that is ambiguous, creating uncertainty about how members should work together (Wageman & Gordon, 2005). Similarly, in airline crews, roles for pilots, co-pilots, flight engineers, etc., might be perceived as quite clear. Yet, research with airline crews found that even when roles are formalized, those roles are in fact inchoate, and an initial clarification of roles was found to improve performance (Ginnett, 2010). This suggests that reliance on roles may not be sufficient to enable coordination.

Additionally, the reviewed work on temporary teams often calls for the reliance on a clear boundary, and yet, this solution, too, is not sufficient. The research reviewed above that suggests teams can implement clear structures, such as role sets, to improve performance in the face of frequent membership change typically assumes, or prescribes, having a stable and clearly defined team boundary (e.g., Valentine & Edmondson, 2015). Yet, in many teams, the boundary is permeable by design; the changing nature of the work renders it unfeasible to establish team members at the work's outset, and instead the team boundary shifts as the work demands different skills or expertise (Edmondson, 2012; Mortensen & Haas, 2018; Wageman et al., 2012). In sum, the research on roles and boundaries has enhanced our understanding of coordination in the face of membership change but leaves open questions about how to use roles and what to do when membership boundaries are permeable.

A second issue created by dynamic teams is that having a permeable boundary leads to fuzzy perceptions of the team membership and thus creates a challenge to understand who is on the team and, therefore, with whom to work (Mortensen & Haas, 2018; Mortensen & Hinds, 2002). To address this challenge, some have advocated for increasing the stability of the team, suggesting that teams will benefit from having some tenure among team members when broader membership is in flux (Bushe & Chu, 2011). Similarly, when members simultaneously work on multiple teams, floating back and forth between work for particular teams, researchers have theorized that teams will benefit from team members working together in real-time, effectively increasing the stability among those members (O'Leary et al., 2011). In sum, while the research on membership change suggests that in the absence of stability teams could rely on a clear boundary, the research on boundary permeability suggests that in the face of boundary permeability teams could rely on stability. Thus, taken together, it remains unclear what will enable coordination in highly dynamic teams—those with both little stability and a lot of boundary permeability.

To study coordination in highly dynamic teams, part of the challenge is in defining the team (Wageman et al., 2012). To this end, there is an emerging team-network perspective (Edmondson, 2012; Humphrey & Aime, 2014; Mortensen & Haas, 2018) that offers a path forward. In particular, research has begun to focus on the more core, central, and critical team members in contrast to the more noncore, peripheral, or outer team members (Ancona & Bresman, 2007; Arrow & McGrath, 1993; Cummings & Pletcher, 2011; Humphrey et al., 2009; Summers et al., 2012). Core team members are more central to a team's workflow and may be more stable during a team's lifespan, while periphery team members are more temporary, fluctuating in and out of the team during the team's lifespan to contribute their expertise as needed (Ancona & Bresman, 2007; Cummings & Pletcher, 2011; Humphrey et al., 2009). This view of core and periphery members implicitly suggests a networks perspective that can facilitate identifying the team and unpacking both coordination and its enablers in dynamic teams.

The pattern of a core-periphery interaction may also be informative with regard to what makes for effective coordination in dynamic teams (Cummings & Pletcher, 2011), relative to teams that do not involve periphery members and/or fail to coordinate among core team members. Some suggested evidence of the benefit of a core-periphery pattern of interactions comes from research on boundary spanning. First, research on boundary spanning in the teams literature has emphasized that groups perform best when they combine interactions within a team boundary with interactions with individuals outside of the team boundary, which allows for gaining information from and learning from sources external to the team (Ancona & Caldwell, 1992; Argote & Ingram, 2000; Bresman, 2010; Bresman & Zellmer-Bruhn, 2013; Choi, 2002; Darr, Argote, & Epple, 1995). Similarly, social network analysis research reveals a robust finding that groups with core-periphery network structures (e.g., Borgatti & Everett, 1999; Cattani & Ferriani, 2008) are associated with stronger performance than groups that have little interaction among the team's members and/or have few connections to individuals/groups external to the team (Balkundi & Harrison, 2006; Reagans, Zuckerman, & McEvily, 2004; Reagans & Zuckerman, 2001). While the research just described on boundary-spanning assumes a stable and clear team boundary that can be crossed (in contrast to research on dynamic teams which must manage a permeable boundary), this evidence is still helpful when integrated with that on core and periphery team members. That is, the pattern of interactions is similar and suggests further investigation of the role of a core-periphery pattern of interactions in highly dynamic teams.

However, the emerging view is a largely post-hoc one: the core-periphery network structure reflects a pattern of interactions that have already been established by the time they are observed. In this way, this emerging perspective is tentative and incomplete. Revisiting the initial challenges created by dynamic teams from the lens of a core-periphery view of the team, how do core team members come to know how to work together? And how do they come to know with which periphery members to work? In short, what enables coordination in dynamic teams?

The incipient state of our current understanding of dynamic teams calls for inductive, grounded theory building (Edmondson & McManus, 2007; Mathieu et al., 2017). Thus, to address the question of what conditions enable dynamic teams to coordinate, I use a qualitative study involving both observations and interviews in the setting of medical inpatient teams to develop grounded theory about conditions that enable coordination in the face of highly dynamic team membership.

Research Setting

I conducted this research in a large metropolitan children's hospital, specifically within the general pediatric inpatient unit. General pediatric inpatient teams include, first, a group of physicians. Typically, in hierarchical order, this group includes one attending physician (the supervising physician), one senior resident (in the 2nd or 3rd year of residency), two interns (in the 1st year of residency) and two to three medical students (in the 3rd or 4th year). These team members are assigned to a team based on various constraints. For example, medical students, interns, and senior residents are all in training and thus must spend a portion of their time on general pediatric teams but other portions of their time engaged in other work (e.g., medical students rotate through internal medicine, surgery, etc., and interns and senior residents rotate through sub-specialty services, outpatient clinics, etc.). Lastly, the faculty serving as attending physicians rotate through service on general pediatric teams, research, and service in outpatient settings, other facilities, etc. As a result, assignment to the physician group is not entirely random, but is also not dictated by such variables as individual ability, preferences for working together, or history working together.

Each week the study's context has four of these physician groups, each of which receives a formal identification within the hospital (i.e., Blue, Green, Purple, and Red). Each group works together for one week at a time, then the group re-forms the following week. Thus, I treated the physician groups across weeks as separate entities. That said, at least one group member carries over each week in effort to ensure continuity of care for patients whose hospital stay overlaps two weeks (e.g., a hospital stay of Friday through Monday). Thus, although the team is almost if not entirely new in terms of the mix of physicians working together from one week to the next, my shifting across the four nominal teams (blue, green, purple, and red) from week to week allowed me to observe a variety of different people. Each week, one of the hospital's chief residents chose a physician group for observation and sent an email to the team members introducing me and providing a consent form. Of the 40 weeks for which I observed teams, only once did a team member decline to participate; in that case, a new team was chosen for the week's observations. No participants asked to withdraw from the study.

Team members also include the shifting set of patients, patient family members, and interdisciplinary healthcare providers (e.g., nurses, specialists, social workers, pharmacists, care coordinators, etc.) with whom the physician group works. While the physician groups were the focus of this work (discussed further below), I was, critically, able to observe interactions among members in the physician group as well as between physicians and other team members. I also interviewed both physicians and nurses.

Team task. The vast majority of the teams' patients are admitted from the hospital's emergency room. If the patients are deemed unfit to be discharged (sent home) from the hospital's emergency room, the patients are admitted to an inpatient unit. The inpatient teams are then tasked with making diagnoses for their patients, developing care plans, and working to execute those plans. Physician groups in the study sample ranged from having four patients to eighteen in a given day.

Dynamic team conditions. Two features make these teams an ideal setting to study dynamic teams. First, teams in this setting are highly temporary in that the physician groups are reconstituted each week. Second, each team's boundary is highly permeable. The physician's work involves an ever-changing array of other people—nurses, patient families, sub-specialties (e.g., neurology, infectious disease, endocrinology), and other interdisciplinary members (e.g., care coordinators, social workers). That is, there are interdependencies that extend outside the bounds of the nominally defined (e.g., Blue, Green, Purple, or Red) physician group.

To define the team, I start with the organizationally-defined inpatient team: the physicians and medical students. Ultimately, the physicians decide when a patient can be discharged (or, in rare instances, transferred to the intensive care unit). Thus, I consider this the set of "core" team members following research that suggests strategically core team members are "central to the workflow" (Humphrey et al., 2009) and "create the team strategy and make key decisions" (Ancona et al., 2002, p. 36). In line with recent calls to reconsider how team boundaries are conceptualized in terms of attention and actual collaboration (Bernstein et al., 2017; Humphrey & Aime, 2014), I then consider how the team boundary is, in practice, managed in terms of the core members attending to and working with individuals outside of the core (e.g., nurses, families, sub-specialists). In sum, this approach allows for studying relationships among core team members while also capturing the relationships between core and periphery members.

Much of an inpatient team's work occurs during morning rounds, when a team discusses each of its patients. Typically, a round on a patient includes the physician group reviewing the patient's history and pertinent information about the patient's condition, making an assessment (either a diagnosis or a set of potential diagnoses), and developing a care plan (treatment course, lab or imaging tests needed to collect additional information, etc.). Of note, the inpatient teams are instructed to conduct "family-centered rounds," which are conducted at the bedside (compared with behind closed doors), with the nurse, patient, and patient's family present and involved in information sharing and plan making. Yet, while this is the prescribed rounding model, it is neither mandatory nor monitored. As seen in an example illustrated in Figure 2.1, the core team (i.e., the "Blue Team") might manage its boundary such that when they start morning rounds at time 1, their boundary expands to include periphery members as the core engages a nurse, the patient and family members, and a physician from the subspecialty called Infectious Disease, in a discussion about a diagnosis and plan. At time 2, the boundary shifts as the core goes to the next patient and attends to and interacts with that new patient as well as a different nurse and subspecialist, and so on as they continue rounds. Thus, in some cases, the team may form and re-form to involve periphery members as depicted in the gray areas across time in Figure 2.1; in other cases, periphery members may not be present for, or may not be involved in, rounds, reflecting a different boundary as the core's attention has not shifted to include periphery members at all. In sum, by starting with a core and examining their interactions with periphery team members, I could examine the interactions among core members and between core and periphery members, as well as their antecedents.

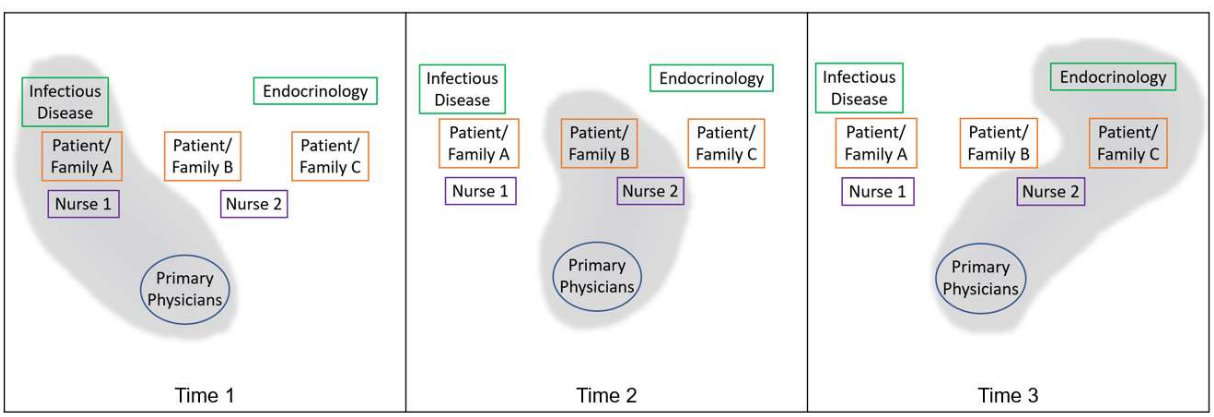

Figure 2.1 Example of Shifting Boundaries Over Time

Method

This study used multiple methods (observations and interviews) as well as multiple sources (all levels in the physician hierarchy and nurses). This allowed for triangulation and stronger substantiation of the emergent themes and grounded theory.

Sample and Data Collection

Phase 1 data collection. ***Observations.*** Over the course of 24 weeks, I observed 24 general pediatric inpatient teams (one team per week). I observed each team for its complete lifespan: Monday to Friday. I observed teams for 3-5 hours per day: each day from 9am-12pm (this included morning rounds), and for 1-2 days roughly 2 hours in the afternoon. In total, I spent an average of 18 hours with each team during the week in which the team was intact, and a total of over 430 hours observing inpatient teams. During morning rounds, I followed the core team members as they moved throughout the hospital. When a single physician group member broke off from the rest of the group, I stayed with the larger subgroup. When a physician group split up more evenly, I chose to follow one of the subgroups based on the situation. For example, if only a subgroup was entering a patient room for a round, I typically did not enter the patient room because the rationale for the team sending in fewer members was often to avoid overwhelming the patient and patient family with a large group. For observations conducted after morning rounds had concluded, I typically stayed in the physician's dedicated team space within the hospital, which is where the core members executed much of their work after rounds.

While observing, I took notes in situ, with the exception that I did not take notes within patient rooms, instead recording what had transpired as soon as I exited the patient room. This was due to the fact that unlike the physicians and nurses, the patients and families were not accustomed to such observation. Physicians and nurses seemed to be unaffected by or adjust quickly to my note taking. This was later explained to me as the most likely outcome given that in this environment the physicians are often evaluated and often observed (e.g., by physicians from other hospitals). After a day's observations, I wrote memos reflecting on and summarizing observations. I did not use participant names in the notes or memos, instead using unique identifiers.

Interviews. I conducted a total of 87 semi-structured interviews (Kvale, 1996; Patton, 2006). Given my goal of gaining multiple perspectives, these interviewees represent all levels of the physician hierarchy: 16 attending physicians, 13 senior residents, 22 interns, 22 medical students (average = 3 core team members per team; generally, 5-15 minutes). I also interviewed 14 nurses (generally, 5-15 minutes). Physicians were selected based on availability and willingness to participate. Nurses were selected based on their working in one of the hospital units that cares for many of the general pediatric inpatient patients (i.e., these nurses worked with the physicians who were the focus of my observations) and their willingness to participate.

Physician interviews covered topics including, for example, roles, learning, teaching, interactions within the physician group, interactions with others (nurses, sub-specialists, patient families), management of the work, and what is different week to week. Nurse interviews covered topics focused on their role and tasks, as well as interactions with the physicians.

Interviews were audio recorded and transcribed when the interviewee allowed for it and the interview space was such that HIPAA-protected information would not be captured (i.e., in a private space and not in or near hallways in which conversations with and about patients might be captured). When it was not possible to audio-record the interviews, I took notes during the interview to capture interviewee's verbatim comments as closely as possible.

Phase 2 data collection. ***Observations.*** After a short break and review of the data and emerging themes, the goal of phase two was to collect additional data that would aid in refining the emerging constructs and theory. Using the same sampling method described above to select teams, I conducted additional observations of 16 teams on Mondays from 9am-12pm. In total, this amounted to an additional 48 hours of observation. As in phase 1, I recorded observational notes in situ, with the exception of inside patient rooms. After a day's observations, I wrote memos reflecting on and summarizing observations.

At the conclusion of phase 2, observations yielded little to no new information or insights. At this point, I concluded I had reached "theoretical saturation" (Corbin & Strauss, 2008), halted data collection, and shifted to focusing on data analysis and theory development.

Data Analysis and Theory Development

Following the inductive approach of building grounded theory (Corbin & Strauss, 2008; Eisenhardt, 1989), data collection overlapped with data analysis. While the data collection was ongoing, in addition to writing memos after each period of observation, I compared data from within a team and across teams. My goal was to understand what enabled these teams to coordinate, thus I focused on differences in how team members interacted. I began with open coding and comparison within and across teams. I created tables to compare teams on the emerging categories (e.g., Monday discussion of physician tasks; Monday discussion of goals; Monday discussion of interdisciplinary members; physicians helping each other; physicians asking interdisciplinary team members for input regarding patient care; location of patient care discussion; cohesion; learning; confusion; working through lunch; use of technology). As I iteratively coded the data and compared within and across teams, I refined the categories, dropped those that did not reveal clear differences within or across teams, and began to group related categories into second-order themes and constructs. By the end of the first phase of data collection, this process yielded a set of tentative constructs and an outline of the relationships between them. During the second phase of data collection, I continued to compare data within and across teams to refine the emerging constructs and theory. Additional categories were dropped, existing category definitions were refined (see Figure 2.2 for an overview of the refinement from categories to constructs and overarching dimensions), and the connections between concepts were further developed to contribute to the emerging theory.

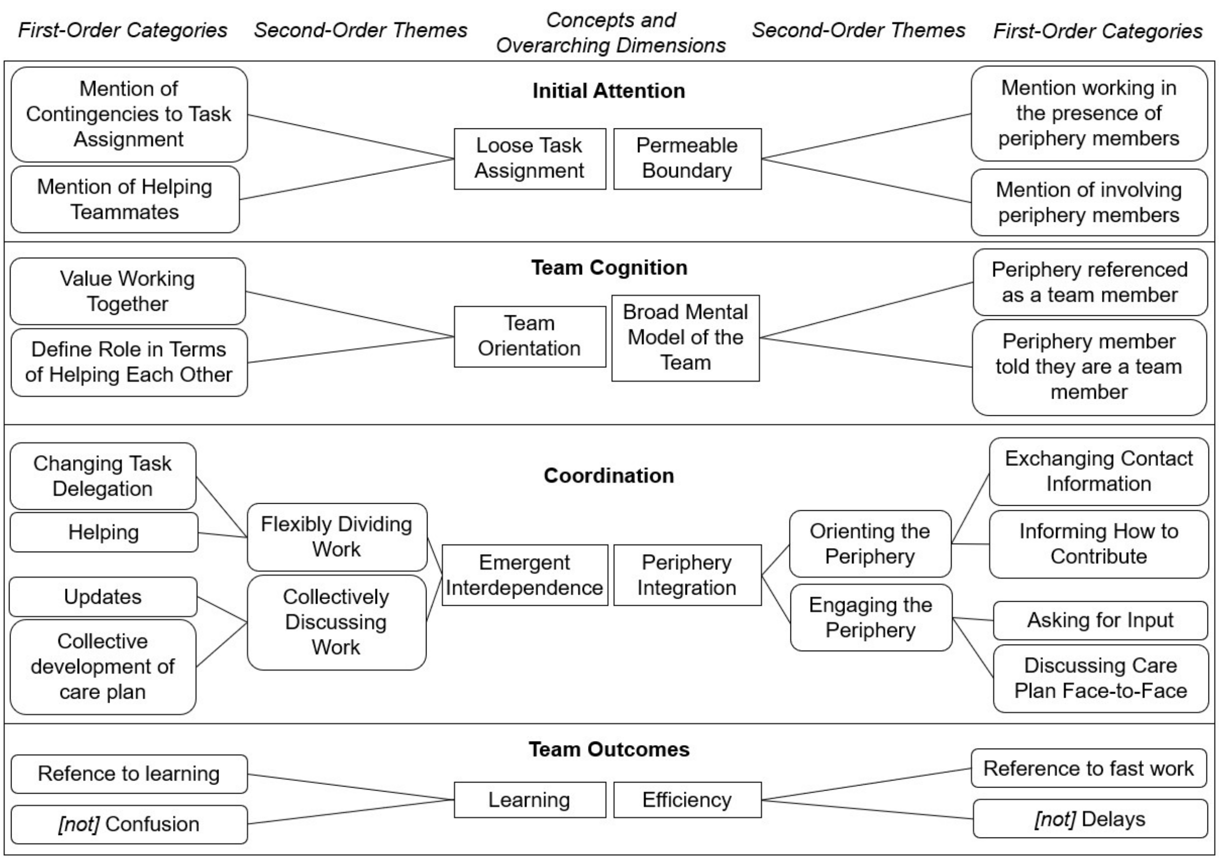

Figure 2.2 Coding Refinement

Throughout data analysis, I took multiple steps to ensure the validity of the emerging theory. First, where analysis of a case did not fit the emerging theory, the conflict was either accounted for or the theory revised; this ensured stronger internal validity (Eisenhardt, 1989; Yin, 1994). Additionally, during the second phase of data collection and after it—as my focus shifted to be predominantly on data analysis—I referred to varied sets of literature, including research on turnover and membership change, fluid teams, healthcare teams, multiple team membership, temporary teams, social network analysis, and team external activities or boundary spanning. This allowed me to make sense of how the emerging constructs and theory fit (and did not fit) with existing literature in order to refine the key constructs and sharpen the emerging theory (Eisenhardt, 1989). This engagement with the literature thus allowed for broader generalizability and a grasp of boundary conditions.

In sum, the iterative process of data collection, coding, within- and cross-case analysis, development of constructs, and comparison to literature, led to the development of a conceptual framework of how dynamic teams can enable effective coordination, discussed below.

The Power of Initial Attention

At the start of a team's life (roughly 9am on Monday morning) the team's core (the physician group) members gathered together as a complete group the first time. The research setting being a highly ranked hospital meant that all teams had highly talented team members, and yet analyses revealed stark differences in whether and how core members engaged in a meeting at this time to discuss their work. Specifically, when core team members first gathered together, they directed their attention to fellow core members, periphery members, both, or neither. Further, initial attention in these meetings could serve as scaffolding to support development of the team's cognition and guide subsequent coordination. Specifically, attention to fellow core members established a team orientation that informed how to work together and fostered emergent interdependence among core team members, while attention to periphery members established a broad mental model of the team that informed with whom else the core members might work and fostered more integration of periphery members into the work. Finally, the two types of emergent coordination described enhanced team effectiveness (see Figure 2.3 for overview of conceptual framework). In the following sections I develop this conceptual model in detail.

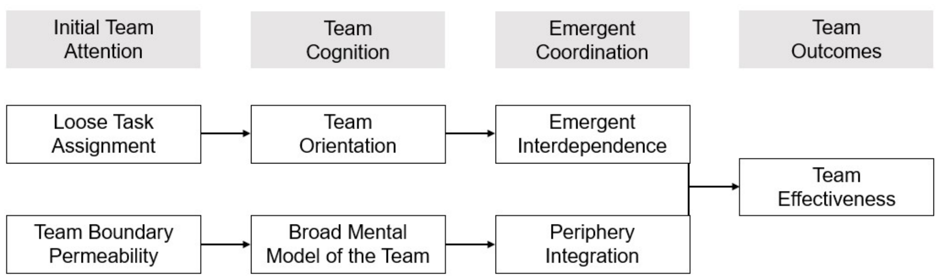

Figure 2.3: Conceptual Framework of How Initial Attention Among Core Team Members Enables Effective Coordination in Highly Dynamic Teams

Team Launches and Initial Attention

Rooted in observations of initial team meetings (or the lack thereof), two primary themes emerged regarding teams' initial attention. (Note: for 3 teams, the initial team convening was not observed and therefore analyses regarding initial attention reflect the remaining 37 teams). Before exploring the effects of initial attention, though, I first discuss how teams directed their attention to fellow core team members and to periphery members.

Attention to core members and loose task assignment. Part of the challenge created by a dynamic team structure is that of members learning how to work together. To that end, it is important to note that the strategically core team members worked in specific positions (attending physician, senior resident, intern, or medical student), which offered those individuals some sense of their role on the team; yet, these roles were fuzzy. As one senior resident acknowledged in an interview, “Sometimes I’ll adapt my role. It’s adaptable every week” (Senior Resident 15). An intern in the same group stated in an interview, “Every attending and senior [resident] are different…. There are things either of us could do, like on another team, the senior did departs…. In those grey areas, you have to say who’s gonna do what” (Intern 15M). As these individuals allude to, many of the tasks assigned to the physician group could be done by multiple, if not all, positions within the physician group. As individuals worked across a variety of different groups, and thus with a variety of different individuals, they experienced different expectations and were challenged to learn and establish different divisions of the work. In sum, there was evidence that, in these teams, there was some uncertainty at the start of each week about how to work together.

Seemingly to address the fuzziness in physician roles and the challenge of learning how to work together, some core teams (12 of 37; 32%) exhibited strong evidence that they used the Monday morning meeting to direct their attention to each other. More specifically, they discussed their roles, but identified contingencies, creating an attention to a loose task assignment among these core roles (see Table 2.1, Column 1), defined as acknowledgement of task assignments that are more flexible than rigid. As one team put it:

> Senior Resident 18: “I know they say to assign these tasks to a person. When you assign these tasks as static” – (interrupted)
> Intern 18A: “It’s not very flexible.”

Rather than focusing on static task assignments, team members discussed the assignment of task to a person while pointing out when the team might deviate from that assignment. The team members from the interaction described above (18) also used Monday morning to discuss providing “backup” to one another. And other teams similarly engaged in this attention to task assignment. For example, most of the teams observed used a mobile computer to place orders for

Table 2.1: Representative Data Illustrating Team Attention to Loose Task Assignment, Team Orientations, and Emergent Interdependence

Team Attention to Loose Task Assignment	**Team Cognition: Team Orientations**	**Team Coordination: Emergent Interdependence**	
		Active Discussion of Plans	***Flexible Division of the Work***
T2: Senior resident said that she didn’t want to be behind the computer while in patient rooms, and asked if the interns could manage that, putting in orders for each other’s patients. T3: The attending physician asked the senior resident to jump in with teaching points throughout the week. T15: The senior resident said that while she normally would delegate the interns to put in orders for one another, today she would help with that and help with other work, and she asked the attending to at times take the lead in the patient rooms because she would be busy entering the patient orders, this was because the senior needed to leave the hospital early. T21: Interns established that they would update the patient-room white boards for each other. T31: The senior resident asked the medical students to call nurses and write on the patient-room white boards for each other.	Intern 18A, in interview: the work is “fairly distributed.” …it’s “just about a team effort.” … “you delegate.” … You don’t know what’s coming in the door when it’s coming, you have to streamline things and teamwork is crucial to that. Medical Student 9E, in interview: “The important role I can play [is to] help out with being observant, filling in cracks if anything gets missed…” Senior 3, in interview: “We’re definitely there as support for [interns], so any questions, concerns that they have, we’re there to sort of help troubleshoot…to help support them, to make things sort of go smoothly.” T22: Attending, to team members: "It's all about teamwork."	Senior Resident 3, in interview: “we’ll typically run the list um as a way to sort of center everybody and make sure that our task list is all synced up and everything is done in an efficient way.” Medical Student 11C, in interview: the team does a “pow-wow” after rounds to run through the “checklist.” … “I always feel like I know what’s going on.” Attending Physician 12, in interview: “They like using this WhatsApp…. Really what we used it for, like, for example, this morning, she said we’re rounding, we’re gonna start at this time and this room…. I find that using this, everybody knows at the exact time where we’re supposed to meet and where we’re supposed to start.”	T3: During morning rounds with a patient: At one point a family member asked a question and [the senior resident] began to answer then received a phone call while he was talking to the family member; [the attending physician] stepped towards [senior resident] to take his phone. [Attending] answered for him, speaking quietly. T11: [Senior Resident 11], to [Medical Student 11C]: “Okay, I’ll work on that with you because [Intern 11F] is so busy.” Intern 15K, in interview: “the team was great… we help each other out. … [Medical Student 15S] would offer to write notes for me…. [Senior Resident 15] had my back if I needed it.” T12: Attending physician, in interview: “I think the team has shown that ability to kind of adjust on the fly this week.”

a patient while rounding on that patient. A common way to achieve this was to assign interns the task of placing orders whenever the other intern was presenting patient information. For example, in one team (17), the senior resident stated on Monday morning that the interns should place “orders for each other.” But she offered a contingency: “on clinic days I can help with orders.” By offering to place patient orders in these special situations where interns were required to leave the hospital early to work in a clinic, the senior resident freed the interns to execute their other hospital tasks more quickly so that they could leave the hospital when needed and with as much work completed as possible. In another team (10) the two medical students decided to tradeoff each day with tasks of updating white boards in patient rooms with the care plan and calling patient nurses to invite them to rounds; however, when rounding on a patient for which the medical student was to present patient information, the other medical student would do those tasks even if it was his/her off day for that task. In sum, some teams used their initial team meeting to direct team member attention to task assignments, and specifically to a loose task assignment.

The observation that some teams began their work by directing attention to loose task assignment is consistent with, but extends, prior research. This theme echoes work on the potential need for unprogrammed coordination means rather than more rigid rules (Argote, 1982), particularly in contexts like this one, in which the tasks are unknown ahead of time. Similarly, this theme echoes work on the fuzziness of roles that exists even in role-based work. In the setting of an aircraft crew, for example, the various roles (e.g., pilot, co-pilot, flight engineer) offer only a rough team "shell" – a set of expected behaviors and interactions; this shell offers some knowledge about tasks and roles that is fairly obvious and need not be discussed, but in ambiguous areas, an initial conversation is needed to clarify expectations (Ginnett, 2010). Other research has also argued that team launches can be used to clarify team-member roles (e.g., Hackman, 2011). Clear roles can provide some understanding of how to coordinate with others in the group (Bechky, 2006; Bigley & Roberts, 2001; Katz & Kahn, 1966), a key challenge for highly dynamic teams. However, rather than clarifying roles in a rigid manner, the current work suggests that core team members may have some redundancy in abilities such that they can direct attention to a loose task assignment. Research on back-up behaviors in temporary teams (e.g., role-shifting (Bechky & Okhuysen, 2011), role negotiation (Bechky, 2006), and extra-role behaviors (Valentine, 2018)) implicitly acknowledges that team members have some redundancy in their abilities so that they can flexibly divide their work. The current finding goes beyond that assumption to highlight explicitly how core team members, who have some redundancy in abilities, can initially direct their attention to loose task assignment.

As will be discussed below, this initial attention to loose task assignment was found to act like scaffolding to support the development of the core team's cognition in a way that enabled an understanding of how to work together and effective coordination among core team members. However, patient care cannot be done solely by the core team members; periphery members are critical to the work. To this end, teams could also direct initial attention to periphery members.

Attention to periphery members and the team's permeable boundary. A second challenge faced by dynamic teams, given their permeable boundaries, is that of coming to understand with whom to work. As the teams' work progresses throughout the week, the shape of the team is in constant flux. There is a shifting set of patient families and interdisciplinary healthcare team members who float in and out of the work with physicians. As one team member (Intern 18A) stated, the team's shape is "changing all the time, like gelatin on a subwoofer, going all over." This shape-shifting nature of the team can create confusion about who is on the team and thus confusion about with whom to work (Mortensen & Haas, 2018; Mortensen & Hinds, 2002).

To address this challenge of managing the team's boundary, some core teams (14 of 37; 38%) exhibited strong evidence that they directed their initial attention to the team's permeable boundary (see Table 2.2, Column 1), defined as acknowledging the possible set of other interdisciplinary members with whom they might work. For example, in one team's initial meeting, Attending 34 indicated the team should conduct the patient round in the patient room,

Table 2.2: Representative Data Illustrating Team Attention to the Existence of Periphery Roles, Broad Mental Models of the Team, and Integration of Periphery Members

Team Attention to Permeable Boundary	**Team Cognition: Mental Models of the Team**	**Team Coordination: Periphery Integration**	
		Orientating Periphery Members	***Engaging Periphery Members***
T2: The attending physician emphasized that these are "*family*-centered rounds, not physician focused," and asked the student to focus on the family during rounds, not on her. T2: The attending physician said a goal for the team is to … "involve the nurses as much as possible." T13: The senior resident said he would like for someone to call the nurse ahead of going to each patient room. T13: The attending physician emphasized that they "use family-friendly language" in the rooms and while on morning rounds that they "aim for everything to be said inside the rooms" as opposed to spending time pre-rounding in the hallway. T22: The attending said, "I'm a big fan of doing everything inside the room" and that the team should use "lay language so [the family] can understand." The attending also asked the team to "try to get nurses in on every round" and to update the white boards in the patient rooms with the care plan. T34: The attending asked the medical students to update patient-room white boards and call nurses to invite them to rounds or update them with a plan immediately after rounds if the nurses were unable to join.	*Broad mental model of the team* T13, observation of patient round: The parents shared information about the patient's history and Intern 13K and Senior Resident 13 both said thanks for the information; Intern 13K said the family was "part of the team." Senior Resident 2, in interview: "It's really nice to have nurses on rounds … they're just as important of a team member." Intern 12SG, in interview: "So if, sometimes, you know… we don't get to call the [physician specialists] until after lunch. And a lot of times they're busy and they don't get back to you until later, and a lot of times if it's really late when we call them, they'll just be like, we have to do it tomorrow, which, is not great. So the sooner we can … get that stuff done the better."	T12: At the start of a round on a patient, [Senior resident] was talking to [Patient 2's] nurse and she gave the nurse her pager number. T36: As the team entered a patient room, Medical Student 36M said to the patient family member that they would "talk about [patient] then talk about the plan." T13: during a patient round, the physicians began to discuss the best time to discharge the patient. Attending 13 turned to the family to explain that they were trying to find a balance – to not discharge them too early so that there would still be inflammation, but also not keep them there unnecessarily. Attending 15, in an interview when asked how he thought the physician group interacted with families: "in terms of orienting families, this was one of the better teams I've seen in a long time." T34: entering a patient room, the senior introduced each physician to the patient's mom saying "we have a big team!"	T2: After rounding on a patient in the patient's room with the surgeons, the nurse, and the patient-family present: Attending physician: "perfect world… we agreed together. They had knowledge we didn't have, and we could ask them in front of the family." T22: The physician group arrived at a patient room; the patient's family was not present. Intern 22A called the parent to discuss the plan for the patient. T22: Attending Physician 22 asked the nurse, "anything else from your perspective?" T9: The medical students and senior resident had failed to reach a nurse by phone to have the nurse join rounds on patients 1 and 2. After rounding on the second patient, the senior resident told Intern 9F to talk to the nurse about patients 1 and 2 to update the nurse about what they discussed. Intern9F nodded and walked away to connect with the nurse in-person.

rather than pre-rounding in the hallway, to include the family and "bring the family in." This language – bringing others *in* – highlights that others will come into the team over time. This attention was also not limited to the families; teams that acknowledged the permeable boundary most often focused on the role of nurses. For example, Attending 2 said that one of her goals for the team was "to involve the nurses as much as possible." Still others highlighted the role of others by emphasizing the need to interact with the periphery in such a way that will allow boundary to be permeated. During one team's initial meeting, the Attending Physician 26 instructed a medical student to "talk to the family, not to me or [the senior resident] or [an intern]. Explain what we're going to do in words they can understand." By encouraging language that all could understand, the family would be able to enter the conversation. In essence, these teams discussed other potential individuals that could (and should) be brought into the team, thus cognitively activating a broader potential set of team members.

The notion that core team members can direct attention to the team's permeable boundary pushes the work on team boundaries in a new direction. First, research has focused on the role of a boundary, specifically on a clear boundary (e.g., Hackman, 2011). For example, much of this work has explored how a clear boundary can be spanned. Ginnet (2010) suggested that as teams are being developed, team members should ensure that they develop an understanding of the team that allows for bringing in information and other resources from outside the team. Similarly, Ancona and colleagues (Ancona, 1990; Ancona & Caldwell, 1988, 1992) studied the benefit of crossing the team boundary through "external activities" that allow teams to gather information from outside the team. In contrast, the current research focuses on teams in which the boundary around team membership can be permeated, with team members flowing into and out of the team. In such situations Edmondson (2012) notes that team members tend to focus on their own subgroup, such that the physicians in this study would be likely to focus on themselves and ignore individuals from other disciplines with whom they should work. One approach to ensuring that team members are aware of other members with whom they should work involves establishing a "deindividualized role set" – or a fixed set of roles (nurses and physicians) – such that team members would better know with whom to coordinate (Valentine & Edmondson, 2015). However, this again fixes the boundary of the team membership and cannot extend to situations in which the roles needed in the team evolve over time. Alternatively, when the nature of the work evolves such that other periphery members might be brought into the fold to offer specialized expertise, the current study suggests core team members can initially direct attention to the team's permeable boundary, effectively cognitively activating a broader set of potential team members. That is, rather than having a clear boundary, the core team members focus on a potential network of teammates. As discussed in following sections, this initial attention to the team's permeable boundary could serve as scaffolding that supported the development of team cognition in a way that enables the team's understanding of with whom to work and subsequent coordination between core and periphery members.

In all, 6 teams exhibited strong evidence of attending only to loose task assignment, 8 only to the permeable team boundary, 6 to both, and 17 to neither. Although uncovering the antecedents to these conversations was not the purpose of this study, the data do suggest that context may have impacted the team's initial attention. Teams were more likely to convene in a hospital hallway (n = 25) than in their team space (n = 12). Yet, of the 25 teams that started their Monday in a hospital hallway, only 10 (40%) exhibited strong evidence of initial attention to loose task assignment and/or a permeable team boundary; in contrast, of the 12 teams that started their Monday morning in their team work space, 10 (83%) exhibited that initial attention. In one of the teams (Team 24) that initially convened in a hallway outside a patient room (and did not exhibit initial attention to either loose task assignment or a permeable team boundary), the attending physician later revealed in an interview that she wished they had sat down together on Monday morning so that she could think about what to say instead of being distracted by getting started. Moreover, in an earlier team (14), the same attending physician convened with the team in the team's work space and did discuss team members having flexible roles; for example, she encouraged medical students to be observant and help with tasks, especially when it gets busy. Similarly, one senior resident (Team 18) made a point to discuss the periphery members of the team when first convening in the team's work space; in a subsequent week (Team 20), the same senior resident did not discuss periphery members on Monday morning when the team initially convened outside a patient room.

These findings are consistent with work that suggests that teams tend to want to jump into the work rather than first discussing it (Wageman & Gordon, 2005; Woolley, 2009) and that situational factors such as task complexity can decrease the quality of initial coordination planning (Weingart, 1992). In the case of inpatient teams, situational factors may lead the team to meet at a patient's room, further lowering the likelihood that the team will pause to engage in a team launch before getting to work. In sum, these data do not allow for unpacking what led to focusing on loose task assignment, the team's permeable boundary, or both, but they do suggest that context might be an important factor that directs the team's initial attention.

However, I find that whether teams had these initial conversations, and the specific target of attention, had a powerful effect on the rest of the team's work. Below I discuss the impact of initial attention to loose task assignment on team cognition and coordination, and I then turn to the impact of initial attention to the team's permeable boundary.

From Loose Task Assignment to Team Orientation and Emergent Interdependence

Team Orientation. I previously discussed how Team 18 exhibited attention to loose task assignment among its core members, manifest in its value of assigning flexible, rather than rigid tasks. This attention to loose task assignment in Team 18, and other teams that similarly attended to loose task assignment, led team members to think about their work in terms of working together to support one another. In this way, initial attention to loose task assignment fostered a team orientation (see Table 2.1, Column 2), defined as an intent to work as a team and an understanding of core member interdependencies.

The data here suggest that teams varied in their team orientation, with teams that initially attended to loose task assignment exhibiting stronger evidence that its members wanted to work together. For example, returning to Team 18, one member (Intern 18A) described that in accomplishing the team's work, it's "just about a team effort." He went on to emphasize the importance of working as a team, saying, "You don't know what's coming in the door, when it's coming. You have to streamline things, and teamwork is crucial to that."

In addition to discussions of teamwork, teams that initially directed attention to loose task assignment had members who defined their roles largely in terms of supporting one another. That is, while much of the past work focused on team orientation with regard to preference for teamwork (Eby & Dobbins, 1997; Mohammed & Angell, 2004; Williams & Castro, 2010), this study points to a related component which is the tendency to conceptualize roles in terms of their interdependence. When asked in interviews about their role, rather than stating specific tasks they might complete, they offered ideas about how they could work with others. For example, one senior resident (Senior 3) described his role saying, "We're definitely there as support for [interns], so any questions, concerns that they have, we're there to sort of help troubleshoot…to help support them, to make things sort of go smoothly." This attention to supporting others was both up and down the physician group's hierarchy. As one medical student (Medical Student 9E) stated, "The important role I can play [is to] help out with being observant, filling in cracks if anything gets missed." In sum, team orientation was evidenced by members who expressed value in teamwork and an understanding of core member interdependencies, and this followed from initially discussing their work in terms of loose task assignments.

The idea that attention to loose task assignment could spark a team orientation is consistent with work demonstrating that preferences for collective work can be altered. For example, a study of work groups at Xerox Corporation demonstrated the work's structure—it's task and goal interdependence—affected individuals' preferences for autonomous work (Wageman, 1995). Yet, the current study focuses on team orientation rather than the flipside of autonomous work, and it suggests that initial attention can foster a team orientation. Moreover, developing the team's cognition in this way, so that the core team develops a team orientation, subsequently enabled coordination among the core team members.

Emergent Interdependence. Having a team orientation provided teams with an understanding of how to work together that fostered more emergent interdependence (also referred to as behavioral interdependence, Wageman et al., 2012; Wageman & Gordon, 2005), defined as the extent to which team members work together as a group rather than individually. Because members focused on working together as a team and understood the redundancy in their abilities, members were able to actually work as a team. In contrast, it follows that if core team members lack an intent to work as a team or an understanding of how to support one another, they will be less likely to do so. Thus, core members' focus on each other allowed them to anticipate when they could help each other, or who could help them, in a way that fostered information sharing and task updating through collective discussions of the work as well as flexible division of the work as the work unfolded. Overall, emergent interdependence was evidenced by more collective discussion of plans and more flexible work division (see Table 2.1, Columns 3 and 4).

First, emergent interdependence was evidenced by team members more frequently discussing patient care together. In one team (12), the physicians were discussing care for a patient. The attending suggested that medicine, in general, is overdoing it in terms of treatment of concussions. Intern 12K argued back, saying "but…." As the group discussed the latest evidence from research and what to do for the patient, Attending Physician 12 joked that Intern 12K was in "fighting mode. I like it!" The attending physician high-fived the intern and they continued to develop a plan for the patient. In contrast to the collective discussion observed in Team 12, discussions of clinical reasoning were often fragmented in the teams, with dyads discussing care ideas or attending physicians overruling ideas from other physicians to state a care plan without providing reasoning. This lack of collective reasoning was captured in Team 1, which had failed to direct their initial attention to each other and any loose task assignment on Monday morning. One afternoon, in response to Intern 1F's question about a patient, Senior Resident 1 agreed that there was confusion about the patient's plan and said, "I just don't make a plan anymore, I wait for a plan to come down," implying that he waits for the attending physician to make decisions about care plans. Another way that teams engaged in collective discussions was through a practice some referred to as "running the list" wherein the team collectively discussed each patient on the team's list – updates, plans, and task delegations. As one Senior Resident stated in an interview: "I like to run the list before [noon] conference, just to clear up what's been ordered, what needs to be done now… who's doing what." This practice allowed team members to actively monitor the tasks on their list and ensure that the team had a collective plan and strategy for accomplishing their work.

Emergent interdependence was also evidenced by more flexible work division. In some teams, when a member's pager beeped or phone rang, teammates would step in to respond if the person being contacted was busy (e.g., amid talking with a patient family member or other interdisciplinary team member). While this was most commonly done among the interns and senior residents, in teams with emergent interdependence, this helping behavior extended to all physicians. In one team (3) Attending Physician 3 even stepped in to answer Senior Resident 3's phone, which was atypical for an attending physician. In another team (12) a new patient was admitted during morning rounds, creating a challenge to adapt and find a way to see this new patient. Attending Physician 12 took the task of learning about the patient and presenting the patient's information to the rest of the team so that the team could round on this patient in the morning rather than waiting for a different team member to do the initial learning about the patient later in the day, which would delay rounds. This, again, was atypical behavior for the attending physician position. In teams exhibiting initial attention to loose task assignment, the medical students also actively helped other team members higher in the hierarchy. In one team (2), Medical Student 2A went beyond any defined role to help with a case by researching the latest evidence related to a patient condition. The medical student shared the information with the team so that the team could develop a care plan. In sum, the flexible assignment of tasks through collective discussions and flexible helping allowed for individuals up and down the hierarchy to engage in this emergent interdependence.

The observed emergent interdependence in some teams is comparable to research on dynamic delegation (Klein et al., 2006) in that both describe team members with some redundancy in their abilities and a flexible assignment of tasks. However, Klein and colleagues' (2006) work focused on top-down leadership wherein the highest in the hierarchy could give or take responsibility for the team's strategic direction. In contrast emergent interdependence highlights how support and dynamic assignment of tasks can flow both up and down hierarchical positions. In this way, the current work fits with attention to the importance of action phases of teamwork (Marks, Mathieu, & Zaccaro, 2001) and aligns specifically with that on backup behaviors described in temporary teams (Bechky, 2006; Bechky & Okhuysen, 2011; Valentine, 2018). Still, the current study extends prior work by demonstrating that in the absence of stable team structures, when emergent interdependence should be unexpected and difficult to achieve, initial meetings can direct core team members' attention in a way that shapes team cognition about how to work together and thus enables emergent interdependence.

This study's evidence of a link between team orientation and emergent interdependence is consistent with past work suggesting a link between team members' value of collective work and emergent interdependence (Caruso & Woolley, 2008; Wageman & Gordon, 2005), as well as past work demonstrating a general association between an individual's collectivist orientation and an individual's tendency to share information or attend to fellow team members' contributions (Driskell & Salas, 1992; Eby & Dobbins, 1997). However, prior work focused largely on individual cognition and some have noted that individuals who are generally collectivistic may not adopt a team orientation in their work, and vice versa (Rau & Hyland, 2003). That said, team orientation has been shown to mitigate the effects of team surface-level diversity on relationship conflict (Mohammed & Angell, 2004), thus suggesting that at the team-level, team orientation is associated with better team interactions. Together, this prior research hints at a relationship between team orientation and emergent interdependence. The current study extends that work to offer evidence of the relationship, suggesting team orientation is the mechanism by which a highly dynamic team can achieve coordination among core team members because it provides team members with a frame for understanding how to work together.

In sum, and in returning to the notion that effective dynamic teams exhibit a core-periphery structure characterized, in part, by quality coordination among core team members, this work demonstrates one condition (initial attention to loose task assignment) that can enable coordination among core members by fostering a team orientation (see Table 2.1 for overview). In the next section, I return to the effect of initial attention to the team's permeable boundary, and how that attention ultimately also enabled coordination, but in a different way.

From Permeable Boundaries to Broad Mental Models of the Team and Periphery Integration

Broad mental model of the team. I previously discussed how Team 2 exhibited attention to the team's permeable boundary, manifest in its attention to interdisciplinary team members, such as nurses, as individuals who should be involved in decision-making discussions. This led Team 2 and other teams that attended to the team's permeable boundary to develop a broad mental model of the team: a broad definition of the individuals who were members of the team (see Table 2.2, Column 2). In effect, these core teams cognitively activated a broad set of potential team members such that core team members viewed those periphery individuals as members of the team. A member of Team 2 (Senior Resident 2) stated in an interview: "It's really nice to have nurses on rounds … they're just as important of a team member." This perspective is contrasted with a member of a different team (Medical Student 10J) who shared in an interview: "I almost feel like it's the culture to not have the nurses involved." Teams more aligned with Team 2, with a broad mental model of the team, also made their perspective clear through their interactions with periphery members. For example, while observing Team 13 rounding on a patient, I observed the parents of the patient sharing information about the patient's history. Intern 13K and Senior Resident 13 both responded by thanking the family members for sharing the information. Intern 13K also said to the family members that they are "part of the team." Overall, I find that teams that initially attended to the team's permeable boundary were most likely to exhibit a broad mental model of the team. This is because thinking about the team's permeable boundary and possible periphery members made those periphery members top-of-mind, making it more likely that core members would think of them as team members. Moreover, I find that a broad mental model of the team, in turn, enabled coordination between core and periphery team members.

Periphery Integration. A broad mental model of the team increased the likelihood of team members realizing a need for periphery team members and subsequently integrating them. Said differently, if core members did not think of periphery members a part of the team, it was less likely that the core members would integrate those periphery members into the work. Thus, despite the team's permeable boundary causing uncertainty about with whom to work, a broad mental model of the team could guide attention to possible periphery members and increase the likelihood of periphery integration, defined as orienting periphery members to the work at hand and engaging them in the work (see Table 2.2, Columns 3 and 4).

First, as periphery team members floated in and out of the work, they did not always know what was going on, but the physicians could orient them to the work, for example, explaining the process of family-centered rounds to families. Attending 15 highlighted this behavior when responding to an interview question about his team's interactions with families:

“in terms of orienting families, this was one of the better teams I’ve seen in a long time.” Orienting periphery members could be as simple as introducing the family member to the physicians. For example, in Team 34, the physician group entered a patient room and Senior Resident 34 introduced each physician to the patient’s mom adding, “we have a big team!” In Team 36, Medical Student 36M explained the process of rounding as they entered a patient room, saying they would “talk about [patient] then talk about the plan.”

Just as teams could orient family members to the team members and the process of rounds, physicians could orient nurses and other periphery members with regard to the best way to interact. In Team 12, at the start of a round on a patient, Senior Resident 12 was talking to Patient 2’s nurse and gave the nurse her pager number. As a nurse later explained, this simple exchange could be extremely helpful because it’s “always just helpful to verbally communicate” and this was made easier when “the pager number is given to me.” That is, being oriented to how communicate allowed for later communication. Overall, orienting behaviors seemed to serve as a way for the periphery team members to make sense of how to interact with the physicians.

Second, periphery integration was evidenced by core members actively engaging the periphery members. For example, some core teams sought out in-person interactions and took advantage of chance in-person run-ins to discuss cases with specialists real-time and make care plans with all available information. In Team 15, the physicians realized that they did not understand an electronic note from a radiologist. The team decided to walk to a different floor in the hospital to find the radiologist in person and clarify the note’s meaning. With this information, they then proceeded to the patient room to discuss a care plan. Similarly, in Team 9, the physician group happened to run into the surgical group while in a hospital hallway. Senior Resident 9 introduced herself to the surgical attending and explained that they share [patient].

Senior Resident 9 asked why the surgeons had ordered a CT scan and they discussed this and the patient's care plan together before parting ways. In yet another team (2), an attending physician acknowledged the benefit of these in-person, real-time interactions after the team rounded on a patient in the patient's room with the surgeons, the nurse, and the patient-family present. Attending Physician 2 said it had been the "perfect world…. We agreed together. [The surgeons] had knowledge we didn't have, and we could ask them in front of the family." In contrast, Team 3, which did not start its week with attention to the team's permeable boundary or exhibit evidence of a broad mental model of the team, walked by consulting specialists in hallways multiple times, missing opportunities to interact in person despite having earlier acknowledged a need to connect with exactly those consulting specialists.

Additionally, some core teams made a point to engage the nurses and families. In Team 9, for 85% of their patients, the nurses were either present for morning rounds and invited to contribute or, if the nurse had been unable to join round, immediately updated about a plan. This was substantially greater than the average (60%). It also stands in stark contrast to Team 10 (which included the medical student who thought it was not the culture to involve nurses); in Team 10, only 32% of the patient's nurses were present for, or immediately updated about, rounds. Some teams also explicitly invited families to participate and encouraged that participation, asking families questions such as, "What questions do you have?" In Team 22, after a patient family member contributed to the conversation during morning rounds, Attending Physician 22 said to the patient family member, "Those are great questions. Thanks for participating." In sum, teams ranged from exhibiting evidence of orienting and engaging all periphery team members (which facilitated the development of complete care plans) to little evidence of orienting and engaging.

The observed periphery integration extends prior work focused on the ties between core and periphery members (Cummings & Pletcher, 2011) and theory that team members need to "flexibly manage boundaries" (Choi, 2002) and "on board" the less core, shifting set of team members (Ancona, Bresman, & Caldwell, 2009). This prior research stops short of detailing what it means to manage a team boundary. In contrast, the current work highlights two key behaviors: orientating and engaging. Just as Argote and colleagues (2018) speculated that a clearly perceived communication structure can orient newcomers about how to interact with incumbents, the current study suggests that periphery members benefit from being oriented to the work and how best to engage with the core members. Additionally, research has argued that when team membership is fluid, core members only should engage in decision making conversations (Ancona & Bresman, 2007), but the current work suggests that engaging periphery members in decision making conversations can serve to integrate them and thereby ensure the team is using the most up-to-date information.

Moreover, the idea that core team member cognition about the team's boundary will drive patterns of interaction between core and periphery members extends research from social network analysis. Research has suggested that expectations about what relationships *should* be can lead to interaction patterns that map onto those expectations (Kilduff & Tsai, 2003 pp 70-79). For example, a leader's expectations for network ties can affect their ability to notice and change the structure of social ties (Balkundi & Kilduff, 2005; Janicik & Larrick, 2005). This suggests that individuals who anticipate that periphery members *should* be a part of the work will act to bring these connections to fruition. Additionally, research suggests that as individuals develop their perceptions of the actual network (Krackhardt, 1987), these perceptions, such as perceptions of who they *think* is central (Krackhardt, 1992), continue to drive behavior. In sum, I suggest that the important role of perceptions of ties shown in network behavior will be comparable in highly dynamic teams, wherein team members will act based on who they *think* is (or is not) on the team.

Overall, returning to the notion that effective dynamic teams exhibit ties between the core and periphery, the current study highlights the critical content of those ties and how one condition (initial attention to the team's permeable boundary) can instill a broad mental model of the team and thereby enable core-periphery coordination (see Table 2.2 for overview). In this way, these findings suggest a second pathway from a team's initial attention to team coordination via team cognition. In the next section, I consider how the two emergent coordination behaviors described – emergent interdependence and periphery integration – relate to team effectiveness.

Core-Periphery Coordination Patterns and Team Effectiveness

This study began with a question of what enables *effective* coordination in highly dynamic teams. Observationally, it became clear that teams varied in the efficiency with which they completed work. This was apparent with regard to the time it took teams to complete their work (e.g., morning rounds and patient notes), as well as instances of a lack of efficiency (e.g., skipping dedicated teaching sessions in the morning and over lunch to continue working). As Senior Resident 18 remarked on Friday as Team 18 finished their morning rounds, "Remember when I said we had a goal to finish everyday by 11? We actually did it. I've never done that before. It's usually a joke at the end of the week." Of note, this team had one of the highest patient loads observed during the study and yet was able to complete their work efficiently. Moreover, this team started the week with attention to both loose task assignment and the team's permeable boundary. Similarly, in Team 12, Intern 12A said to Intern 12B that they'd seen "14 patients" (above average) and Intern 12B was "going to clinic on time with everything signed and done," pointing out that this was enabled in part by finishing morning rounds earlier in the morning, freeing up time to complete patient notes after rounds and before lunch. As Intern 12B acknowledged, "That's incredible." Again, this was a team that exhibited attention to both loose task assignment and the team's permeable boundary. In contrast, teams with similar numbers of patients who failed to launch the team on Monday morning or exhibit emergent interdependence or periphery integration conducted rounds that extended beyond noon, causing team members to miss lunch and the teaching session that occurred during lunch (e.g. Team 8 members missed lunch every day of the week due to morning rounds extending past noon). Overall, this pattern throughout the data suggests that both emergent interdependence and periphery integration can contribute to greater efficiencies. These coordination behaviors appear to have benefitted teams in different ways.

Benefits of emergent interdependence. First, teams can benefit from emergent interdependence in that it helps teams to maintain awareness of tasks that must be completed while avoiding bottlenecks. In one team for which I observed little evidence of emergent interdependence (Team 1), Intern 1A – at the end of an interview, when asked if they had anything else to share about working on inpatient teams – nonetheless noted the importance of collective discussions and flexible work:

> "There are times when the interns do a lot of management and a lot of the smaller tasks totally on their own. There are a lot of times when the senior takes those jobs. And I think that's really ideal because it allows you to be flexible but it also means kinda being in some level of constant communication with each other in terms of what needs to get done."

This benefit of emergent interdependence is consistent with prior work (Hackman & Wageman, 2005) including that on extra-role behaviors (Valentine, 2018), role-shifting (Bechky

& Okhuysen, 2011), role negotiation (Bechky, 2006), generally "monitoring changing task demands" (Thomas-Hunt & Phillips, 2003), and the use of more unprogrammed means of coordination, such as general policies rather than rigid rules or authority (Argote, 1982). Extant work might suggest that this kind of coordination is unlikely to emerge in temporary teams (Valentine, 2018), and this should be especially true of dynamic teams that both are temporary and have a permeable boundary. Yet, the emergent theory from this study suggests that highly dynamic teams can engage in and reap the benefits of emergent interdependence through core team members' initial attention to loose task assignment and the subsequent team orientation.

Additionally, consistent with prior work, the collective discussions that makeup emergent interdependence may have bolstered the core team members' learning (Myers, 2018; Wageman & Gordon, 2005), which could, in turn, foster more efficiency (Reagans, Argote, & Brooks, 2005; Tucker, Nembhard, & Edmondson, 2007). Above I described an interaction in Team 12 in which Attending Physician 12 and Intern 12K debated the best way to treat a patient's concussion. Later in the day, the intern reflected on the conversation in an interview: "That's, like, how I learn. So, I really enjoy, like, having those in the moment discussions." Similarly, Medical Student 1B on Team 1 explained in an interview that "rounds is where we can learn the most from attendings or residents." Intern 1A on the same team stated in an interview, "So there's a lot of learning that happens kinda on the fly. You come up with an idea, uh, or a management plan. And in correcting that or in suggesting an alternative, you necessarily learn something." Interestingly, Team 1 did not engage in much collective discussion of the work, and yet its team members were aware of the potential benefit to learning when they did engage in those conversations.

Benefits of periphery integration. At the same time that emergent interdependence was associated with efficiency, so, too, was integration of periphery team members. Observational work suggested that patient care depended on the integration of periphery team members because those periphery members were integral to providing some of the care and information about the care. Interviews with nurses made this even clearer. First, nurses noted that it was not always clear with whom they should be interacting, but when physicians introduced themselves and exchanged numbers, the work flowed more smoothly. They also highlighted the effects of core members integrating them into the work. One nurse, responding to a question about what type of interaction with physicians is helpful, emphasized the importance of being involved in making a plan, or at least being updated about a plan. She explained that when physicians place orders through the electronic system, it would take “just a call” to ensure she is made aware of the task to be done. When the nurses were not kept up to date, the patient care could be delayed. The nurse explained, that due to juggling multiple patients, it “could be hours before I see a note on a computer” and that included “STAT orders.”

Physicians, too, offered insights suggesting that involving periphery members was key to the speed, as well as the quality, of care. In Team 15, Intern 15K acknowledged that nurses have information to contribute saying, “they’re the one with the patient all the time.” Similarly, Intern 22K, when asked about nurses in an interview, said that there has often been “something the nurse shared – something that changed our approach.” She estimated this happens “20% of the time,” adding, “or they at least add something.” Moreover, Attending Physician 14 stated that she had learned involving the nurses during rounds could save the team from pages and calls made later in the afternoon to clarify confusion from nurses not being present during rounds or learning the patient care plan. Similarly, if physician specialists were not integrated into the work, the team ran the risk of starting to head down an incorrect path due to a lack of complete information, or they may face delays due to asynchronous and highly delayed communication with the specialists.

In sum, the idea that integrating periphery members is important for team performance echoes research demonstrating a benefit to integrating periphery members compared to not working at all with periphery members (e.g., Cummings & Pletcher, 2011). The current work also builds on prior work by suggesting that the quality of the connection to periphery members is important. In short, periphery integration – through orienting others about how to interact with them and actively engaging them in the work – enhances team ability to make use of all available information in a timely manner and thus to perform efficiently and effectively.

Integration of periphery members also facilitated learning from periphery members. As Intern 1A noted, in an interview, "I was talking to a cardiologist earlier this week as part of a consult and he not only gave me the answer to my consult question, but he explained the kind of medical reasoning behind it. So that was a neat chance to think about, you know, kinda get insight into a little bit of cardiac knowledge." That is, by integrating others into the work, core team members could learn about other aspects of medicine from those specialists. This evidence of a positive impact of integrating a variety of perspectives on learning echoes research on boundary spanning (e.g., see Edmondson, 2012). And again, team member learning likely contributed to the team's efficiency.

In sum, these findings build on prior research suggesting the benefit of a core-periphery network by highlighting how the content and quality of these connections – both emergent interdependence and periphery integration – can drive learning and efficiency.

Discussion

Inpatient teams are made up of a highly dynamic set of individuals who must quickly come to understand how to work together and with whom to work. The instability of these teams should create serious coordination challenges. This study's findings suggest that in the absence of stable team structures that would otherwise guide coordination, initial meetings with core team members can serve as scaffolding to support the development of team cognition. Moreover, that cognition can anchor team attention going forward to guide coordination. Specifically, initial attention to loose task assignments can create scaffolding around how to work together that supports a team orientation, which subsequently enables emergent interdependence among core members. At the same time, initial attention to the permeable boundary around their team can provide scaffolding around the team's boundary that supports a broad mental model of the team, which subsequently enables the integration of periphery members. Further, both of these coordination behaviors should contribute to team members' learning and team performance. This work makes multiple theoretical contributions, particularly with regard to team beginnings, coordination, and leadership.

Team Beginnings & Coordination

These findings shed new light on conditions that can enable effective coordination in highly dynamic teams, and in doing so they extend what we know about the benefit of early team events (Ericksen & Dyer, 2004; Hackman, 2011; Steiner, 1972) to the area of highly dynamic teams. Specifically, this work suggests that while dynamic teams lack the structure afforded by stability and an impermeable boundary, they can still rely on initial scaffolds to enable coordination. First, the current study's findings are consistent with extant work in suggesting that a brief conversation that directs attention to roles, though specifically on loose task assignment, can instill the desired coordination among core team members in teams with highly dynamic membership. Yet, in contrast to prior work focused on stable teams, the current study reveals that when the team membership fluctuates, this initial focus can be implemented with only core team members. Additionally, the current study's grounded theory goes further to address "unbounded" teamwork (Bernstein et al., 2017); an additional brief conversation that directs core team member attention to the team's permeable boundary can set the stage for coordination with periphery team members. In sum, this work adds to efforts in this space of dynamic teams to promote individual training around teamwork skills (e.g., Bedwell et al., 2012), and suggests group-level interventions that can enable coordination in dynamic teams. Further, this work extends findings from social network analysis (Balkundi & Harrison, 2006; Reagans et al., 2004; Reagans & Zuckerman, 2001) to offer some evidence that coordination both among core members *and* between core members and a shifting set of periphery members will benefit the team's effectiveness.

Leadership

The above attention to team beginnings emphasizes the notion that an important leadership function for any team is to engage the team in an initial "launch" that establishes the group of individuals as a team (Ginnett, 2010; Hackman, 2011; Hackman & Wageman, 2005). To this end, Tannenbaum and colleagues (2012) argued that dynamic teams should have "quick-start" guides to help teams get to work quickly, and Cummings and Pletcher (2011) suggested that teams might use a "kickoff meeting" to orient the team to the notion that they could look outside of the team for help with the work. These two goals for an initial meeting speak to the specific challenges of dynamic teams: teams need to know how to work together (the temporary nature makes this difficult particularly within core members) and teams need to know with whom to work (the shifting boundary makes this confusing). Extending prior work on team launches (Ginnett, 2010), the current findings suggest that, in highly dynamic teams, leaders should work with core team members to initially direct attention to both the core and potential periphery members.

Boundary Conditions

My focus on core and periphery members that guided this qualitative inquiry hints at boundary conditions of this theory. The benefit of team launches that provide scaffolding around team roles is likely most beneficial when teams are temporary and members lack familiarity or other structure that could support an understanding of how to work together. Indeed, when team members already know how to work together, taking time to discuss what is already known may be cumbersome and even harmful. Similarly, team launches that provide scaffolding around the team's boundary are likely most beneficial when the team's boundary is more permeable and must be managed. When a team's work does not require boundary spanning or boundary management, discussing individuals external to the team may be distracting. As such, this theory is not likely to port onto teams that are long standing or that have a more closed boundary, and instead will likely to generalize to dynamic teams in other medical contexts and in contexts outside of medicine such as new product development teams that are temporary and have changing membership during their lifespans. Still, I note that the data were collected from a single hospital unit. While this offered the opportunity for a rich dive into the workings of a particular type of dynamic team, research is needed to further explore how the theory developed here applies in other settings. Additionally, the current theory is built using a qualitative approach, and future quantitative approaches could both test this emergent theory and may offer additional insights.

Conclusion

The grounded theory developed here highlights how, despite the absence of some structures, dynamic teams can use team beginnings to establish cognitive scaffolding that support coordination in dynamic teams, both among core members and between core and periphery members. In the next chapter, I present a field experiment designed to test two interventions focused on putting into place some of the cognitive scaffolding that is theorized to facilitate coordination in dynamic teams, while also elaborating on the downstream effects of that coordination with regard to individual learning and team efficiency.

CHAPTER III: ATTENTIONAL SCAFFOLDS AND ANCHORS IN DYNAMIC TEAMS: USING TEAM LAUNCHES TO IMPROVE COORDINATION, INDIVIDUAL LEARNING, AND TEAM EFFICIENCY

This work was conducted with Anita Williams Woolley, Carnegie Mellon University; Liny John, Children's National Medical Center; and Christine March, Selma F. Witchel, and Andrew Nowalk, UPMC Children's Hospital of Pittsburgh

Team membership in today's organizations is often so in flux that scholars are reconsidering how to define teams (Wageman et al., 2012). Membership is fleeting and fluid (Mortensen & Haas, 2018; Wageman et al., 2012), and teams form and, almost as quickly, disband (Edmondson, 2012; Klein et al., 2006; Valentine & Edmondson, 2015). When team membership is so unstable, the lack of stable team conditions makes it difficult to manage and direct members' attention effectively. The lack of stability can inhibit team members' understanding of how to work together (e.g., Summers et al., 2012), while fluid team boundaries create uncertainty about with whom to work (e.g., Mortensen & Haas, 2018; Mortensen & Hinds, 2002). Thus, while organizations are increasingly relying on fluid collaborations to do work, highly dynamic teams lack the structure that could guide attention (March & Simon, 1958; Simon, 1957, 1997) and thus the conditions often considered critical to enabling coordination (Hackman, 2011; Hackman & Wageman, 2005). At the same time, research is just beginning to unpack the conditions that could foster coordination in these teams (Mathieu et al., 2017).

Recent research on highly dynamic teams suggests that team launches can focus on the team's core team members—those characterized as more stable and central to the workflow and decision making, relative to more temporary, peripheral members (Humphrey et al., 2009).

Specifically, dynamic teams can use a launch among only its more core team members to direct attention and thereby enable coordination both among core members and between core members and a shifting set of more peripheral members (Mayo, Chapter 2). In the current study, we test that theory while also exploring the effects of these types of coordination in dynamic teams. Specifically, we take a meso approach (Hackman, 2003; House, Rousseau, & Thomas-Hunt, 1995) and build on learning research (e.g., Myers, 2018) to argue that coordination among core members will enhance learning among core team individuals. Finally, we suggest that periphery integration as well as learning can enhance team efficiency.

We develop these predictions below and test them in a sample of medical inpatient teams. In doing so, we make multiple contributions. Our demonstration of the causal effects of team launches on team coordination contributes to our understanding of the conditions that can enable coordination in highly dynamic teams. Additionally, we highlight how coordination both among core team members and between core and periphery members impacts individual learning and team efficiency. This further contributes to our understanding of highly dynamics teams and to research on the role of social interaction in learning. At the same time, these findings contribute to healthcare management by pointing to team launches as an inexpensive lever in terms of time, cost, and personnel that can have a practically significant impact on important outcomes.

Theory

Team Beginnings: Scaffolding and Anchoring Attention to Enable Coordination

To understand how dynamic teams are able to coordinate, we build on two metaphors: scaffolds and anchors. In construction, scaffolds are set up to support the construction of a building. Prior research has used the metaphor of team scaffolds to describe the structures that can be crafted in temporary teams to support coordination (Valentine & Edmondson, 2015).

Whereas this prior work focused on scaffolds that are at least in part physical, for example including a physical space in which individuals work, we turn more fully to the role of cognitive team scaffolds. We propose that dynamic teams can make use of cognitive scaffolds around team roles and the team's permeable boundary to anchor future attention and thereby guide coordination. Anchors, by definition, fix an object to something and constrain (or guide) subsequent possibilities. For example, a climber can fix him/herself to an anchor (e.g., a tree), and this will guide the climber's movement. Research on judgement and decision-making and negotiation has used the metaphor of an anchor to explain how attention to a certain object guides subsequent action (e.g., housing list prices influence first offers, Northcraft & Neale, 1987). We adopt the metaphor of an anchor to suggest that cognitive scaffolds around the team roles and the team's permeable boundary act as attentional anchors that will guide coordination within the team. However, before delving into the way in which teams can scaffold and anchor attention, and thus enable coordination, we first discuss the challenges of dynamic teams that create a need for such scaffolding.

Dynamic-Team Coordination Challenges. Teams with highly dynamic membership face two key challenges related to the team. First, their temporary nature makes it difficult for core members to know how to work with others because they are likely to lack role clarity and the associated knowledge of which tasks to focus on (Ginnett, 2010). Second, and simultaneously, the team's boundary permeability makes it difficult for core members to know with whom to work, as more peripheral members join the team transiently as their expertise is needed (Mortensen & Haas, 2018; Mortensen & Hinds, 2002). These represent two critical team-based cognitive challenges (DeChurch & Mesmer-Magnus, 2010; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000)—uncertainty about who else to attend to, and what tasks to focus on in working with them.

Given the gravity of these challenges, some research has called for ensuring some stability among a team's core members, limiting boundary permeability, or both (Bushe & Chu, 2011; Huckman, Staats, & Upton, 2009). Paradoxically, the existing research suggests that teams lacking membership stability can rely on a clear boundary, and vice versa, to foster coordination. For example, research on temporary teams suggests that, in the absence of membership stability, teams can rely on a clear boundary to facilitate the team's coordination (Valentine & Edmondson, 2015). Similarly, research on fuzzy, permeable boundaries – e.g., cases where individuals are spread across projects, joining and leaving as their expertise is needed – suggests that in the face of boundary permeability, teams can benefit from having some stability among a team's members via members working together in real-time for longer periods of time (O'Leary et al., 2011). However, highly dynamic teams both are temporary and have permeable boundaries, so these solutions will not work in this context.

Building on research on early team events (Ericksen & Dyer, 2004; Ginnett, 1990, 2010; Hackman, 2011; Woolley, 2009; Woolley, Gerbasi, Chabris, Kosslyn, & Hackman, 2008), we turn to team beginnings, and specifically team launches (Hackman, 2011), as a potential leverage point for dynamic teams to build scaffolds that, in the absence of stable structures, can guide coordination. Traditionally, launches are designed for all team members, but a traditional team launch cannot apply to dynamic teams—not every team member is present at the team's start, nor can it be known at the outset who will join the team over time. Indeed, while the purpose of a team launch has been described as allowing the team to become a "real team" (Hackman, 2011), dynamic teams by definition do not meet the criteria of a real team: stability and boundary impermeability. In contrast, Mayo (Chapter 2) adopted a core-periphery network perspective of the team to focus on launches with only the core team members (those more central to workflow and decision making, Summers et al., 2012). Specifically, Mayo (Chapter 2) theorizes that an initial meeting with only the core subgroup effectively serves as a scaffold to support the team's development and anchor attention on core members or the team's boundary, thus guiding coordination. Due to the distinct effects predicted for scaffolding core roles versus the team's boundary, we were interested in testing these separate effects and unpacking how the resulting team coordination would enhance individual learning and team efficiency.

Scaffolding Core Roles. In dynamic teams, the lack of team members' experience working together limits team members' opportunity to learn how to interact, and thus creates a need to quickly clarify how members should work with one another. Using the metaphor of a "team shell," Ginnett (2010) described how a team forms with a shell of loose expectations about specific roles and behaviors that will exist in the team. Based on research done with airline crews, he goes on to argue that the shell needs to be elaborated for a team to be able to function well, and this is done when a leader "breathes life into the shell" through early conversations that elaborate on member roles and expectations to reduce ambiguity. Extending this notion to a dynamic-team launch, Mayo's (Chapter 2) qualitative work suggests that a launch conducted with only a team's core members to direct attention to core members' roles will foster the team's ability to develop emergent interdependence—backing up one another, updating one another, and generally engaging in coactive decision-making discussions. In sum, while Tannenbaum and colleagues (2012) argued that dynamic teams should have "quick-start" guides to help teams get to work quickly, this qualitative work suggests the "quick-start" should be focused on attention to and clarification of core members' tasks in order to provide scaffolding around those otherwise fuzzy roles (Mayo, Chapter 2). In the current chapter, we build on those ideas to test the theorized causal path from a team launch that directs core team members' attention to fellow core members to emergent interdependence.

H1: Scaffolding team member roles by focusing attention on core members and task coordination will increase the amount of emergent interdependence among core team members.

Scaffolding the Team's Permeable Boundary. The existence of boundary permeability in dynamic teams creates a need to clarify with whom to work. When core team members first convene, their default might be to consider the team as composed of fellow core members, those proximal to them in that moment (Edmondson, 2012). Yet, the team boundary is expected to change over time. To this end, Ginnett (2010), in his discussions of team shells, also suggested that a core group could extend the boundary of the team shell by bringing others into the team launch; offering a slightly different view, Cummings and Pletcher (2011) suggested that teams might use a "kickoff meeting" not to bring others in, but to orient the team to the notion that they could look outside of the team for help with the work. Extending these ideas, Mayo (Chapter 2) suggested that a core team could extend its definition of the team to include *potential* members. If core team members extend the team shell by directing initial attention to the team's permeable boundary, they cognitively activate of a set of potential periphery team members, which is likely to enhance the integration of those members into reciprocally interdependent work. Building on Mayo (Chapter 2) we test this theorized causal path from a team launch that directs attention to the team's permeable boundary to the integration of periphery members.

H2: Scaffolding the permeable team boundary by focusing attention on the team's boundary and periphery members will increase the amount that core team members integrate periphery members.

From Coordination to Individual Learning and Team Efficiency

Coordination in dynamic teams should have important implications for how much the individual team members learn. Consistent with cognitive perspectives across the study of individuals (Anderson, 1993; Walsh & Anderson, 2012), groups (Argote, 2013; Wilson, Goodman, & Cronin, 2007), and organizations (Argote & Miron-Spektor, 2011; Huber, 1991), we define individual learning as an outcome—as a change in one's set of knowledge and potential behaviors as a function of some experience. We focus here on individual learning given the priority it holds as an organizational goal in many contexts, as evidenced by recent discussions of facilitating learning at work (Bersin & Zao-Sanders, 2019). Moreover, we suggest that understanding individual learning in the context of dynamic teams is important because individual learning can bolster team efficiency. First, though, we discuss the how dynamic team coordination can foster individual learning.

While attention has long been given to learning through direct experience (Thorndike, 1898) and learning vicariously through observation of others (Bandura, 1971; Gioia & Manz, 2011), individuals also learn through interaction with the social context in which they are embedded, such as verbal interaction among individuals (Palinscar, 1998). Building on the latter perspective, recent theory proposes a process of coactive vicarious learning wherein an individual learns by engaging in discussion with another to collectively process and make sense of the other's experience (Myers, 2018). Aligned with this theory, research has demonstrated a link between emergent interdependence and individual learning (Wageman & Gordon, 2005). Building on this work and applying it to the current discussion, we suggest that when teams exhibit more emergent interdependence the group's individuals are likely to learn more.

Further bolstering the idea that emergent interdependence supports individual learning, we note that emergent interdependence both involves and encourages the exchange of information among individual team members. Thus, the more a team exhibits emergent interdependence, the more opportunities its individuals should have to learn. There is suggestive evidence of this benefit of information exchange from research at the team level. First, researchers have theorized that sharing is a core process of learning (Argote, 2013) because it allows for group members to not only exchange knowledge, but also to develop a shared understanding of the work (Wilson et al., 2007). This implicitly assumes that sharing will impact the group's *individuals'* knowledge. Further, the way that researchers have studied the effect of group interaction on learning has often been such that the work captures, to some extent, changes in individual knowledge. For example, there is a demonstrated and consistent link between group communication (particularly face-to-face communication at a team's start and communication in groups with brief lifespans, as is true for dynamic teams) and the development of team's transactive memory system (TMS; Argote et al., 2018; He, Butler, & King, 2007; Lewis, 2004). That is, communication among group members changes the group's knowledge structure (which provides a system for encoding, retrieving storing knowledge, Liang, Moreland, & Argote, 1995; Ren & Argote, 2011). Key, for our purposes, though, is the underlying change in knowledge among the team's individuals when a TMS develops. In other words, this work suggests that group discussions can foster some individual-level learning.

This suggestion of a relationship between group interaction and individual learning is also echoed in research on team learning orientations. For example, Bunderson and Boumgarden's (2010) assessment of team learning orientation included group member reports of whether they "learn from one another as we do our individual jobs" and observer reports of whether the "team members develop their skills and competencies." The authors then demonstrated that information sharing fostered a team learning orientation, suggesting that information sharing impacted the underlying individual learning. In this way, the research on TMS and team learning orientation, though they take different perspectives in viewing learning as an outcome versus a process, respectively (Edmondson, Dillon, & Roloff, 2007), both suggest that part of the benefit of group interaction lies in its support of individual-level learning. In sum, we build on recent theory of coactive vicarious learning along with research on team-level learning to propose that emergent interdependence among core team members will enhance core members' learning.

H3: Emergent interdependence will enhance the amount that core team members learn.

While we argue that emergent interdependence will drive team member learning, we argue that periphery integration, in contrast, will affect team efficiency. In highly dynamic teams, periphery members are added to the group as members who have some specialized expertise and are therefore often critical to the execution of work (Ancona & Bresman, 2007; Mortensen & Haas, 2018). Thus, if periphery members are integrated into the team's work, those periphery members will be more likely to be up to date on the tasks they need to contribute and able to execute those tasks more quickly. Additionally, they will have opportunities to contribute relevant information that helps the team to avoid backtracking and avoid general delays from waiting to get information; consistent with this notion, research has shown that ties across units can facilitate the speed of work by fostering the transfer of information (Hansen, 1999). In sum, we propose that failing to integrate periphery team members should slow the team's work, while better integrating periphery team members into the work has the potential to speed up the work.

H4: Periphery integration will enhance team efficiency.

While individual learning is often an end in and of itself, it, too, can impact the group's ability to perform efficiently. First, we note that some research points to the expectation of a trade-off between learning among some members of a collaboration and overall efficiency. For example, in the context of academic hospitals, education of medical residents is expected to slow patient care efficiency (e.g., Dennis et al., 2014; Rabinowitz et al., 2016). Similarly, in the study of new product development projects, interdependence between suppliers and manufacturers was shown to increase the extent to which the manufacturer learns, but detract from the project's efficiency (Sobrero & Roberts, 2003). Underlying the speculated trade-off is the idea that the processes that lead to individual learning, particularly when students or novices are involved, can take time and ultimately detract from productivity.

However, we make the case that rather than a trade-off, individual learning can in fact enhance team efficiency. For example, Reagans, Argote, and Brooks (2005) found that individual experience (which is often assumed to equate to learning, e.g., Epple, Argote, & Murphy, 1996) impacted operating team procedure times, though the effect was curvilinear. The authors speculate that individual experience may initially hurt team efficiency because individuals may, at first, inappropriately apply new knowledge, whereas individual experience may be more helpful over time as individuals have more knowledge and thus better understand what knowledge to apply. However, the ability to apply knowledge may be enhanced more immediately when the knowledge is gained through coactive vicarious learning, through which part of what is learned from collective interactions is an ability to apply knowledge (Myers, 2018). Taking these points together, we argue that individual learning that follows from emergent interdependence should manifest in gains in both knowledge and the ability to apply that knowledge, which should, in turn, benefit group efficiency.

Research on team learning also supports this link between individual learning and team efficiency. Definitions of team learning often attend to whether "individuals acquire, share and combine knowledge" (Argote, Gruenfeld, & Naquin, 2001), or otherwise consider individual learning to be a supporting condition for team learning (Wilson et al., 2007). To this end, as discussed above, studies of team learning often blend a focus on individual learning that occurs through group experience, and learning at the group level. As such, measures of group learning often include an examination of whether the individuals within the team have gained knowledge. For example, Sarin and McDermott (2003) studied team learning in product development teams and their operationalization of the construct included a measure of "how much members had learned while conducting the project." Moreover, they find that team learning predicted efficiency in terms of quicker speed to market. In sum, their work suggests a relationship between the underlying individual learning and team efficiency. Consistent with Sarin and McDermott (2003), Kostopoulos and Bozionelos (2011) studied team learning in innovation project teams, where their measure of team learning included the item, "The members of our team developed many new skills during the project." Moreover, they found that team learning predicted manager ratings of team performance (where the definition of performance included a focus on efficiency). Subsequently, by tying team learning to team performance, using measures of team learning that account for individual learning, this work suggests that the underlying individual learning is linked to the team's performance. In sum, we build on the work reviewed here to argue that individual learning will enhance team efficiency.

H5: The amount of learning in the core team will enhance team efficiency.

Our overall conceptual model is depicted in Figure 3.1.

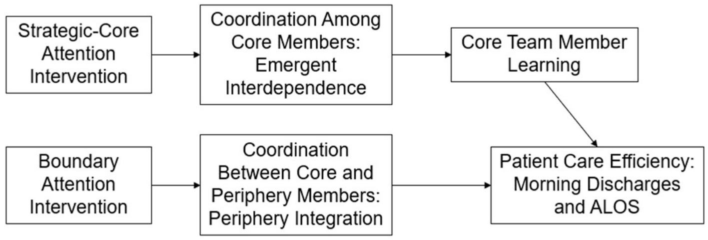

Figure 3.1: Conceptual Model

Research Setting

This research took place in an urban, academic, children's hospital in a general pediatric inpatient unit. Teams in this unit care for patients admitted primarily from the hospital's emergency department, and patients are assigned to teams on a rotating basis – in this way, the work is exogenous. Teams are tasked with making diagnoses for the patients, developing care plans, executing those plans, and deciding when patients can be discharged.

In this context, general pediatric physicians on the team have decision-making authority, and thus represent the group's strategic core (Ancona & Bresman, 2007; Humphrey et al., 2009). The strategic-core subgroup typically includes one attending physician (supervising physician), one senior resident (2nd or 3rd year of residency), two interns (1st year of residency) and two to three medical students (3rd or 4th year). A core group is intact for one week at a time, after which they disband and a new group forms. During the week, other members of the broader health care team, or "periphery" team members (nurses, consultants, pharmacists, social workers, care coordinators, patients/families, etc.), rotate on and off the team based on task demands. Overall, the combination of the core's short lifespan and the shifting boundary during the week make these teams an ideal case for the study of highly dynamic teams.

Each week, four formally defined core groups are active (i.e., each week there is a red, blue, green, and purple core group). Team members for all teams come from the same overarching pool of employees, and scheduling for all team members is constrained by shift or training requirements. As such, overall team membership is largely random—it is not dictated by ability, preferences, or history working together. Due to the change in membership each week, we consider the teams in each week to be separate entities such that our unit of analysis is a team in a given week.

Much of the team's work occurs during "morning rounds," when the strategic core discusses and makes decisions about the care for each of its patients. Indeed research has identified rounds as the primary time of coordination and decision making (Ervin, Kahn, Cohen, & Weingart, 2018). In this study's research setting, the core team is instructed to include patient families and nurses during morning rounds. However, based on a qualitative study of teams in the same context, this is known to vary greatly (e.g., teams ranged from engaging nurses on 30% of their rounds to 85% of their rounds, Mayo, Chapter 2). Similarly, observations in that work revealed that teams differed greatly in the extent to which they engaged in emergent interdependence. Given the variance in coordination both across core and periphery members and among core members, this setting presents an opportunity to intervene in a way that affects coordination and, in turn, team outcomes.

Method

Sample & Design

The sample included 96 teams,[1] with 244 individuals rotating through strategic-core positions and 33 nurses. Teams were assigned to one of three conditions: control (no

[1] To assess the study design's power, data were simulated based on anticipated relationships among the constructs of interest, as well as hypothetical individual effects (e.g., the effect of having a highly skilled attending physician), effects of time (e.g., over time, we could expect teams to improve across the board with regard to some coordination behaviors), and noise for each construct of interest (i.e., error). 100 data sets were simulated for a range of sample sizes. Planned analyses were then run with each simulated data set and used to recover the power to detect each hypothesized effect. The power for a range of sample sizes and each effect is provided in Appendix A.

intervention, n = 48), "strategic-core-attention" intervention (n = 24), and "boundary-attention" intervention (n = 24). For each team receiving an intervention, on Monday morning, the team's senior resident led the core team through the intervention (average duration = 10 minutes). Each week during the study, for each team in the sample, strategic-core members and associated nurses were eligible for participation in surveys.[2]

The study sample comes from two time periods. The first time period consisted of 48 baseline teams (12 weeks with 4 teams observed each week). In the immediately following second time period, we used block random assignment to assign teams to one of the two intervention conditions (12 weeks with 2 teams assigned to each condition each week). Block random assignment was handled as follows. Strategic-core team members participated on a single team in any given week, but these individuals could work on multiple teams over multiple weeks. To ensure that once a member participated in an intervention group, they never participated again in the other intervention group, and vice versa (i.e., preventing contamination via member change from week to week), assignment of strategic-core members to teams was constrained. While the interventions were being implemented, if an individual received one of the interventions, subsequent work in the general pediatric inpatient unit was restricted to being on teams receiving that same condition for the study duration. In this way, individuals only ever received one of the interventions. That is, individuals were constrained to one of two blocks of nominal teams (Blue/Green or Red/Purple) and those blocks were randomly assigned to the intervention conditions (boundary-attention = Blue/Green; strategic-core-attention =

[2] We also surveyed patient families and a pharmacist. However, the sample of patient families relied on nurses to introduce the experimenter to families, thus introducing some bias in the sample driven by which families the nurses were willing to introduce to the experimenter. Further, many families were not present in the hospital during the experimenter's time on the floor, and thus did not have an opportunity to participate. Though this cannot be validated, the absence of families is speculated to be associated with socio-economic status, which could affect perceptions of the hospitalization. For these reasons, the patient family data were not analyzed. The pharmacist was added as a study participant midway, and thus only responded to surveys related to the teams in phase two, receiving interventions. We thus also exclude pharmacist data in order to make use of data from the entire study.

Red/Purple). In sum, this design was such that aside from constraining core-team members to the condition they first randomly receive, their assignment to teams was effectively random – based on scheduling constraints and not on factors such as history of team members working together or individual experience, ability, or preferences. Overall, we also note that the effect of interest was that of the team-level intervention (compared with, for example, an effect of team composition or individual-level intervention); thus, critically, this design allowed us to randomize the assignment of teams to conditions through random block assignment.

A key benefit of this design was that, although the control condition teams were observed before the intervention conditions, the intervention conditions, implemented concurrently, served as additional controls for each other. Additionally, by running two intervention groups concurrently, there was less likelihood that team members would share details across intervention groups, as all teams received some form of intervention, compared with if some teams were receiving some form of an intervention while other teams received nothing. Still, time could have affected the behaviors and performance of team members, though we argue that these effects would be a reflection of other environmental conditions—namely, the potential for team members working later in the year to have more experience working in their specific positions on these inpatient teams, and the potential for a specific week to result in a higher patient load, for example, when the flu season hits. We addressed this by using control variables in our models (e.g., core team members' experience in their position, the core team's experience together, the team's patient load) and using statistical methods that account for individual-level effects; both are discussed in more detail below. In sum, this design allowed us to assess intervention effects as driven by the intervention substance and not demand effects (e.g., from receiving an intervention of any kind) or time (and, e.g., any related experience or learning).

Interventions

Intervention materials are provided in Appendix B. The interventions were multifaceted; each deployed three strategies designed to alter the team cognition and, in turn, coordination behavior. The interventions included 1) a set of background information highlighting the benefit of the intervention's focus (core or periphery members); 2) instruction to exchange and/or gather contact information for specific team members (core or periphery); and 3) a discussion guide for their initial Monday-morning meeting designed to spark conversation about the intervention's focus (core or periphery members). In the "strategic-core attention" intervention, the three intervention elements were designed to develop the core-team's cognitive understanding of task coordination. In the "boundary attention" intervention, the three intervention elements were designed to develop the core-teams' understanding of periphery members as a part of the team.

Data

The strategic core (general pediatric physicians and medical students) and nurses were surveyed at the end of each week, and archival data were collected when the study concluded.

Coordination. *Periphery integration.* To assess the integration of periphery members, we focused on involvement of nurses. We chose to focus on nurses because nurses are always involved in the work for patients, and thus offered a consistent point of input, in contrast to positions that vary in involvement from patient to patient such as specialist physicians or social workers. On Wednesday and Friday of each week, we surveyed nurses assigned to general pediatric patients (i.e., nurses working with the general pediatric physicians). Nurses, blind to the study, rated the extent to which they agreed/disagreed with two items: "The team included me in the decision making," and, "The team valued my input" (7-point scale: 1 = strongly disagree, 7 = strongly agree). Each nurse's responses were averaged to create an individual-level rating of their perceived involvement (α = .91). Each team's nurses' responses were then averaged to create a team-level indicator of the extent to which the core involved the periphery (ICC(1) = .09; ICC(2) = .32; median $r_{WG(J)}$ = .61, mean $r_{WG(J)}$ = .75). These statistics suggest that there was a lack of agreement from nurses working with a given core with respect to how much the core integrated those nurses. Said differently, core teams were not always consistent in the extent to which they integrated nurses. This is not unexpected, as we anticipated core teams to vary in this behavior. When these aggregation statistics are low, it is recommended that multiple ratings be obtained (Bliese, 2000). We thus include teams in our analyses if they received two or more nurse ratings, leading us to exclude three teams for which we had zero or one nurse response. In the remaining teams, we received an average of 4.9 responses per team (min = 2, max = 10). Note that when nurses elected not to take the survey, they cited urgent patient-related tasks as the reason.

We also asked nurses to report whether they had been invited to participate in morning rounds with the target teams. Nurse responses were averaged to the team level to indicate the percent of nurses invited to rounds. Finally, we created z-scores of the involvement measure and the percent of nurses invited to rounds. We averaged these two scores (α = .83) to create a composite measure of the core team's general extent of *periphery integration*.

Emergent Interdependence. To assess the extent of emergent interdependence among core team members, we focused on collective discussions that involved task monitoring and updating. Following from qualitative work in this context (Mayo, Chapter 2), one way that teams engaged in this behavior is via the general pediatric physicians "running the list" at the end of morning rounds. This activity entailed discussing each patient on the team's list, sharing updates, and discussing and delegating remaining tasks. In this way, the practice reflects the collective work characterized by emergent interdependence. Thus, in order to assess *emergent interdependence*, we surveyed the general pediatric inpatient group (excluding the attending physician, but including the senior resident, interns, and medical students) on Thursday or Friday of the week (participation rate from the strategic core = 90%). Specifically, we asked them, to rate the extent to which they agreed/disagreed with the statement, "We tended to run the list after rounds, discussing each patient's tasks/updates" (7-point scale: 1 = strongly disagree, 7 = strongly agree). The individuals' responses were averaged to create a team score. Aggregation statistics were sufficient to warrant this aggregation: ICC(1) = .22; ICC(2) = .66; mean $r_{WG(1)}$=.81; median $r_{WG(1)}$=.86.

Outcomes. We first assessed *learning* among core team members in terms of task mastery (Hoegl & Gemuenden, 2001). In the weekly survey, core team members (excluding the attending physician) responded to the items, "I was able to acquire important know-how during this week," and "I learned important lessons from this week" (scale: 1 = strongly disagree, 7 = strongly agree). We averaged these two items (α = .87) to create individual scores. We then took the team members' average scores to reflect the general amount of learning that occurred within the core team. Aggregation statistics varied in their support of aggregation based on common guidelines (Bliese, 2000; James, Demaree, & Wolf, 1984): ICC(1) = .04; ICC(2) = .22; mean $r_{WG(J)}$ = .92; median $r_{WG(J)}$ = .96. This suggests teams were fairly similar with respect to the amount of learning reported. However, given that the responses are restricted (83% of individual scores on the learning scale were greater than 5.5) ICC scores can be expected to be low (Bliese, 2000). Additionally, we take the perspective that learning is a process that is embedded in a context and can occur through interactions with others (Myers, 2018; Palinscar, 1998; Vygotsky, 1978). This view suggests that learning is in part explained by the team context. We thus argue that it is reasonable to aggregate this measure to the team level as an indication of the extent of learning that occurred in the team.

We also assessed efficiency of care in two ways, using measures from archival data from the hospital's information system. First, as an indication of a team's daily task efficiency, we calculated the percentage of a team's discharges that occurred between 6am and 11am – *morning discharges.* Completing patient discharges early in the day allows for throughput from the hospital's emergency department and thus aligns with a hospital-determined goal; attendings were even incentivized to meet this goal with a financial bonus. We consider discharges earlier in the day to reflect a shorter-term efficiency in this context, as it reflects how a team works within each day. As a second measure of efficiency, we calculated each patient's severity-adjusted length of stay: length of stay divided by the patient's All Patients Refined Diagnosis Related Groups weight (a measure of case severity). Because higher severity suggests the need for a longer stay, a severity-adjusted length of stay removes differences created by differences in case severity. We then used the *average severity-adjusted length of stay (ALOS)* for a team's patients as an indicator of the team's overall care efficiency. Average severity-adjusted length of stay is a commonly used measure for comparison of efficiency across units in hospital care (Gross et al., 1997; Lu, Sajobi, Lucyk, Lorenzetti, & Quan, 2015).

Controls. We accounted for several potentially confounding variables. First, we considered a variety of team-level variables (see Table 3.1 for control variable means by condition). Teams across conditions differed slightly in *core-team size* (control = 7.0; core attention = 6.61; boundary attention = 6.36; $F = 3.02$, $p = .054$). Larger team sizes can also generally present additional coordination challenges, and thus we accounted for the core-team size in our analyses. Teams also differed by condition on *patient load* (the number of patients assigned to a team; control = 12.65; core attention = 17.04; boundary attention = 15.04; $F = 4.96$, $p = .009$). Work load can also impact coordination processes and thus we accounted for this measure in our analyses. *Core experience working together* could also explain team performance (Reagans et al., 2005). Following prior work, we calculated a measure of experience working together by taking the number of weeks during which each dyad within the core group had worked together during the year, then aggregating to team by taking the average dyadic experience working together. Teams did not differ by condition in their experience working together, nor did conditions differ in the *average case severity* of patients, but we controlled for these variables given the theoretical relationship between these variables and the outcomes of interest.

Table 3.1 Comparison of Control Variables by Condition

Variable	Control Condition	Strategic-Core Attention Intervention	Boundary Attention Intervention
Core Team Size	7.00	6.61	6.36
Attending Experience	16.06	14.52	17.18
Sr. Resident Experience	1.63[a]	3.39[b]	2.31[a]
Average Intern Experience	2.24[a]	3.29[b]	3.00[b]
Core Experience Working Together	1.17	1.19	1.23
Core Team Orientation	3.72	3.63	3.73
Patient Load	12.65[a]	17.04[b]	15.04[c]
Average Case Severity	3.91	3.96	4.29

Notes: Distinct letters indicate a significant difference $p < .05$. A lack of letters indicates no significant differences across conditions.

We also considered the role of individual factors. Over time, team members gain experience working on general pediatric inpatient teams, and this individual experience could impact coordination and outcomes. To account for this possibility, we calculated the number of weeks for which the senior residents and interns had served on a general pediatric inpatient unit, including the week of observation. We also calculated the number of years of experience among attending physicians. Across the three conditions, teams did not differ in the experience of attending physicians; however, they did differ in the amount of experience among senior residents (control = 1.63, core attention = 3.39; boundary attention = 2.31; $F = 7.69$, $p < .001$) and the average experience of a team's interns (control = 2.24; core attention = 3.29, boundary attention = 3.00; $F = 7.71$, $p < .001$). We controlled for *attending experience, senior resident experience*, and the average number of weeks for which the team's interns have served on a general pediatric inpatient team (*average intern experience*).

In addition to experience, individual characteristics could influence the team's coordination. Specifically, we use a 12-item measure of team orientation, or the "general tendency to be comfortable in team settings, to exhibit interest in learning from others, and to have confidence in the productivity of the team" (Mohammed & Angell, 2004). In the setting of dynamic teams in which collaboration is necessary and difficult, we suspected this preference could affect collaboration. Individual scores across the 12 items were averaged ($\alpha = .90$). This measure has been theorized to reflect a stable individual characteristic (Mohammed & Angell, 2004) and thus was only measured once for each participant. We used the average of individual scores to reflect the level of *team orientation* within the core team.

Finally, we also accounted for the role of time. Although time was likely to influence the team's behavior indirectly via differences in individual member experience, experience working together, or fluctuations in case load (for which we are already accounting), time can also serve as a general indicator of the amount and type of work a team will face. We thus included the *week* in which a team was observed.

Results

Descriptive statistics and correlations are shown in Table 3.2.[3] We conducted our analyses using a series of multiple membership models (Browne, Goldstein, & Rasbash, 2001). These statistical models allow us to account for the lack of independence between teams due to individuals serving on multiple teams during the data collection period. Specifically, for each team, we assign equal weighting to its members; each team outcome is then explained by a combination of random effects for each member that are inversely weighted by team size.[4] The models were fit using the R package **`M2LwiN`** and iterative generalized least squares methods. The control condition was used as the referent group. Model results are reported in Tables 3.3-3.5.[5]

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[3] In the first week that we implemented the interventions, we did not implement the intervention in one of the four teams due to a last-minute scheduling change in which a replacement team member was added, but this replacement was scheduled to receive the alternate intervention in later weeks. To avoid contamination, we did not implement an intervention for that team and excluded them from analyses. Additionally, in the final week of the study, due to another last-minute scheduling change, a replacement member for one of the teams slotted to receive one of the interventions had already received the alternate intervention in earlier weeks. We excluded this team from analyses. Finally, we included teams in our analyses only if they received a minimum of two nurse ratings, leading us to exclude an additional three teams. Subsequently, our analyses include 91 teams (46 teams in the control condition, 23 teams in the “strategic core attention” intervention, 22 teams in the “boundary attention” intervention).

[4] We follow past approaches (Aven & Hillmann, 2017) to partition the variance explained by the individuals in the team, accounting for average team size, using intercept-only models (see Table 3.3, Model 1; Table 3.3, Model 4; Table 3.4, Model 1; Table 3.5, Model 1; Table 3.5, Model 4). This reveals that the individuals in the team explain a negligible amount of the variance in most variables. Specifically, team individuals account for 38% of the variance in emergent interdependence; 0% of the variance in periphery integration; 0% of variance in core team member learning; 0% of variance in morning discharges; and 1% of variance in Average ALOS. Note that hierarchical models, for all dependent variables, including random effects specifically for the team’s attending physician and the team’s senior resident (i.e., leadership positions) produce random effects that are not significantly different from zero.

[5] Given that our predictions suggest a path model, we also estimated a structural equation model. This model offers the benefit of estimating all regressions simultaneously. However, we note that this model cannot account for the lack of independence across teams and given the variance that team members explained in emergent interdependence, some estimates may be biased. Nevertheless, results are consistent with those reported using multiple membership models and are shown in Appendix C.

Table 3.2 Descriptive Statistics and Correlations

	Statistic	Mean	St. Dev.	Correlations 1	2	3	4	5	6	7	8	9	10	11	12
1	Average ALOS	1.33	0.41												
2	Morning Discharges	0.37	0.15	0.06											
3	Core Team Member Learning	6.26	0.36	**-0.27**	0.19										
4	Emergent Interdependence	6.25	0.72	0.03	0.00	**0.21**									
5	Periphery Integration	0.00	0.93	0.17	**0.36**	0.02	-0.02								
6	Core Team Size	6.75	1.07	0.07	-0.11	-0.04	-0.03	0.14							
7	Attending Experience	15.95	11.30	0.04	0.11	0.11	0.04	0.09	0.18						
8	Senior Experience	2.24	1.89	0.01	0.10	-0.03	0.12	**0.24**	0.08	0.04					
9	Average Intern Experience	2.69	1.22	0.04	0.18	0.11	-0.03	0.12	**-0.42**	-0.02	0.03				
10	Core Experience Working Together	1.19	0.17	0.12	0.12	-0.03	**0.21**	0.06	0.04	0.03	0.16	0.08			
11	Team Orientation	3.70	0.25	-0.15	0.00	**0.30**	0.18	-0.13	-0.16	-0.05	**-0.26**	-0.02	0.00		
12	Patient Load	14.34	5.83	**-0.39**	**0.23**	0.08	0.11	0.16	-0.01	0.03	0.20	0.03	0.01	0.06	
13	Average Case Severity (APR)	4.02	0.77	**0.31**	-0.15	-0.20	-0.01	**0.22**	0.13	0.05	0.09	0.13	-0.06	**-0.23**	-0.14

Note. Values in bold are significant at $p < .05$. N = 91.

Table 3.3 Multiple Membership Model Estimates of Emergent Interdependence and Periphery Integration (n = 91)

	Emergent Interdependence			Periphery Integration		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	6.243*** (0.075)	2.709† (1.483)	2.651† (1.413)	0.000 (0.096)	–2.492 (1.098)	–1.253 (1.846)
Controls						
Week		0.020 (0.010)	–0.014 (0.020)		0.006 (0.013)	–0.034 (0.026)
Average Case Severity		0.0323 (0.097)	0.010 (0.092)		0.205 (0.125)	0.116 (0.121)
Patient Load		0.003 (0.013)	–0.003 (0.012)		0.021 (0.017)	0.022 (0.016)
Core Team Size		0.004 (0.078)	–0.074 (0.071)		0.152 (0.102)	0.154 (0.010)
Core Team Orientation		0.621* (0.301)	0.708* (0.283)		–0.084 (0.385)	–0.282 0.368
Core Experience Working Together		0.721† (0.423)	1.061** (0.402)		0.059 (0.542)	0.010 0.526
Attending Experience		0.003 (0.006)	0.005 (0.006)		0.003 (0.008)	0.000 (0.008)
Senior Experience		0.021 (0.041)	–0.008 (0.039)		0.073 (0.053)	0.010† (0.051)
Average Intern Experience		–0.076 (0.067)	–0.124* (0.063)		0.106 (0.086)	0.143† (0.083)
Key Variables						
Strategic-Core Attention Intervention			1.001** (0.344)			0.330 (0.454)
Boundary Attention Intervention			0.310 (0.336)			1.072* (0.441)
Random Effects						
Core Team Members	0.413 (0.154)	0.257 (0.250)	0.313 (0.512)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Residual	0.096 (0.135)	0.177 (0.243)	0.062 (0.143)	0.847 (0.126)	0.719 (0.107)	0.639 (0.095)
DIC	195.7	181.9	167.6	243.1	228.2	217.5

Notes. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. The control condition is the referent. Contrasts reveal that in Model 3 the strategic-core attention intervention increased emergent interdependence above the boundary attention intervention condition ($b = .692$, $p < .001$), and in Model 6 the boundary intervention increased periphery integration over the strategic-core attention intervention condition ($b = .741$, $p = .004$). Using a Bonferroni correction, both of these effects are significant at $p < .05$.

Coordination. We first assessed the intervention effects on the extent to which the core team engaged in emergent interdependence (see Table 3.3, Model 3). Hypothesis 1 stated that scaffolding core roles (via the core strategic-core attention intervention) would increase the extent to which core team members engage in emergent interdependence. As predicted, the strategic-core attention intervention increased emergent interdependence relative to both the control condition teams ($\beta = 1.00$, $p = .004$) and, as revealed by a post-hoc test, the boundary attention intervention teams ($\beta = .69$, $p < .001$[6]). The boundary attention intervention teams did not differ from the control condition teams ($\beta = .31$, $p = .357$). Additionally, the core team members' team orientation ($\beta = .71$, $p = .012$) and experience working together ($\beta = 1.06$, $p = .008$) were positively associated with emergent interdependence. Average intern experience was negatively associated with emergent interdependence ($\beta = -.12$, $p = .050$).

We next assessed the intervention effects on the extent to which the core team integrated periphery members (see Table 3.3, Model 6). Hypothesis 2 stated that scaffolding the team boundary (via the boundary attention intervention) would increase the extent to which core teams integrate periphery team members. Consistent with our prediction, the boundary attention intervention increased periphery integration relative to the control condition ($\beta = 1.07$, $p = .015$). As revealed by a post-hoc test, the boundary attention intervention also significantly increased periphery integration relative to the strategic-core attention intervention ($\beta = .74$, $p = .004$[7]). The strategic-core intervention groups did not differ from the control groups ($\beta = .33$, $p = .466$).

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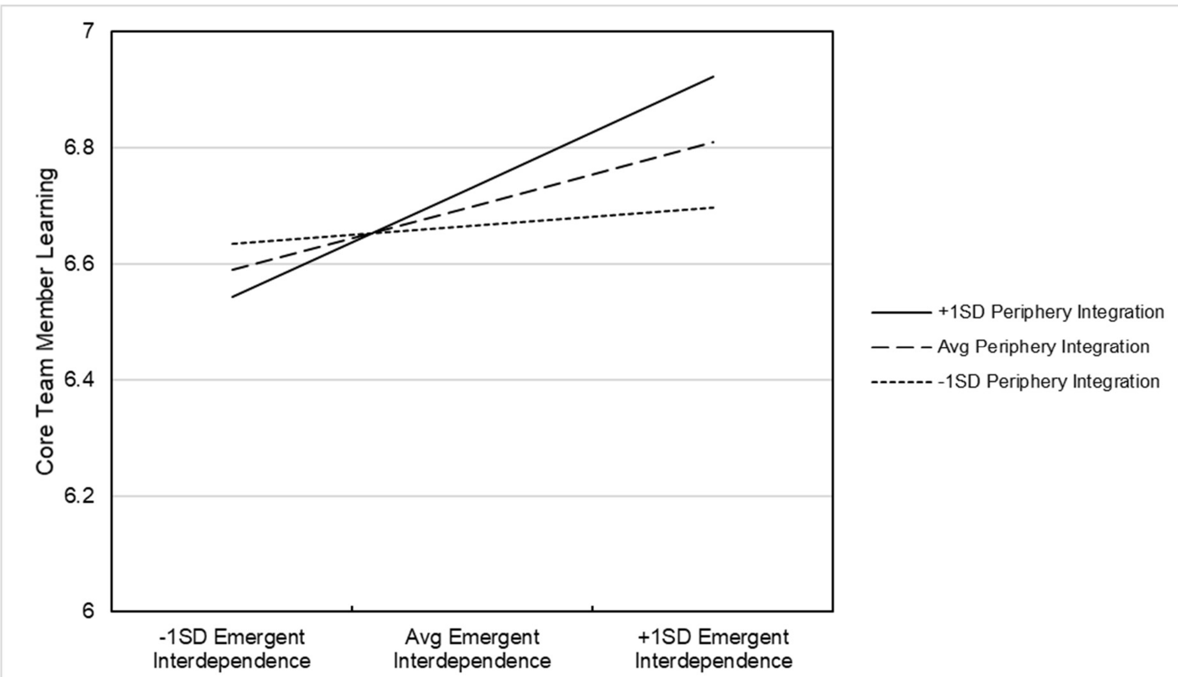
[6] Note that a Bonferroni correction was applied to post-hoc comparisons in predictions of both emergent interdependence and periphery integration. Significance values less than .017 were considered significant at the level of 95% confidence.
[7] See footnote 4.

Table 3.4 Multiple Membership Model Estimates of Core Team Member Learning (n = 91)

	Model 1	Model 2	Model 3	Model 4
Intercept	6.258***	4.431***	4.863***	4.779***
	(0.038)	(0.740)	(0.755)	(0.724)
Controls				
Week		0.021*	0.020*	0.023*
		(0.010)	(0.010)	(0.010)
Average Case Severity		–0.076	–0.076	–0.081†
		(0.049)	(0.046)	(0.045)
Patient Load		–0.000	–0.002	0.002
		(0.006)	(0.006)	(0.006)
Core Team Size		0.047	0.025	0.038
		(0.040)	(0.035)	(0.036)
Core Team Orientation		0.473**	0.435**	0.418**
		(0.149)	(0.151)	(0.415)
Core Experience Working Together		–0.223	–0.311	–0.336
		(0.211)	(0.215)	(0.206)
Attending Experience		0.004	0.004	0.004
		(0.003)	(0.003)	(0.003)
Senior Experience		–0.000	–0.002	–0.001
		(0.021)	(0.021)	(0.020)
Average Intern Experience		0.041	0.056†	0.075*
		(0.033)	(0.032)	(0.033)
Key Variables				
Strategic-Core Attention Intervention		–0.225	–0.297	–0.415*
		(0.182)	(0.183)	(0.181)
Boundary Attention Intervention		–0.351*	–0.393*	–0.448**
		(0.177)	(0.025)	(0.171)
Emergent Interdependence			0.100†	0.154**
			(0.054)	(0.056)
Periphery Integration			0.034	0.036
			(0.038)	(0.038)
Emergent Interdependence x Periphery Integration				0.119**
				(0.044)
Random Effects				
Core Team Members	0.000	0.013	0.098	0.080
	(0.000)	(0.102)	(0.017)	(0.037)
Residual	0.129	0.089	0.001	0.011
	(0.019)	(0.103)	(0.008)	(0.035)
DIC	71.8	51.2	44.1	38.7

Notes. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. The control condition is the referent.

Outcomes. We first tested effects of team emergent interdependence and periphery integration on team member learning (see Table 3.4, Model 4). As predicted in Hypothesis 3, we find that emergent interdependence is significantly and positively associated with core-team-member learning (β = .15, p = .006). However, that effect is qualified by an interaction between periphery integration and emergent interdependence (β = .12, p = .006). We probed this interaction by plotting it (see Figure 3.2) which reveals that learning is greatest when teams both integrate the periphery at a high rate and engage in a high level of emergent interdependence.



Note: Plotted based on parameters from Table 3.4, Model 4.

Figure 3.2: Interaction Effect of Emergent Interdependence and Periphery Integration on Core Team Member Learning

Unexpectedly, both the strategic-core intervention condition and the boundary intervention condition reflected less learning relative to the control condition (β = -.415, p = .022; β = -.448, p = .009, respectively). Additionally, core team members' team orientation (β = .42, p = .004), average intern experience (β = .07, p = .024), and the week of observation (β = .02, p = .018), were positively associated with learning.

Table 3.5 Multiple Membership Model Estimates of Morning Discharges and Average Adjusted Length of Stay (n = 91)

	Morning Discharges			Average Adjusted Length of Stay		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	0.374***	0.546†	0.228	1.325***	1.235	2.745**
	(0.015)	(0.304)	(0.355)	(0.043)	(0.779)	(0.936)
Controls						
Week		–0.007†	–0.008†		0.003	0.012
		(0.004)	(0.004)		(0.011)	(0.011)
Average Case Severity		–0.039†	–0.037†		0.087†	0.054
		(0.020)	(0.019)		(0.051)	(0.050)
Patient Load		0.005†	0.004		–0.029***	–0.031***
		(0.003)	(0.002)		(0.007)	(0.006)
Core Team Size		–0.010	–0.022		0.042	0.049
		(0.016)	(0.016)		(0.042)	(0.041)
Core Team Orientation		–0.045	–0.059		–0.128	–0.032
		(0.061)	(0.061)		(0.155)	(0.161)
Core Experience Working Together		0.079	0.106		0.201	0.072
		(0.087)	(0.085)		(0.222)	(0.223)
Attending Experience		0.001	0.001		0.000	0.001
		(0.001)	(0.001)		(0.003)	(.003)
Senior Experience		0.007	0.002		–0.000	–0.005
		(0.008)	(0.008)		(0.022)	(0.022)
Average Intern Experience		0.024†	0.012		–0.004	0.008
		(0.014)	(0.013)		(0.035)	(0.035)
Key Variables						
Strategic-Core Attention Intervention		0.091	0.103		0.030	–0.114
		(0.225)	(0.074)		(0.191)	(0.195)
Boundary Attention Intervention		0.171*	0.149*		0.265	0.091
		(0.073)	(0.072)		(0.186)	(0.190)
Emergent Interdependence			–0.011			0.067
			(0.021)			(0.056)
Periphery Integration			0.048**			0.058
			(0.016)			(0.043)
Core Team Member Learning			0.076†			–0.269*
			(0.041)			(0.108)
Random Effects						
Core Team Members	0.000	0.000	0.000	0.016	0.008	0.008
	(0.000)	(0.000)	(0.000)	(0.167)	(0.113)	(0.104)
Residual	0.022	0.017	0.015	0.153	0.106	0.097
	(0.003)	(0.003)	(0.002)	(0.168)	(0.114)	(0.105)
DIC	-90.7	-110.4	-123.4	96.4	60.5	52.9

Notes. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. The control condition is the referent.

Lastly, we tested effects on two measures of efficiency: morning discharges (i.e., percent of patients discharged between 6 and 11am; see Table 3.5, Model 3) and average severity-adjusted length of stay (ALOS; see Table 3.5, Model 6). Consistent with Hypothesis 4 that periphery integration would enhance efficiency, we find that periphery integration is positively associated with efficiency in terms of morning discharges ($\beta = .05$, $p = .003$); yet, counter to predictions periphery integration did not directly predict ALOS ($\beta = .06$, $p = .176$). This offers mixed support for our prediction that periphery integration will increase efficiency. At the same time, consistent with the prediction in Hypothesis 5 that learning would enhance efficiency, we find that learning had a marginally significant effect on morning discharges ($\beta = .08$, $p = .064$) and significantly reduced average ALOS ($\beta = -.27$, $p = .013$). Additionally, we find that the boundary attention intervention was associated with more morning discharges ($\beta = .15$, $p = .039$), while having a higher patient load was associated with a shorter ALOS ($\beta = -.03$, $p < .001$).

Discussion

We demonstrated that brief, 10-minute interventions with a specific subset of a team can significantly improve coordination among core members and between core and periphery members. This evidence highlights how launches that direct attention at the beginning of a dynamic team's life can create scaffolds to foster these two types of coordination. Specifically, we found that an intervention that encouraged a team's core members to explicitly attend to and discuss their roles enhanced coordination within that core group. In contrast, an intervention that encouraged core team members to attend to peripheral team members and consider them as a part of the team enhanced coordination between the core and periphery members. Further, we found that while coordination between core and periphery members fostered one type of efficiency in the setting of medical inpatient teams – morning discharges – it was the combination of coordination among core members *and* coordination between core and periphery members that facilitates core members learning, which in turn reduced patients' length of stays.

This study makes multiple contributions. First, empirically, this work complements grounded theory developed in the preceding qualitative study (Chapter 2) to demonstrate evidence of a causal effect whereby, in the absence of membership stability and boundary impermeability, initial team launches can provide scaffolding that supports team coordination.

Second, this work contributes to our theoretical understanding of dynamic teams by building on the preceding grounded theory and shedding light on how coordination processes lead to effectiveness in dynamic teams. When the core members of dynamic teams integrate periphery members by involving them in decision making, we find teams are able to achieve short-term efficiencies (i.e., discharges are completed earlier in the day). Additionally, it is the combination of coordination between core and periphery members *and* coordination among core members that facilitates core-member learning and subsequent overall task efficiency.

Additionally, our study contributes to research on learning. The approach to study relationships between group coordination, individual learning, and group efficiency, answers calls for a multi-level approach to research in organizations (Hackman, 2003; House et al., 1995), while shedding light on how underlying individual learning can boost team level outcomes. In doing so, this work counters the notion that learning and efficiency present a tradeoff (e.g., Dennis et al., 2014; Rabinowitz et al., 2016; Sobrero & Roberts, 2003) to instead demonstrate a positive relationship between the two.

Lastly, this work makes practical contributions with regard to the management of dynamic teams. For example, this study highlights a low-cost lever for supporting coordination in highly dynamic teams which are common to healthcare delivery. In doing so, this work answers recent calls for more scientific study of medical teams (e.g., Rosenbaum, 2019a). Additionally, recent research has pointed out the increase in use of checklists and other standardized procedures, and the potential downsides of these rigid policies in restricting physician ability to adapt (Pronovost, Berry, & Sutcliffe, 2018; Rosenbaum, 2019b). Counter to the trend toward checklists, we offer a more general guide and demonstrate its ability to enhance coordination.

Limitations and Future Directions

This work has multiple limitations and unexpected findings that suggest directions for future research. First, we treat the teams in our sample as coming from a cross-section, yet the control teams were observed before the intervention teams. This creates the possibility that effects observed in the intervention teams are due to the elapse of time and potential related changes, e.g., learning, rather than due to the substance of the intervention. However, our field experiment design takes advantage of an opportunity to test two distinct launch activities such that each intervention condition can be used as a control relative to the other. Critically, the two interventions were anticipated to have distinct effects. For example, only the strategic-core intervention was anticipated to affect emergent interdependence. The evidence supporting this prediction—that the strategic core intervention enhanced emergent interdependence relative to the control condition *and* relative to the boundary attention intervention, which was implemented simultaneously—allows for confidence in the claim that the intervention substance, not the timing or demand effects, is what drove the team's coordination behavior.

A second challenge faced in this context is the fact that individual team members rotated through different teams throughout the study, a condition that will be true of many dynamic team contexts. This creates a lack of independence across teams. However, we address this statistically using multiple membership models that partition the variance explained by team members. With most dependent variables, the individuals on the team explained negligible variance, highlighting the importance of team-level interventions. That said, this may not be true of other contexts. The hospital studied is a highly ranked academic teaching hospital, and thus attracts some of the best talent in the medical field. As a result, there may have been too little variance in the individuals' abilities to detect variance in outcomes that could be attributed to individuals. At the same time, we did find that the team's individuals explained a substantial amount of the variance in emergent interdependence. This may be because this coordination is most proximal to the core team's individuals of the outcomes studied. While this may be worth future study that could inform where individual versus group-level interventions are most practical, we also highlight that the statistical approach used here will be critical in such future research.

We also limited our study to a single unit within a single hospital. This allowed for the greatest ability to compare across teams thus increasing the internal validity of the study. Still, we expect the findings to generalize to other teams that face both short lifespans and permeable boundaries, such as in other hospital contexts as well as in emergency response, product development, and consulting; future work should test this.

We theorize that initial team attention drives team outcomes by altering the way in which team members interact, and we found support for this process explanation. Drawing on the grounded theory that informed this study (Mayo, Chapter 2), we suspect that the underlying mechanisms driving the links between the initial team attention and subsequent coordination are rooted in team cognition. Future work that explores these cognitive mechanisms could shed light on additional informal structures or team activities that could be leveraged in highly dynamic teams to enable effective coordination.

Finally, some of the results warrant further exploration to better understand what characterizes effective coordination. First, unexpectedly, we found that both interventions were associated with less learning. These negative effects could suggest caution in implementing the interventions.

To unpack this finding, we first note that this may be an artifact of the study design and the fact that control teams were observed prior to the intervention teams; it may be that earlier in the year, when trainees are newer to their position, there is more opportunity for learning such that core team members were more likely to learn important lessons earlier in the year. That said, we also acknowledge that the measure of learning was a self-report, survey-based measure, thus subjecting the measure to a possible halo effect. It could be that when teams engage in the interventions and therefore expect teamwork, any unanticipated lack of teamwork may engender less learning *or* general negative assessments of the team that lead to a lack of perceived learning. It may be that more objective measures offer a clearer insight into both the antecedents and consequences of individual-level learning, as the survey-based measure may have been influenced by general affective feelings about the group. It could be that when teams engage in the interventions and therefore expect teamwork, any unanticipated lack of teamwork may engender less learning *or* general negative assessments of the team that lead to a lack of perceived learning. If either of these are the case, once we account for the teamwork behaviors that have a positive association with learning, there may be a residual negative effect of the interventions on learning, driven by teams that received the interventions but did not then exhibit the expected teamwork. If this is the case, we should not see an overall direct effect of the conditions on learning, as instead this would suggest an indirect effect via teamwork behaviors.

To test the direct effect of the interventions on learning, we conducted a robustness test using a multiple membership model and only the study conditions to predict learning, using the control condition as the referent group. We find that the three conditions do not significantly differ from one another in the amount of learning reported by trainees (control mean = 6.25 [SD = .32], core-only intervention mean = 6.32 [SD = .37], core-periphery intervention mean = 6.20 [SD = .43]). Specifically, the core-only intervention condition does not differ from the control condition (β=.07, P=.445, 95% CI [-.11, .25]); the core-periphery intervention condition does not differ from the control condition (β=-.06, P=.541, 95% CI [-.24,.12]), and (via a post-hoc comparison) the core-only intervention does not differ from the core-periphery intervention (β=.13, P=.236, 95% CI [-.08, .33]). In other works, the interventions do not directly impact team learning. However, as demonstrated in our main analyses, once accounting for the positive effect of teamwork on learning, residual negative effects of both interventions emerge. We take this to suggest that the interventions may indirectly affect learning—when the interventions enhance teamwork, learning increases, but if teamwork is not enhanced when it is expected to increase, individuals may be less likely to learn or less likely to recognize their learning. Future work using more objective assessments of learning is needed help to parse these effects.

Additionally, the different effects on these two efficiency measures suggests that future work should explore the role of task type. For example, while the process of discharging patients is largely one of execution (once the decisions to discharge some patients has been made), reducing overall length of stay is a more complex task that involves reasoning, decision making, etc., and may be reflective of the team’s general efficacy rather than mere efficiency. Indeed, adjusted length of stay is often used as a proxy for quality of care in medicine. With this in mind, it could be that integration of periphery members is directly helpful for moving the needle when it comes to executing task efficiency because the periphery members are required to complete part of those tasks (e.g., nurses are required to complete some paperwork in order to discharge patients which would affect the specific time of day a patient is discharged), while learning could be more important when the task is more complex or the outcome of interest is general effectiveness.

Conclusions

The results reported here demonstrate that in the absence of stability, teams can strategically use launches at their start to create cognitive scaffolding that improves coordination. Further, this work contributes to our understanding of how coordination among core members and between core and periphery members relate to learning and efficiency. Finally, and practically, the demonstrated power of a team launch suggests a simple and low-cost lever for instilling effective coordination in dynamic teams.

CHAPTER IV: GENERAL DISCUSSION

The nature of work is changing as organizations shift away from centralized structures to more decentralized work in which authority is distributed to teams that are themselves highly dynamic, frequently with temporary lifespans and permeable boundaries. Despite the promise of this way of organizing work, the conditions of dynamic teams should present real barriers to coordination. As such, this dissertation set out to explore the conditions that enable coordination in dynamic teams.

Overview of Findings

The qualitative study offered grounded theory about how dynamic teams can use team launches to build attentional scaffolds that develop team cognition and enable coordination. Further, the field experiment provides quantitative evidence of the causal effect of those attentional scaffolds on emergent interdependence in dynamic teams. The field experiment also offers insights about the downstream effects of coordination in dynamic teams, suggesting that teams will do best to both develop emergent interdependence and integrate periphery members. Finally, this work demonstrates a positive association, rather than a trade-off, between individual learning and efficiency.

Taken together, the application of multiple methods allows for this work to make a substantial contribution to our theoretical understanding of what enables effective coordination in dynamic teams. The qualitative study offers rich insight into what coordination looks like in dynamic teams and suggests scaffolding as a means for anchoring attention and thereby enabling that coordination. The field experiment complements that richness by demonstrating empirical support for the causal link between team launches and coordination, while also using hard data—patient outcomes—to shed light on the downstream implications of that coordination.

Theoretical Contributions and Future Directions

The research presented here makes several theoretical contributions that also raise questions for future research, particularly with regard to team beginnings, organizational design and team scaffolds, learning, and the management of dynamic teams.

Team Beginnings

Across a wide range of research domains and units of analysis, small differences in beginnings can have large impacts on outcomes. This is evident in the study of individual careers, for example in the effect of initial career placement on career outcomes (Oyer, 2006), as well as in the study of larger systems, whether focusing on the initial conditions that drive organizational strategic alliances (Doz, 1996) or even the link between the universe's initial conditions of extreme density and temperature, present at the beginning of the Big Bang, and the current structure of our universe (Chow, 2008). Groups, as complex systems (Arrow et al., 2000) also exhibit evidence of this sensitivity to initial conditions. A team's beginning can impact subsequent coordination and performance (Ericksen & Dyer, 2004; Gersick, 1988; Ginnett, 2010; Hackman, 2011; Woolley, 2009), such that team norms established early in a team's life become "cemented" for some time (Bettenhausen & Murnighan, 1985) and form structure (Hackman, 1987). As such, early events can be used strategically. For example, establishing team charters—outlining teamwork (including, among other topics, roles, coordination, and backup mechanisms)—at the start of team's life can generate higher initial team performance, and, when coupled with high quality team strategies focused on the task work, higher performance trajectories (Mathieu & Rapp, 2009).

The current works' demonstration of the impact of team launches on coordination is consistent with past research demonstrating the impact of a team launch (Ericksen & Dyer, 2004; Ginnett, 1990; Hackman, 2011), but we extend that work to apply to dynamic teams. For example, while prior theory would dictate that all team members be present for a team launch, we build on research emphasizing the importance of core team members (Summers et al., 2012) and find that when not everyone can possibly be present at the team's start, teams can still enhance their coordination by using a team launch with only the core. In doing so, this work highlights a potentially fruitful avenue for future research to explore further the initial conditions that can impact coordination in highly dynamic teams. Specifically, research could explore how effective initial conditions differ across different team dimensions such as team length (from short-lived to more long-standing), the extent of membership change, and who is changing over time.

Organizational Design & Scaffolding

Stepping back, the rise of organizational use of fluid collaborations such as dynamic teams has largely followed a more general trend toward decentralization (e.g., Malone, 2004). Yet the acknowledged emergence of core-periphery structures across contexts (e.g., Balkundi & Harrison, 2006; Cummings & Pletcher, 2011; Reagans et al., 2004; Reagans & Zuckerman, 2001), and the benefit of such structures, suggests that in the face of overarching decentralization, teams might correct for the attendant challenges using a more localized and emergent centralization of work. This is in line with recent research suggesting that amidst the removal of structures such as hierarchy, dynamic organizations have come to rely on teams to provide stability and structure (Bernstein, Bunch, Canner, & Lee, 2016; Moreland & Argote, 2003), and the general finding that when authority is highly decentralized work often evolves organically into a centralized form, such as with the vast majority of Wikipedia edits being made by a small portion of highly central contributors (Matei & Britt, 2017). At the same time, this idea that teams seek centralization in the face of decentralization is counter to other work suggesting that team structure is subject to entropy, where the evolution from more to less organization happens more readily than the opposite (Johnson et al., 2006). Perhaps, taken together, there is a moderate level of structure or centralization that all social systems seek and will move toward in the absence of countermeasures. In sum, this calls for more investigation of how organizations might manage both global and local structures to best facilitate flexibility and coordination.

This also raises questions about the role of scaffolds. In this dissertation, I propose that in the absence of other structure, dynamic teams can rely on cognitive scaffolding to serve as structures that aid in the development of a cognitive understanding of team roles and the team's permeable boundary. In this way, cognitive scaffolds can help to address the challenges created by dynamic team conditions of knowing how to work together and with whom to work. That is, these cognitive scaffolds act as mental structures—mental organizations of team roles and membership—that guide coordination. More broadly, scaffolds can be cognitive, as I discussed here, or physical, as in the case of physical boundaries used to identify with whom to work (Valentine & Edmondson, 2015). Yet, while scaffolds may support work in environments that otherwise lack certain structures, what happens when structure initially exists, then breaks down? Can scaffolds be used to repair broken structures? For example, building on recent research on communication networks and turnover (Argote et al., 2018), when a team member turns over, thus creating uncertainty about team norms, the team might rely on a centralized communication network as scaffolding to reestablish norms about how to interact. In sum, research that explores the role of structure in organizations would likely benefit from further considering what scaffolds can do.

Learning

The work presented in this dissertation also has implications for the study of learning with regard to the potential tension between learning and efficiency, the role of group learning in dynamic team coordination, and the study of learning at different levels of analysis. First, research has suggested that individual learning takes time, particularly when students or novices are involved, which can detract from productivity. For example, in the context of academic hospitals, there is a common belief that the goal to educate medical residents is at odds with the goal to provide expedient patient care (e.g., Dennis et al., 2014; Rabinowitz et al., 2016). Similarly, in a study of new product development projects, research demonstrated that interdependence between suppliers and manufacturers increased learning by the manufacturer, but simultaneously detracted from the project's efficiency, suggesting a tradeoff between learning by a subset of the collaboration and efficiency of the overall project (Sobrero & Roberts, 2003). Still other research has suggested that the negative effect of individual learning may be temporary, as individuals will initially fail to understand how to apply their new knowledge and this will detract from efficiency (Reagans et al., 2005).

Counter to this speculated trade-off, we find that in the context of short team lifespans, individual learning is positively associated with team efficiency. Of note, we also found that emergent interdependence enhanced individual learning among core team members, suggesting that core team members had engaged in coactive vicarious learning. And this has been theorized to enhance individual's ability to apply new knowledge (Myers, 2018). Taken together, future work exploring the role of learning in dynamic teams could benefit from using more fine-grained measures of learning to unpack the content of what is learned, untangling know-what (i.e., gains in knowledge) and know-how (i.e., gains in understanding about how to apply knowledge).

Additionally, while the current research focused on learning at the level of the individual, extensive work on *group* learning has demonstrated the importance of factors such as team learning behaviors and group-level knowledge structures in facilitating team performance (for review, see Edmondson et al., 2007). Group learning is characterized as a system-level learning about how to coordinate knowledge (Wilson et al., 2007). In that sense, group learning is not the aggregation of individual learning, but rather something attributable to the group as a whole. This group learning could be expected to drive performance improvements during the lifespan of a dynamic team as the team learns to better function (Argote & Epple, 1990; Argote & Miron-Spektor, 2011; Darr et al., 1995), however the field experiment cannot speak to this effect as it uses only a single view of the team's efficiency based on the entire team lifespan. In other words, the cross-sectional view of the team may have masked any group learning effects (note that the field experiment included measures of transactive memory systems (Lewis, 2003) and learning behaviors (Edmondson, 1999), but neither were associated with team efficiency measures). This suggests that future work might benefit from exploring how team launches affect performance over time.

Counter to the notion that group learning should benefit dynamic teams, the development of and reliance on specialization that can come with group learning may not be helpful if it leads to rigidity that prevents a dynamic team from working flexibly as the task demands (Majchrzak et al., 2007). To the extent that dynamic teams have a core set of members with some redundancy in abilities, future work might explore the role of specialization among those core roles, contrasted with specialization across the core and periphery roles, who are expected to bring unique expertise to the group. Further, we suggest that future research would likely benefit from following past approaches (e.g., Reagans et al., 2005) to explore learning at multiple levels of analysis simultaneously.

Relatedly, psychological safety has been shown to play a prominent role in group and organizational learning and thus performance (e.g., see Edmondson & Lei, 2014). In the studies presented in this dissertation, it is possible that core team members' initial attention to fellow core members enhanced psychological safety, and that this is what explains the subsequent emergent interdependence rather than a team orientation. While the qualitative work did not indicate this possibility, the field experiment also did not test the underlying mechanism, and thus future work is needed to disentangle the roles of team orientation and psychological safety to better understand when each arise and how they might uniquely, or perhaps jointly, contribute to team outcomes.

Finally, the demonstrated importance of individual learning that follows from emergent interdependence suggests potential implications for other levels of analysis. Research demonstrates that groups and organizations can learn directly and vicariously through knowledge transfer (Argote & Epple, 1990; Argote & Miron-Spektor, 2011; Darr et al., 1995), but perhaps they, like individuals, can also learn through coactive vicarious learning. For example, many organizations participate in collectives in which individuals working in the same position (e.g. COO) meet to discuss challenges and to both share and develop best practices based on situations faced by individual organizations. This type of formal interaction may provide an opportunity for coactive vicarious learning at the organizational level that has effects beyond learning from direct experience or vicariously learning.

Managing Dynamic Teams

The grounded theory and field experiment results have multiple implications for managing dynamic teams, particularly with regard to attention, role-based work, and knowledge transfer.

Managing Attention. The spotlight on team launches in this work blends a team dynamics perspective with an attentional view of teams to show that the *early* focus of attention can have important downstream implications for teams. This bolsters the importance of calls for an attention-based view of teams (Bernstein et al., 2017) and raises questions about how teams can manage attention to multiple targets. The current work suggests this is possible. First, the qualitative work reveals that a handful of observed teams did manage to implement attentional scaffolds regarding both core and periphery members. Further, given that 32% of teams in the qualitative work organically directed their attention to core team members' roles, and 38% to the permeable boundary, we can expect that teams observed in the field experiment study that were directed to attend to one target may have also directed attention to the other target. In line with this possibility, the field experiment reveals that some teams were able to develop both downstream coordination behaviors, coordinating both among the core members and between core and periphery members. This suggests that they may have achieved both types of coordination because an intervention laid the groundwork for one, while their own natural launch laid the groundwork for the other. Still, more work is needed to further unpack the role of attention in teams and the possibility of managing attention to multiple targets. Future work could test the causal effects of an intervention designed to direct attention to both core members' roles and the permeable boundary, thus ideally fostering both within-core and core-periphery coordination, which Chapter 3 suggests is best for learning and overall efficiency.

In addition to unpacking whether teams can manage attention to multiple targets, future work should explore the temporal dynamics of attention management. For example, can teams correct course partway through their work? As team work unfolds and members change, leaders may need to actively manage team member attention. Larson (1996) found leaders can direct attention to unshared information. Building on this focus on the leader as someone to direct team member attention, and given the natural tendency of individuals in highly fluid collaborations to focus on their own subgroup (Edmondson, 2012), core team leaders might need to continuously direct attention to periphery members over time. In doing so, they might encourage the core to integrate periphery members. Alternatively, it is possible that core members could become too periphery-focused and fail to continue to coordinate within the core, in which case leaders might need to continuously direct attention to fellow core team members, encouraging them discuss the work collectively and dynamically manage their tasks. Future research that can further explore the temporal dynamics of attention over time could shed additional light on best leadership practices in highly dynamic team settings.

Role-based Work. The teams used to develop the conceptual framework here include core team members who have some level of redundancy in their abilities, and who can take advantage of this overlap. This stands in contrast to work on stable teams, and even unstable teams, that emphasizes the benefit of team member specialization (Argote et al., 2018; Lewis, Belliveau, Herndon, & Keller, 2007; Liang et al., 1995). While role-based work has largely assumed a need for role specialization and clarity to facilitate coordination among individuals shifting in and out of given roles (Bechky, 2006; Valentine & Edmondson, 2015), work on temporary teams has also implicitly shared the view that team members have redundant abilities by acknowledging that they could engage in role shifting (Bechky & Okhuysen, 2011) and role switching (Bigley & Roberts, 2001). Future research could further explore the contexts in which redundancy among some team members is needed, and how much redundancy is beneficial.

Knowledge transfer. In effort to understand the effect of initial attentional scaffolding, the field experiment was designed to specifically to minimize any possibility that knowledge about one intervention could diffuse to teams in the other intervention (i.e., contamination). That said, relaxing such efforts and allowing for the possibility of knowledge to diffuse, to reflect more common organizational conditions, raises questions for future research. For example, in an organization, one could consider budgetary or time constraints that create the need to send some, but not all, team members to receive training. Might the knowledge gained from the training diffuse across dynamic teams best when certain members receive the training and then rotate across teams? For example, if teams are constantly reforming, and the knowledge gained suggests a particular process, it may be that core members, who often guide the team processes, would be most effective in diffusing that new process. In contrast, if teams face highly permeable boundaries, might a periphery member common to many teams be able transfer that knowledge most quickly to the most teams? Future research could examine these and other avenues of future research to shed more light on how and when dynamic teams work best.

Limitations and Boundary Conditions

The theory developed here suggests some boundary conditions. First, the theory may be limited to teams that have highly dynamic membership both in terms of a short lifespan and a permeable team boundary. The factors that emerged as critical for effective coordination in this context may be less important when teams have longer lifespans and/or have boundaries that are less permeable. For example, while the benefit of attention to core team member roles may transfer to any temporary team, the need to initially direct attention to periphery team members may be less critical when team boundaries are less permeable. Second, in this setting, the core team, though short-lived, was stable for a week at a time. Turnover of team core members has been demonstrated as particularly detrimental to the team's ability to coordinate (Christian, Pearsall, Christian, & Ellis, 2014; Summers et al., 2012), and it may be that when highly dynamic teams experience turnover among core members they will need to reset, or re-direct their attention. Alternatively, building on the findings related to core and periphery member interactions, there may be a way to implement a sort of orientation of the new core member. Future research could explore this.

Additionally, the context in which this work was conducted – with a compelling overarching goal of quality patient care and surprisingly little emphasis on status differences, especially for the medical context – suggests additional boundary conditions to the theory that emerged. In contexts with less compelling overarching goals, creating motivation to work towards an overarching goal that could conflict with individual goals may become a bigger issue, and individuals may need additional encouragement to work across professional boundaries. For example, additional conditions may be required to instill motivation for core team members to integrate periphery members. To that end, researchers might turn to work on turnover and the integration of newcomers to consider factors such as shared social identity (Kane, 2010; Kane, Argote, & Levine, 2005). Although social identity is likely to be limited in temporary teams, there may be ways to overcome such motivational issues (Valentine, 2018).

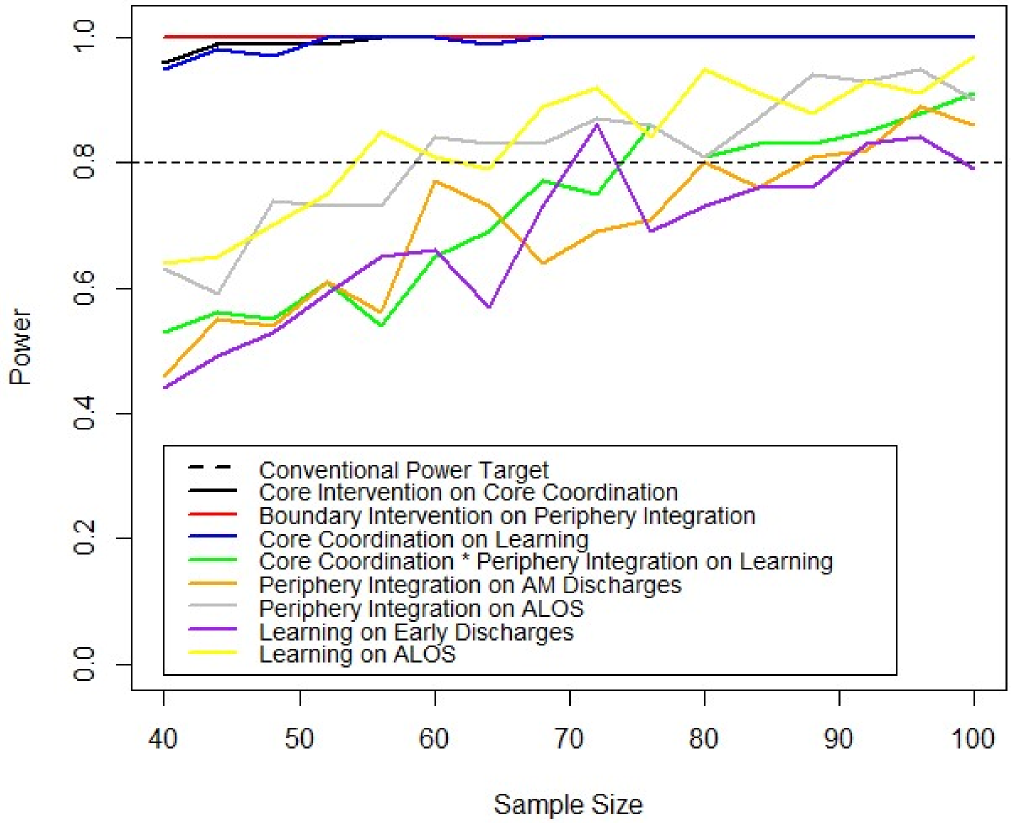
Finally, the nature of work in medicine is typically very hierarchical, yet status did not emerge in this setting as a critical driver of coordination. Through observations and interviews, there was some sense that despite differences in status within and across professions, the culture in this hospital unit was such that team members typically valued others' input. In other settings, as found in much of the literature in medical contexts (e.g., Nembhard & Edmondson, 2006), overcoming barriers to coordination presented by status differences would likely need to be considered. For example, when status hierarchies are emphasized, core team members may need more than general initial attention to periphery members to redirect their behavior such that periphery members of perceived lower status are considered a part of the team and integrated into the work.

Conclusion

It is increasingly common in today's organizations for teams to form quickly and change shape during their short lifespans, leaving team members with a real challenge to understand how to work with team members and even identify their fellow team members. While a large body of research speaks to how more stable teams can coordinate, knowledge of the conditions that enable coordination in these highly dynamic teams is incipient. The research presented in this dissertation offers one step in the path toward building out that knowledge and crafting a better understanding of how work can be effectively coordinated as organizations shift toward less hierarchical and more decentralized forms, but we have much to learn.

APPENDICES

Appendix A: Estimated Power to Recover Specific Effects Across Sample Sizes



Appendix B: Intervention Materials

Intervention 1: Strategic-Core Attention

Script for Blue Senior Residents

I'd like to talk about how we're going to work together this week. Based on research with our DRG teams, we learned that teams don't always talk about roles, responsibilities, or expectations, and they don't figure out how to work together until late in the week. For example, despite differences across teams in terms of who calls consults, tracks down lab results, places orders during rounds, handles discharge preparations, or places admission orders, some teams never discussed these roles. These team members reported "fuzzy" roles and expectations and having to "wing it" on rounds. Additionally, many teams did not "run the list" after rounds, leaving members unclear on who was to do what. In these teams, members missed opportunities to help one another or share relevant information, and some tasks were missed until late in the day.

However, when teams did discuss roles and how to work together, the team members knew who was expected to do certain tasks, allowing them to anticipate who was busy and find ways to help, or, if busy, to delegate to those who had less work. Similarly, when team members kept one another up to date, conducted "read-backs" during rounds, and ran the list after rounds, teams were able to keep track of work and who was doing what, and assign tasks to fit workloads. Otherwise, tasks may have been overlooked or left until later in the day, and patient care could be delayed. Overall, the research done here showed that working together flexibly while keeping one another up to date is related to more collaborative, quicker work.

Moreover, if we work closely with one another, the results of the research suggest we'll avoid bottlenecks and move more quickly through our work, and this should free up time for team members to finish their notes earlier in the day.

To build on what the research here has demonstrated, we've been asked to share **our own contact information** with one another to help us stay in contact. {Please pause to do this now.}

Lastly, we've been given a quick **guide** to talk through.

Before you begin rounds this morning, please discuss the following:
1. What are our roles, responsibilities, expectations? 2. What is our plan for how to conduct rounds (e.g., on rounds, who's doing what, how much should be said outside vs. inside the room, when should a full H&P be presented)? 3. What do we need to communicate with one another? 4. When and how are we going to do that? (e.g., calls, in person, pages, texts?) 5. How can we support/assist one another and balance the workload?

Intervention 2: Boundary Attention

Script for [Team Color] Senior Residents

I'd like to talk about how we're going to work with other roles in the hospital this week. Based on research with our DRG teams, we learned that teams don't always include other roles, or do so later than ideal. For example, some teams involved as few as 30% of their patients' nurses on rounds – they didn't invite the nurse to round or didn't call after rounds to update the nurse. In addition, often during rounds, teams reverted to medical jargon, which effectively excluded the family and left the plan unclear to the family. Also, consults were often placed after noon conference.

However, when teams did communicate with nurses during rounds, involve families, and call consults, care coordinators, the pharmacist, or other roles earlier in the day, the team's work was done more quickly. For example, when teams talked with nurses while on rounds, nurses were expecting to receive orders and able to execute them more quickly. Similarly, when teams called to inform nurses of discharge orders, the nurse could prepare and execute his/her work related to discharge more quickly. Otherwise, the nurse may not have seen orders in their computer and the patient care could be delayed. Overall, the research done here showed that involving nurses during rounds is related to a shorter adjusted length of stay. Similarly, involving the family has been demonstrated to lead to smoother discharges. And when sub-specialists learn of a consult earlier in the day, they are able to adjust their plan for the day to ensure that they can see the patient rather than postponing the consult until late in the day or even the next day, which could extend the patient's hospital stay.

Moreover, if we work closely with these other roles, involving them and taking steps like writing a clear plan on the white board in patient's rooms, the results of the research here suggest we'll face less work – fewer pages from nurses who missed rounds or a family that need clarification. This freed up time for team member to finish their notes earlier in the day.

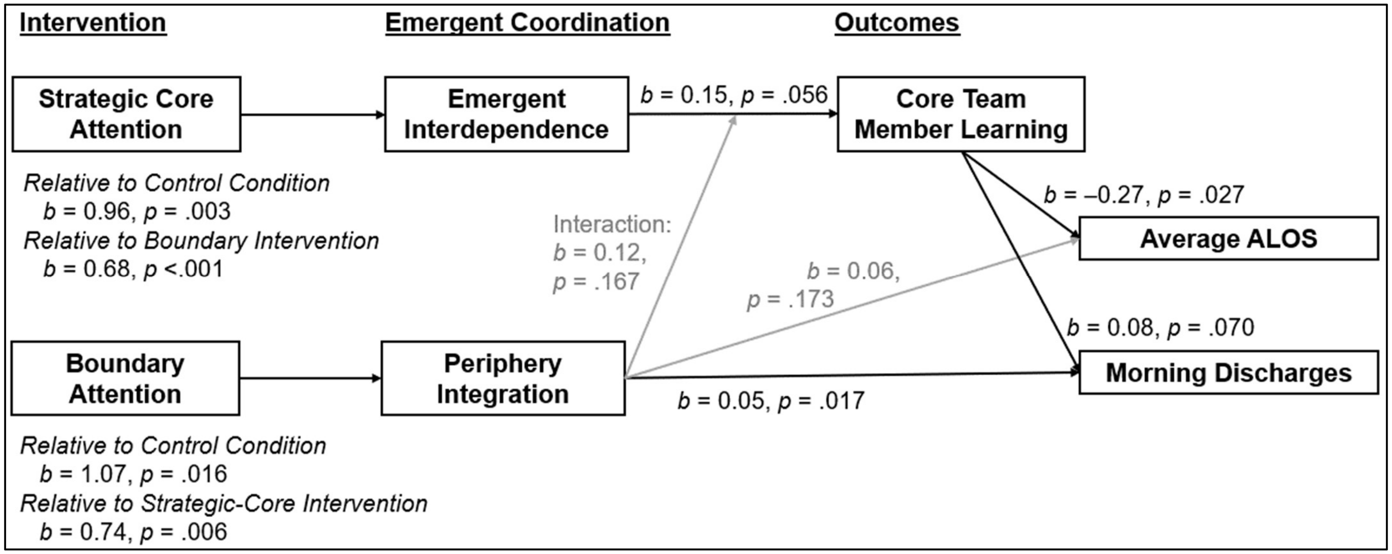
To build on what the research here has demonstrated, we've been provided with some **contact information for other roles** to help us to be in contact with them.

We've also been asked to run through our patients and gather all **nursing phone numbers**. {Please pause to do this now, and **determine how you will repeat this step each morning before rounding**.}

Lastly, we've been given a quick **guide** to talk through.

Before you begin rounds this morning, please discuss the how your team will achieve the following this week:
1. Who are the key roles not on the [color] team with whom we need to interact? (e.g., nurses, families, sub-specialists, care coordinators, etc.) 2. At what point do they need to be involved? 3. How are we going to do that? (e.g., Point person? Dependent on the case?) 4. How can we ensure that other roles know the care plan for a patient? 5. How will we ensure that those other roles know how to contact us?

Appendix C: Structural Equation Model Estimates



Notes. We performed SEM using maximum-likelihood estimators (Bollen, 2005), which we carried out using the **`lavaan`** package (Rosseel, 2012) for structural equation modeling implemented for R. We use Bollen-Stine's model-based bootstrapping (drawing 1,000 samples) to determine statistical significance and the adjusted bootstrap percentile (BC) method to construct confidence intervals. $\chi^2(52) = 67.858$, $p = .461$; CFI = .956; RMSEA = .058; SRMR = .072. All predicted variables are regressed on all control variables. Effects that are not significant at $p > .10$ are listed in grey.

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