Social Capital and Relational Coordination in Outpatient Clinics

by

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A thesis submitted in conformity with the requirements
for the degree of Doctor of Philosophy
Graduate Department of Nursing

University of Toronto

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ABSTRACT

Coordination is a vital component in health care provision and teamwork. The need for better coordination is particularly prominent in outpatient setting where patients assume the primary responsibility to follow-up on their own health care, especially when treatment is complex and lengthy in duration. Relational coordination represents a type of informal coordination process reinforced by communication and supportive relationships. This concept has been associated with enhanced interprofessional team performance, including patient care outcomes.

This study aimed to examine the theoretical underpinnings of relational coordination in the outpatient setting using social capital theory. It was hypothesized that social capital, resources embedded within network of relationships, would predict relational coordination. Additionally, social capital was hypothesized to be predicted by team tenure; and relational coordination was hypothesized to be predicted by formal coordination mechanisms.

A non-experimental, cross-sectional survey design was used to examine the relationship between social capital and relational coordination. Participants (N=342) were physicians and nurses recruited from outpatient clinics in two University affiliated hospitals. Study surveys were sent to 501 nurses and 187 physicians with follow-up reminders sent at three, five and seven weeks after the initial distribution of surveys. The overall response rate was 49.71%. Study variables were measured using previously validated instruments with acceptable levels of reliability and validity.

Structural equation modeling (SEM) was used for hypothesis testing. Final analysis revealed good fit of data to the hypothesized model (χ^2=383.38, df=177, p<0.001; CFI=0.966; RMSEA=0.060; SRMR=0.0316). SEM revealed that social capital predicted both factors of relational coordination [communication (β=0.70, p<0.001); supportive relationship (β=0.81, p<0.001)], and team tenure predicted social capital (β=0.13, p<0.05). In addition, the association between team tenure and relational coordination (β=0.09, p<0.05) was found to be partially mediated by social capital.

Findings of this study suggested that characteristics within relational ties are predictive of informal coordination. Administrators may facilitate teamwork through team building initiatives that foster these relational qualities, such as trust and shared language. Future research can further investigate the association between social capital and relational coordination in other health care settings, as well, in larger teams involving health care professionals in addition to physicians and nurses.

ACKNOWLEDGMENTS

I would like to thank the many individuals who provided generous help and support throughout my doctoral education. Their contributions and efforts made the achievement of this remarkable learning milestone possible.

First, I would like to express my sincere gratitude to my supervisor, Dr. Diane Doran, who supported my training in so many great and profound ways. Her kindness, wisdom and steadfast support are instrumental in navigating the forest of academia and attaining the level of competence required for establishing a career in health services research.

I am blessed to have an exceptional thesis supervisory committee. Dr. Ann Tourangeau, Dr. Glenn Regehr and Dr. Neil Fleshner are outstanding scholars who provided critical feedback and continual guidance that facilitated the development and completion of my dissertation. In addition, I am the most appreciative of the insightful and encouraging comments from my examiners, Dr. Margaret Fitch and Dr. Richard Redman. The constructive input from these individuals has motivated the next steps of my research.

I would like to thank all the nurses and physicians who participated in this study. The study could not have happened without the generous giving of their time and the careful completion of the questionnaires. Special thanks must also be extended to the administrators at participating clinics and hospitals for granting access to recruit staff members for this study.

I would like to acknowledge the funding agencies that provided financial support through the years of my study. I am privileged to be supported by training fellowships from the Ontario Training Program in Health Services and Policy Research and the Wilson Centre for Research in Education. My doctoral study was also supported by awards from the Government of Ontario /

University of Toronto Foundation, Lawrence S. Bloomberg Faculty of Nursing and the Nursing Health Services Research Unit at the University of Toronto.

I am extremely fortunate to have gracious friends and colleagues within and outside of the university, including those at the Princess Margaret Hospital. My friends and colleagues have stood by and cheered for me without always understanding the burden of this academic endeavour. They never ceased to ask about my progress and celebrated my success every step along the way. I am grateful for their friendship and support, and for accommodating my clinical, research and writing schedules. At the University of Toronto, learning with and from my friends and colleagues has been a humbling yet invigorating experience. I enjoyed sharing common challenges with them, pushing each other to think in different ways, and more importantly, encouraging one another during difficult times. I would like to thank all of them for making this long and at times, grueling journey delightful and less lonely.

Lastly, I would like to thank my family, especially my parents and husband, for their love and unwavering support. My parents taught me the love of life and education and to persevere through trying times. My mother is the greatest listener and knows to offer just the right, comforting words whenever they are needed. Most importantly, I thank my husband for having the weight to support the strength of this endeavour. He encouraged me to embark on this journey and was with me all the way. I share this accomplishment with him.

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CHAPTER ONE: INTRODUCTION

Coordination is a vital process in health care because of the vast number of interdependent activities involved in care provision. This study aimed to examine the theoretical underpinnings of relational coordination, a specific type of coordination, in outpatient clinics. In particular, the association between social capital and relational coordination was examined to provide a more comprehensive framework for understanding and utilizing relational coordination in the future.

Coordination in Outpatient Care

Coordination is ‘managing dependencies between activities’ (Malone & Crowston, 1994). Successful management of interdependencies is crucial as effective coordination methods have been shown to be associated with superior performance at group- and organization-level (Fussell et al., 1998; Ni & Li, 2001). Health care organizations are no exception. Indeed, the increasing role differentiation in health care calls for seamless coordination amongst different health care providers, with research findings supporting a link between coordinated care and enhanced efficiency and quality of care. For instance, research in medical errors suggests that enhanced communication, a means to coordinate, can prevent future adverse events related to human errors (Forster, Asmis, et al., 2004; Forster, Clark, et al., 2004).

The needs for better coordination is particularly prominent in outpatient setting where patients assume the primary responsibility to follow-up on their own health care; as well, when treatment is complex (e.g., multiple medications, multiple modalities) and lengthy in duration.

An outpatient is defined as a patient who is not an inpatient (not hospitalized) but instead is cared for elsewhere; as in a doctor's office, clinic, or day surgery center (Merriam-Webster Inc., 2005). Used interchangeably, the terms ‘outpatient care’ and ‘ambulatory care’ imply the intermittent nature of services provided for patients under this mode of care. The intermittent nature of services is a major barrier in coordinating care because patients are not closely monitored by any designated health care professionals; and currently, there is a dearth of literature on coordination in outpatient care setting. Considering the growing outpatient population in Canada as well as the limited amount of knowledge in coordinating outpatient care, research efforts to advance our knowledge in coordinating care in this unique care setting should be a top priority.

To illustrate these conditions with a context-specific example, in oncology, treatments often involve multiple modalities (e.g., chemotherapy, radiation therapy, surgery; alone or combined) with numerous diagnostic tests between treatment cycles. With the exception of surgery, a majority of treatment plans lasts for more than one month, followed by frequent follow-up schedules (with numerous diagnostic tests). As a result, much like other medical sub-specialities, oncology care services may be difficult to navigate and cancer treatment regimes can be challenging to cope with. Given this, it is not surprising that researchers found cancer patients rating care coordination as one of the most important issues and those for which they most wanted help from their health professionals (Snyder et al., 2007), implying a link between coordination of care and quality of care perceived by patients.

Relational Coordination and Social Capital

The theory of coordination suggests unique contributions from both explicit (e.g., formal coordination mechanisms) and implicit coordination (e.g., informal, unplanned coordination mechanisms) (Espinosa, Carley, Kraut, Lerch, & Fussell, 2001; Malone & Crowston, 1994). However, organizational research has been focusing primarily on the assessment and enhancement of formal coordination mechanisms. It is not until late 1990s when the concept of implicit coordination was explicated beyond its definition (Espinosa, et al., 2001; Malone & Crowston, 1994).

Implicit coordination was first proposed by Thompson (1967) as 'mutual adjustment' coordination methods in the context of integrating subparts of an organization. Thompson explained that mutual adjustment coordination is a more spontaneous form of coordination and is needed when mutual adjustment is required for new information. To date, the term 'implicit coordination' is more commonly used to describe the processes that manage task dependencies spontaneously (Espinosa, et al., 2001; Malone & Crowston, 1994).

The emergence of relational coordination (RC) signifies an important step in understanding implicit coordination, in particular, the relational underpinnings of coordination is pertinent to unplanned and spontaneous coordinating processes. As suggested by its name, RC represents the relational aspects of coordination and accounts for coordination activities that occur as a result of relational ties amongst individuals involved in a task (Gittell, 2002a). Gittell (2000) theorized and validated the seven dimensions of supportive relational and communication qualities that enhance performance in work setting with team interdependencies. More importantly, the theory and knowledge of RC has been validated in health care in hospital inpatient units (Gittell et al., 2000; Havens, Vasey, Gittell, & Lin, 2010), Internal Medicine clinics (Hagigi, 2007) and nursing homes (Gittell, Weinberg, Pfefferle, & Bishop, 2008).

Studies in airline departure teams and in orthopedic surgery inpatient teams validate the relationship between RC and work outcomes. For instance, health care providers' RC is negatively correlated with patients' length of hospital stay and post-operative pain after joint replacement surgery (Gittell, et al., 2000). These findings suggest that the association between RC and care outcomes should be further examined and validated beyond inpatient care units. However, despite the fact that RC offers a framework to study the impact of relationships on coordination, the concept of relationship within RC needs to be further delineated in order to provide clarity in understanding what qualities in relationship give rise to the supportive behaviour and attitudes in relational coordination. The characterization of relationship within the theory of relational coordination remains unclear.

The social capital theory provides an approach to study relationships within an organizational setting. Identified as a form of capital, social capital was described as ‘the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance and recognition’ (Bourdieu, 1986). Social capital can be applied to different settings where social networks exist, such as work teams and organizations, to understand how resources embedded in relationships affect employees’ behaviour and work outcomes (Lazega, Mounier, Jourda, & Stofer, 2006). Thus, social capital was chosen in this study in attempt to explain the construct of relational coordination.

Problem statement

Within the important organizational process of coordination, relational coordination has been shown to associate with superior team performance. However, relational coordination is a relatively new concept with its theoretical underpinnings to be explored. It is believed that social capital may explain the behaviours and attitude embedded in relational coordination.

The present study examined the predictive relationship between social capital and relational coordination in outpatient interprofessional teams. The unique challenges in the outpatient care environment warrant an investigation specific to this setting. This is a necessary first step prior to the development of specific coordination and teamwork improvement interventions.

Chapter 1

CHAPTER TWO: LITERATURE REVIEW

A literature review was conducted to examine the constructs of relational coordination and social capital. The review began with the work by Gittell that explicated the concept of relational coordination in late 1990s. This included a review of the theory and extended to the gathering of empirical evidence to validate the impact of relational coordination on teamwork outcomes. Next, theories related to interpersonal relationship were examined with emphasis on the social capital theory. Finally, support for the proposed association between relational coordination and social capital was articulated. Factors influencing relational coordination and social capital were also discussed.

Search Strategy

A majority of literature included in this literature review was identified through searches on Medline, Scopus, Scholars Portal and Web of Knowledge databases from 1980 to June, 2011. The following key words were used in searches: ‘relational coordination’, ‘implicit coordination’, ‘interpersonal relationship’, ‘social capital’, ‘outpatient’, ‘ambulatory’, ‘teamwork’. For additional literature, bibliographies from identified articles or books were used; as well, content experts were consulted. Although literature in outpatient teams was preferred, those published in other settings were considered.

Conceptualization of Relational Coordination

Relational coordination captures coordination processes and activities that result from interpersonal relationships amongst participants. Conceptually, the construct of relational coordination was developed based on the premises that: a) unplanned coordination mechanisms were not well explicated; and b) characteristics embedded within relationship influence coordination. Findings from qualitative studies in airline departure teams suggest that these characteristics can be classified into two main themes: supportive behaviour and supportive attitude. It is believed that supportive behaviour and supportive attitude are the key elements in work coordination (i.e., managing interdependencies among different work functions) (Gittell, 2000). To validate this assertion, Gittell (2000, 2007) further operationalized relational coordination and suggested seven dimensions associated with supportive behaviour and supportive attitude.

The seven dimensions of relational coordination are: frequency of communication, timeliness of communication, accuracy of communication, problem-solving communication, shared goals, shared knowledge and mutual respect. Each of these dimensions is associated with the presence of relationships among participants of a work task and influences work outcomes, as such, these dimensions are mutually reinforcing. That is, higher frequency of communication leads to an increase in shared knowledge.

Additionally, the seven dimensions of supportive coordination activities are distinct from the formal coordinating mechanisms as they cannot be pre-planned and not explicitly stated in protocols or training programs (Gittell, 2000; Gittell, Seidner, & Wimbush, 2007). The ensuing outcomes of relational coordination, therefore, complements other forms of coordination activities (e.g., pre-programmed or feedback approach). More importantly, the implicit and spontaneous nature of relational coordination may be more prevalent than the conventional, explicit coordinating strategies in situations with high uncertainties (Argote, 1982) such as those encountered daily by health care professionals. This is due to the fact that many coordination issues in health care settings cannot be solved by pre-planned strategies.

To delve into the seven dimensions of relational coordination in further details, each dimension is supported by theory and empirical evidence. First, *frequency of communication* refers to the quantity of exchanges and interactions among group members; it enhances the development of relationships through repetition as repetition builds a sense of familiarity that fosters relational ties. Indeed, frequency of communication reflects the strength of personal ties in network theory (Granovetter, 1973) which views collective actions as a result of a summation of individual characteristics.

Frequency of communication qualifies as an element of the relational form of coordination because the frequency of communication related to work process is influenced by the relational ties among participants. When relational ties are present among participants within a particular work process, they are more likely to communicate with one another about their work.

Timeliness of communication is another element of communication that affects the outcome of information exchange. Timely communication means that communications occur at the appropriate time that is suitable or optimal for interactions or exchanges. Timing is of paramount importance in settings with time constraints, high interdependencies and high uncertainty as ill-timed communication can lead to delays and errors. Moreover, timely communication has been associated with successful task performance (Gaal, Blatz, Dix, & Jennings, 2008; Wong, Caesar, Bandali, Agnew, & Abrams, 2008; Zeng, Wei, & Joshi, 2008).

The presence of interpersonal relationships potentially enhance timeliness of communication because when relational ties are present, participants are more likely to have an understanding about each other’s work habits, preferences and expertise. With better understanding, individuals are able to communicate with others involved in the work process at an appropriate time.

Timely communication may not lead to quality communication if the information exchange is inaccurate. Thus, another key element to quality communication and relational coordination is *accuracy of communication*. Accuracy of information exchange refers to the precise and correct exchange of information amongst members of a work group. Inaccurate communication leads to errors and delays, affecting productivity. O'Reilly and Roberts (1977) argued and showed that accurate communication plays an important role in group effectiveness. Similar to timeliness of communication, relational ties among participants enable further understanding about other participants' work, leading to a greater likelihood of using punctual information and language in communicating with each other for work-related issues (O'Reilly & Roberts, 1977).

More recently, accuracy of communication has been conceptualized in terms of its trustworthiness in the knowledge seeking literature (Levin & Cross, 2004). This assumption is appropriate in circumstances where accuracy is determined subjectively because the perceived 'correctness' of information is associated with how confident an individual feels about the source of information (Levin & Cross, 2004). Levin and Cross conceptualize that close relationships are associated with a greater sense of trustworthiness; this, in turn, will lead to more likely uptake of new information and knowledge. As such, perceived trustworthiness will likely reflect perceived accuracy of communication. A more recent version of relational coordination survey has incorporated this re-conceptualization of accuracy of communication as trustworthiness (Weinberg, Gittell, Lusenhop, Kautz, & Wright, 2007).

The final communication dimension in relational coordination is *problem solving communication*. It is another vital aspect of communication required to achieve quality communication and ultimately relational coordination (Green, Ashton, & Felstead, 2001; Tjosvold, Sun, & Wan, 2005). Problem solving communication concerns efforts to resolve difficulties in accomplishing the common tasks within a group. When individuals are connected at work, they are likely to communicate more; the enhanced understanding of each other will then improve the willingness and capacity to resolve difficulties in accomplishing tasks.

Relational ties among participants enhance the willingness and capacity to problem-solve as a collective. In particular, the capacity for participants to problem-solve is improved by the overall frequency and quality of communication, leading to better understanding of each other's roles, expectations, responsibilities and competency (Kasouf, Celuch, & Bantham, 2006). Communication for this purpose is crucial for teamwork as interdependencies exist and tasks are increasingly complex (i.e., cannot be solved by one single functional group or participant), requiring the participation of all members involved to accomplish the task.

Furthermore, problem-solving communication is essential in work groups with high interdependencies because: a) in situations with high interdependencies, team process to achieve goals are relatively complex and thus, problems may arise more frequently than that with lower interdependencies; b) in situations with high interdependencies, problems may not be solvable based on a single effort from one participant and tasks cannot be completed alone with one single expertise (Tjosvold, et al., 2005; Van de ven, Delbecq, & Koenig, 1976). These reasons concur with the notion that joint problem solving communication from participants is even more important for work groups with high interdependencies, such as the work environment of patient care provision.

The relational dimensions of relational coordination include shared goals, shared knowledge and mutual respect. These dimensions capture elements in relationships that enhance coordination. *Shared goals* are important because common goals foster bonds among participants through better understanding; as well, shared goals help with ensuring consistent responses among different participants or functional groups in unexpected situations, increasing chances to achieve more compatible conclusions in managing routine and unexpected tasks (Parsell, Spalding, & Bligh, 1998; Sherman, 2006). This phenomenon is more likely to emerge with the presence of relational ties among participants of a work team as individuals with relational ties or stronger ties are more likely to share common interests.

The presence of shared goals is believed to be an important factor in successfully coordinating highly interdependent work (Saavedra, Earley, & Van Dyne, 1993; Wageman, 1995). In addition, a negative impact on outcomes was found in settings with a lack of shared goals (Thompson, 1967). Thompson described the potential ‘dis-integrative’ effects when individuals pursue their own functional goals without recognizing the superordinate goals of the work process they are engaged in. This demonstrates the impact of shared goals at work.

In addition to shared goals, optimal relational coordination also comprises of a high level of *shared knowledge* regarding other participants’ tasks. Shared knowledge about each other’s tasks will enable a better understanding about other participants’ roles and challenges, leading to stronger bonds among participants (Kummer, 2005; Postrel, 2006; Rauniar, 2005). Furthermore, Levin and Cross’ work argue similar influences of strong ties on knowledge attainment, demonstrating a mutually reinforcing relationship between relational ties and shared knowledge. Additionally, shared knowledge about one another’s tasks will enable better management of interdependencies as participants can anticipate changes and unexpected information that may alter work process based on the extra knowledge about other participants.

Espinosa et al. (2001) studied coordination activities and argued that knowledge is the basis for coordinating beyond the traditional, explicit means. For instance, they suggested that shared mental model (mental model explains one’s thought process and plays an important role in cognition and decision-making) is a coordinating mechanism that provides the knowledge needed to manage dependencies spontaneously. In addition, Karl Weick discusses the effects of collective mind in group work. Collective mind is a less well known concept similar to shared mental model and it explains organizational performance in situations requiring nearly continuous operational reliability (i.e., requiring spontaneous coordination). Collective mind is conceptualized as a pattern of heedful interrelations of actions in a social system, Weick and Roberts advocate its application in aviation to enhance safety and performance. Evidently, arguments about shared mental model, collective mind and knowledge as implicit forms of coordination coincide with the role of shared knowledge in relational coordination.

Last, but not the least, relational coordination also includes *mutual respect* as a dimension of supportive relationship, supporting coordination in situations with high interdependencies. Respect is an assumption of good faith and competence in another person and is very important in any communities because it encourages harmony among individuals. Literature shows that participants from different occupational communities are often divided by differences in status (Amer, 2005). These differences in status are linked with disrespect for the work performed by others, posing challenges for accomplishing interdependent tasks where individuals have to rely on each others' expertise to complete the team's tasks.

Moreover, in settings with interdependency, uncertainty and time constraints, a lack of respect for each other's competency will affect communications, leading to a breakdown in coordination process. Indeed, mutual respect is an important relational factor for successful coordination process because respect for others' contribution is fundamental to integrating interdependent tasks (Eisenberg, 1990).

Empirical Evidence of Relational Coordination

A total of 18 studies that employed the concept of relational coordination were reviewed (Appendix B). Results of this literature search revealed a concept that is validated in a variety of work settings, as relational coordination has been shown to predict work outcomes in commercial airlines, hospital inpatient units, nursing homes and Internal Medicine outpatient clinics (Gittell, Weinberg, Bennett, & Miller, 2008; Weinberg, et al., 2007). On the other hand, a dearth of evidence was found that sheds light on the predicators of relational coordination (Gittell, 2000, 2002a; Gittell, Weinberg, Bennett, et al., 2008).

Strengths of the current studies on relational coordination include: the use of relatively large sample size (most studies with a sample size greater than 200), clear inclusion / exclusion criteria of studies and relatively large effect size (Cohen, 1992; Kline, 2005). However, the quality of evidence is not robust enough to confirm causality between relational coordination and work outcomes with the majority of empirical evidence (14 studies) generated from studies employing cross-sectional, observational design with no control groups. Overall, the growing body of literature in relational coordination offers support for the inclusion of this construct in future research examining team effectiveness. Nevertheless, further studies employing more robust research methods (e.g., prospective, longitudinal studies) would further strengthen the evidence for relational coordination as an antecedent to positive work outcomes. In addition, future studies are warranted to investigate the predictors of this type of informal coordination mechanism. This study was designed to address this particular limitation. The empirical evidence on relational coordination is summarized below.

Relational coordination as a predictor. Relational coordination is commonly examined as a predictor for work outcomes in a variety of settings. Gittell et al. (2000, 2001) demonstrated airline departure team's relational coordination was associated with efficiency and performance as indicated by lower gate time ($r = -0.79$, $p < 0.05$), fewer passenger complaints ($r = -0.72$, $p <$

0.01) and better overall performance score ($r = 0.88$, $p < 0.01$). Similar findings were noted in the criminal justice system where agencies' coordination predicted offender reentry rates in nine different communities within the State of Massachusetts in the United States (Bond & Gittell, 2010). In another study of graduate students and employees in finance, software and electronic companies (Carmeli & Gittell, 2009), quality relationship (three dimensions of relational coordination) predicted learning from failures ($\beta = 0.71$, $p < 0.001$).

In health care settings, various quality and efficiency outcomes were related to relational coordination. Gittell et al. (2000) replicated the study of relational coordination in orthopaedics inpatient units at nine hospitals and reported that relational coordination predicted quality of care, level of post-operative pain and the percentage of decrease in length of stay ($R^2 = 46\%$ to 81%). A similar study in 15 nursing homes found that relational coordination is a significant predictor for both quality of life of nursing home residents ($\beta = 0.37$, $p < 0.01$) and job satisfaction of nursing aids ($\beta = 0.30$, $p < 0.001$) (Gittell, Weinberg, Pfefferle, et al., 2008). In addition, Hagigi (2008) examined the impact of relational coordination in 16 Internal Medicine outpatient clinics within one institution in Massachusetts (U.S.A.). She reported that the construct was associated with overall lower charges ($\beta = -3.78$, $p < 0.05$) and better quality outcomes for heart failure and asthma patients as indicated by changes in hospitalization rate (Heart failure patients: $\beta = -6.41$, $p < 0.01$) and documented action plan (Asthma patients: $\beta = 26.81$, $p < 0.001$). In addition to formal work teams, Weinberg et al. (2007) demonstrated relational coordination between formal care providers and informal caregivers also predicted 12-week pain ratings ($\beta = 0.20$, $p < 0.01$), functional ratings ($\beta = 0.17$, $p < 0.001$) and mental health ratings ($\beta = 0.21$, $p < 0.001$).

Studies examining predictors or correlates of relational coordination. Only a few studies explored the predictors or correlates of relational coordination, and all of them involved organizational characteristics as predictors. Gittell (2000, 2002) hypothesized and validated a model where the use of cross-functional liaisons ($r = 0.63, p < 0.10$), the use of information technology ($r = -0.69, p < 0.05$), cross-functional performance measurement ($r = 0.74, p < 0.05$), employee selection ($r = 0.72, p < 0.05$), conflict resolution ($r = 0.81, p < 0.1$) and flexible work roles ($r = 0.63, p < 0.10$) were correlated with relational coordination in both airlines and orthopaedics patient care services. Gittell, Seidner and Wimbush (2010) labeled the aforementioned characteristics as 'high performance practices' and reported that these practices (cross function selection, conflict resolution, performance measure, rewards, meetings, boundary spanners) predicted relational coordination in their study with a cross-sectional, observational study. In medical units, relational coordination was also predicted by job design ($\beta = 0.66, p < 0.01$) where the use of hospitalist for inpatients versus community physician (Gittell, Weinberg, Bennett, et al., 2008).

When conceptualized as a coping mechanism, relational coordination was shown to be predicted by perceived work stress ($\beta = 0.13, p < 0.05$) and formal work system ($\beta = 0.25, p < 0.001$) in orthopaedic inpatient units (Gittell, 2008). Although this conceptualization of relational coordination is not the focus of the present study, it is important to note the potential to apply this concept beyond the teamwork process of coordination.

In sum, empirical evidence of relational coordination validated its impact on teamwork outcomes in a number of different settings. However, despite expansion of its literature and an enhanced understanding of its predictors, the theoretical underpinnings of relational coordination remain unclear.

Theoretical Underpinnings of Relational Coordination

As its name implies, relational coordination finds its root in both organizational and relational theories. The concept contributes to the theory of coordination by filling in the gap for implicit, unplanned coordinating mechanisms. The integration of relational theories and coordination is a key progress in organizational science as work process is more frequently seen as relational, and the relational elements within organizations are increasingly recognized (Gianvito, 2007; R. M. Meyer & O'Brien-Pallas, 2010). Coordination theory provided the foundation of the construct while theories of interpersonal relationship provided the specific contextual elements that specified this particular form of relationship-based coordination.

Theory of coordination. Coordination is defined as the ‘management of interdependencies’ (Malone & Crowston, 1994). In the 1950s, March and Simon asserted that organizations can be coordinated through two means: planning (also known as ‘programming’) and feedback. Planning / Programming coordination aims to minimize discrepancies through setting standards for activities to be coordinated (i.e., pre-planned activities to clarify roles and responsibilities). On the other hand, feedback coordination is less tangible and involves the exchange of information to determine the activities to be performed and responsibilities for conducting these activities. Later on, Thompson (1967) proposed a third category of coordination, mutual adjustment coordination. Mutual adjustment coordination has similar properties as feedback coordination. Thompson explained that mutual adjustment coordination is a more spontaneous form of feedback coordination and is needed when mutual adjustment is required for new information. These categories of coordination are fundamental and remain the basis of today’s studies of coordination in various settings.

Similar to March and Simon’s argument, Thompson discussed coordination in the context of organization integration in the 1960’s. In his book, Thompson suggested the need to integrate components of an organization (Thompson, 1967). Coordination is needed in order to achieve integration. This notion of bringing parts together to yield a whole, final product or outcome ensures cohesiveness of production or work process (regardless of the nature of the target outcomes). Eventually, better performance, as indicated by the quality and efficiency of outcomes, will result from the enhanced cohesiveness. In addition, Thompson suggests the important factor of interdependence in coordinating work tasks. He theorizes that three levels of interdependence exist and affect the coordinating process – pooled interdependence, sequential interdependence and reciprocal interdependence. This taxonomy classifies coordination according to the quantity of interdependency involved in tasks. Pooled interdependence refers to individual units that perform completely separate functions, leading to indirect dependence on the performance of others. Sequential interdependence refers to work process where one unit produces an output necessary for the performance of the next unit. Lastly, reciprocal interdependence is similar to sequential interdependence where the output of one unit becomes the input of another, with the addition of being cyclical. These three types of interdependence (listed in increasing order of interdependence) warrant different coordinating processes, each requires a different (increasing) degree of interaction among the different units. For instance, more feedback coordination is required for tasks with higher level of interdependence. The propositions for levels of interdependency here reflect the importance of considering the nature of dependency in determining the appropriate coordination strategies required; as well, suggest that several forms of coordination exist.

The abovementioned framework serves as the theoretical foundation and subsequent development of coordination, including the emergence of relational coordination. It is believed that coordinating activities must address the type of interdependencies that exist and warrant interventions. For instance, in ambulatory clinics, sequential interdependence is noted as one of the interdependencies to be managed when the staff nurse and physician need to wait for the receptionist to retrieve a patient's medical record prior to assessing the patient. Sequential interdependence is depicted by situations when the product of one person is dependent upon the output of another and in this situation, the sequential interdependence can be managed through the establishment of clinic protocol to ensure the retrieval of medical record occur as soon as a patient arrives. Nevertheless, this early conceptualization of coordination was not validated empirically until the next wave of coordination studies took place.

Subsequent to the initial discussions by March and Simon (1958), and Thompson (1967), researchers in organizational science began to examine means to measure coordination and contingency factors relevant to coordination. In particular, Lawrence and Lorsch (1967), Van de Ven and Delbecq (1976) provided research evidence to support theories suggested by previous scholars.

Van de Ven and Delbecq contributed to the theory of coordination in several aspects. First, their research examined coordination at the unit or individual level of organization as opposed to the organizational or macro level. Novel data on individual's coordinating action suggested that the construct of coordination is suitable for multi-level analysis; as well, data at the individual level can be aggregated to the group level.

Moreover, Van de Ven and Delbecq suggested a different nomenclature for programming coordination and feedback coordination mechanism. They organized coordinating processes by the type of personal contact – group, personal and impersonal coordination (Van de ven, et al., 1976). This classification provides another perspective in conceptualizing coordination but never became the mainstream view in the conceptualization of coordination.

Furthermore, Van de Ven and Delbecq reported that work factors of task uncertainty (impersonal mode: $\beta = -0.44$, $p < 0.05$; personal mode: $\beta = -0.33$, $p < 0.05$; group mode: $\beta = 0.57$, $p < 0.05$), task interdependence (personal mode: $\beta = 0.19$, $p < 0.05$) and unit size (impersonal mode: $\beta = 0.22$, $p < 0.05$) predicted different modes of coordination. Based on these findings, task uncertainty, task interdependence and unit size are the most important work factors to be considered in determining the mode of coordination. Considering these factors, authors furthered Thompson's three levels of interdependencies and suggested a new level of interdependency called team interdependency, which captures a type of interdependency unique from pooled interdependence, sequential interdependence and reciprocal interdependence. Van de Ven and Delbecq claimed that team interdependency is unique and involves an even higher level of dependencies amongst subtask people and resources than reciprocal interdependency. However, details of team interdependency were not elaborated. The introduction of team interdependency reflects a need to explore coordination processes used for teamwork as teamwork entails a unique level of dependency, a need similar to Thompson's idea of mutual adjustment in coordination.

Lawrence and Lorsch (1967) also tested previous coordination theories; they studied the pattern of differentiation and integration (coordination) in association to external demand within complex organizations. Findings from their work suggested several key attributes are associated with varying level of coordination [e.g., degree of structure (formal structure versus informal structure); orientation of members towards others (task-oriented versus socially oriented interpersonal relations)]. Again, these findings contribute further understanding of coordination in response to various organizational factors (Lawrence & Lorsch, 1967) and supporting the premise that coordination (and its impact) can vary according to work environment. Since then, numerous factors have been examined for their impact on coordination, such as communication, leadership and decision making (Malone and Crowston, 1994). Certainly, the increasing amount of empirical evidence on various aspects of coordination enhances our understanding of this concept. However, despite growth in understanding the influence of contextual factors, the fundamental issues brought up by Thompson, Van de Ven and Delbecq remain – What is mutual adjustment coordination (i.e., the spontaneous form of coordination)? What dependencies are unique in team interdependencies? These are important questions as a thorough understanding of coordination will, ultimately, lead to more effective management of work.

The emergence of relational coordination was a break through alongside a few other theories that address mutual adjustment coordination, such as collective mind (Weick & Roberts, 1994) and shared mental model (Lee-Kelley & Blackman, 2005). Relational coordination not only explains coordination related to relational ties, but also spells out dimensions that can be interchangeable based on role-based relationships instead of unique personal ties. Next, theories in relationship were reviewed to clarify relational theories that explain relational coordination.

Theories on interpersonal relationship. Differences in how one relates to others explain variations in attitude and behaviour. Over the years, psychologists, sociologists and anthropologists have studied interpersonal relationship from various perspectives, leading to myriad of theories about relationships with differing foci. Some of these theories provide linkages for postulating the association between interpersonal relationships and behavioural outcomes that affect work performance in group setting, providing a theoretical foundation for relational coordination. These theories and concept include *social exchange*, *social equity*, *trust*, *relational dialectics* and *social capital*. Of these concepts, social capital is the most encompassing concept that offers the most fitting explanation for the theoretical underpinnings for relational coordination.

The social exchange theory argues that relationships can be explained in terms of exchanged benefits; that is, the way individuals feel about their relationships is influenced by the rewards of the relationship and this feeling, in turn, affects attitude and behaviours one may have towards these relationships (e.g., willingness to exert more effort at work) (Homans, 1958). This mutually reinforcing association between perceived benefits and efforts influence performance. For instance, when one perceives benefits with a relationship at work, he or she is more likely to communicate with others and engage in problem solving initiatives. Consequently, with further understanding, members will likely develop shared goals, mutual respect and the capacity to communicate in a timely and accurate manner.

Contrary to social exchange theory, the *social equity theory* argues that relationships are not only based on maximizing rewards, behaviours in relationships are also driven by a sense of equity and fairness. According to the equity theory, relationships that are driven by a sense of equity of fairness will prompt the establishment of shared goals, mutual respect and willingness to problem solve (Adams, 1965). Consequently, more frequent communication will lead to shared knowledge that enhances accuracy and timeliness of communication.

Scholars in social psychology examined *trust* resulting from the presence of interpersonal relationship. Trust is a mental state that translates to the willingness of an individual to be vulnerable; additionally, it is believed to have an impact on behaviour and decision-making (Levin & Cross, 2004). The presence of trust may lead to shared goals, mutual respect and more frequent communication as a result of a trustor's willingness to be vulnerable to the trustee(s) (Levin & Cross, 2004). These coordination attributes lead to problem solving communication, shared knowledge, followed by more timely and accurate communication.

As discussed previously, accuracy of communication has been conceptualized in terms of its trustworthiness in the knowledge seeking literature (Levin & Cross, 2004) under the circumstances where accuracy is determined subjectively because the perceived 'correctness' of information is associated with how confident an individual feels about the source of information (Levin & Cross, 2004).

Another theory that sheds light on the impact of relational ties on behaviour *is relational dialectics*. Relational dialetics posits that a relationship is a dynamic and continuous process affected by the equilibrium of three main themes. These themes are: autonomy versus connection; novelty versus predictability and openness versus closeness (Baxter, 1988; Levin & Cross, 2004). Relational dialetics suggests that relationship and behaviour are mutually reinforcing. It coincides with mutual adjustment coordination as the relational dialectics theory concurs with the dynamic and spontaneous nature of mutual adjustment coordination.

The aforementioned concepts and theories contribute to explain certain dimensions of relational coordination. However, none of these concepts or theories can provide comprehensive explanation for all seven dimensions of relational coordination. Social capital provides a broader fundamental view about how interpersonal relationships tie with behaviour and attitude (Table 1).

Social capital refers to the assets or resources embedded in relational ties. The central thesis of social capital theory argues that relational ties or networks of relationships constitute an important resource for the conduct of social affairs, resulting in a collectively-owned capital which entitles individuals within these networks to credit one another (Nahapiet & Ghoshal, 1998). Nathapiet and Ghoshal also suggest that much of this collective capital is embedded within networks of mutual acquaintance and recognition. For instance, the connections amongst friends, colleagues and family are different relationships (different in strength and other characteristics); yet, each type of connection has its own contribution to a unique form of capital for individuals embedded in these networks. Trust, cooperation and different forms of collective actions (e.g., shared language) are considered examples of social capital (Gianvito, 2007; Jacobs, 1961; Nahapiet & Ghoshal, 1998).

Early studies of social capital were launched to understand the functioning and survival of communities through developing networks of relationship (Jacobs, 1961). To date, the impact of social capital and the value of social resources have been demonstrated in a variety of population and communities, including neighbourhoods, ethnic groups, individuals of different socioeconomic status, work teams and organizations.

Literature search in the current study revealed over 180 studies related to social capital in organizations. Social capital theory finds its root in sociology and thus, its body of literature is mixed with a combination of qualitative and quantitative methods used. Similar to the literature review for relational coordination, only publications with empirical evidence were reviewed. In particular, publications related to organizations and teamwork outcomes and utilized quantitative methods were of interests in explicating the theoretical foundation of relational coordination.

Findings from the present review showed an abundance of evidence that support social capital as a predictor for behavioural and attitudinal outcomes in work settings. A major strength in this body of literature is the fact that this construct has been examined in many different countries and a variety of settings with consistent, positive associations found with individual behaviour and attitudes embedded in a collective. However, the quality of the quantitative evidence is only moderately robust. Similar to the literature in relational coordination, studies in social capital mostly employed cross-sectional, observational methods. The monomethod, subjective used in measuring social capital posed risks for common method variance. Certainly, future studies employing more robust research methods (e.g., prospective, longitudinal studies with multi-methods) would further strengthen the evidence in demonstrating the impact of social capital and organizational outcomes. Notwithstanding the deficiencies found in this body of literature, the present study aimed to test the hypotheses generated from previous theory and evidence in explicating the theoretical foundation of relational coordination.

Table 1
Interpersonal Theories and Relational coordination

	Definition	**How it explains relational coordination**	**Deficiencies**
Social exchange	The benefits that people obtain from (and contribute to) social interaction and the opportunity structures and interdependencies govern social exchanges (Molm, 2006). In other words, behaviour is driven by rewards or maximizing benefits.	Perceptions of benefits and costs of coworkers motivate quality communication and supportive beahviour.	A one-dimensional explanation of behaviour and attitudes. Does not explain mutual respect
Relational dialetics	A relationship is a dynamic and continuous process affected by the equilibrium of three main themes. These themes are: autonomy versus connection; novelty versus predictability and openness versus closeness (Baxter, 1988; Levin et al., 2004).	Similar to the premise of mutual adjustment (informal) coordination, relationship and behaviour are mutually reinforcing.	Not well understood. A lack of empirical evidence supporting specific ties with the dimensions of relational coordination.
Trust	The willingness for the trustor to be vulnerable to the trustee.	Positive perceptions motivates positive behaviour and attitude (e.g., perceived correctness of information)	A one-dimensional explanation of behaviour and attitudes. Does not explain timely communication and shared knowledge.
Social equity	Behaviours in relationships are driven by a sense of equity and fairness.	A sense of fairness prompts the establishment of shared goals, mutual respect and willingness to problem solve (Adams, 1965)	Also a one-dimensional explanation of behaviour and attitudes. Does not explain accurate communication, timely communication and shared knowledge.
Social capital	Assets or resources embedded in relational ties	Provided a broad perspective in characterizing resources available within a network of relationship. These resources are potential pre-cursor of the dimensions specified in relational coordination, a more focused construct.	Many different definitions and taxonomies used for this broad construct. Relatively new in its application in the organizational literature (1990s).

Conceptualization of social capital. Although resources within personal relationships have always been the central focus in the social capital, there is a lack of consensus on a specific definition of social capital. This is due to the fact that social capital has been conceptualized differently by different scholars. Some scholars believe that social capital is limited to the structure of relationship networks (e.g., social network theory), while other scholars argue that social capital includes the structure and the potential resources available through such networks (e.g., resource-based theory) (Gianvito, 2007). In the study of coordination, neither internal (i.e., resources from the characteristics of the network ties) nor external (i.e., assets resulting from the structure and configuration of network) relationships should be excluded because coordination involves participants from different work groups at various levels; therefore, for the purpose of exploring the role of social capital in explaining coordination activities, a comprehensive approach will be adopted for this study. Based on this assumption, social capital is defined as 'the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit' (Nahapiet & Ghoshal, 1999). Please see Appendix A for a list of common definitions.

Following this definition, the 'potential' resources refers to those that originate from the nature and characteristics of relational structure (network approach) and the 'actual' resources refer to those that originate from the nature and characteristics within the relational structure (resource approach). Different taxonomies have been used to describe the aforementioned resources. The two most commonly known taxonomies are: a) bonding / bridging social capital; and, b) structural / relational / cognitive social capital. Potential resources from the structure of relationships are labeled as structural social capital (Nahapiet and Ghoshal, 1998) or bridging social capital (Adler & Kwon, 2002; Putnam, 1995). On the other hand, the actual resources within relational ties are labeled as bonding social capital by Adler & Kwon (2002). However, Nahapiet and Ghoshal (1998) further divided the actual resources into relational social capital and cognitive social capital.

The present study adopted the taxonomy proposed by Nahapiet & Ghoshal (1998) in their examination of the association between social capital and intellectual capital. This taxonomy is chosen because: a) intellectual capital (such as knowledge) has crucial role in achieving mutual adjustment coordination and relational coordination; and b) the three dimensions of social capital provide more thorough and specific analyses than the two dimensional approach (i.e., bonding and bridging social capital) for understanding the association between relational ties and the seven dimensions of relational coordination. Further details about the two constructs can be found in Table 2 and Table 3.

The structural and relational dimensions of social capital have roots in Granovetter's work on the structural and relational embeddedness of social capital, which argues for the value of both strong and weak interpersonal ties. *Structural social capital* refers to the properties of the network or the impersonal configuration of linkages between relationships, such as the overall pattern of connections among individuals. Structural social capital is most commonly assessed in terms of: a) connectivity of network, b) configuration of network, and c) pattern of network. Connectivity of network is reflected by network size and the configuration of network is reflected by direct or indirect ties. According to Gianvito (2007), direct network ties reflect immediate connections between actors, whereas indirect ties are those paths that act as bridging points between actors who are not immediately connected. With regards to the pattern of network, it can be reflected by network density, network stability, network range, network closeness or network centrality (Brass, 1996).

In understanding the theoretical underpinnings of relational coordination, structural social capital is best thought of as *network strength* which reflects the overall manifestations or advantages of all the aforementioned attributes within structural social capital. Network strength is typically represented by magnitude of openness in communication within the network.

Relational social capital concerns the personal properties of the relational ties, such as trust, approval and respect. Although relational social capital is relatively under developed in the social capital literature, Nahapiet and Ghoshal (1998) employed relational social capital to define the nature of existing ties. According to this perspective, relational social capital refers to the kind of personal ties a person has, and is characterized primarily by trust (Levin et al., 2004; Moran, 2005); trustworthiness (Coleman, 1988; Tsai & Ghoshal, 1998); obligations and expectations (Nahapiet & Ghoshal, 1998); norms and identification (Nahapiet & Ghoshal, 1998); liking and intimacy (Bolino, Turnley, & Bloodgood, 2002). While all these characteristics are important for work, *trust* is the most commonly examined constructs in health care communication and work teams, therefore, will be used to represent relational social capital in outpatient care teams. The construct of *liking* is also chosen for the present study due to its association with satisfaction, which is an important motivational factor and thus, offer close ties with spontaneous behaviour and attitudinal responses included in relational coordination.

Lastly, *cognitive* dimension of social capital refers to the resources for social capital that provide ‘shared representations, interpretations and systems of meaning amongst parties’ (Nahapiet & Ghoshal, 1998). The cognitive dimension refers to shared codes, rules, representations, interpretations and systems of meaning (Nahapiet & Ghoshal, 1998). It also includes interdependent values, attitudes and beliefs. The specific resources that reflect cognitive social capital include shared expectations and culture (Inkpen & Tsang, 2005; G. W. Watson & Papamarcos, 2002); shared vision and shared goals (Tsai & Ghoshal, 1998); shared language and codes; quality of communication (Watson & Papamarcos, 2002); and shared values (Lang, 2004). Of these, *shared language* and *shared interpretation* are particularly pertinent to effective communication, which is a central element of relational coordination. Thus, *shared language* and *shared interpretation* will be used to reflect cognitive social capital resources. Although shared expectations, shared vision and shared values have significant role in communication, they were not included because of the similar nature of these constructs to relational coordination.

To summarize, social capital is a broad and encompassing theory, discussion in this section led to the identification of specific resources suitable for explaining relational coordination: *network strength*, *trust*, *likings*, *shared language* and *shared interpretation*. These are very important resources that originate from social network, affecting attitude and behaviour amongst care providers in outpatient clinics. Moreover, these five types of social capital resources have been examined for their association with work place outcomes (Gianvito, 2007; Merlo, Bell, Menguc, & Whitwell, 2006; Tsai & Ghoshal, 1998).

Study Question and Hypotheses

To explicate relational coordination involves an examination on both relational and coordination theory, as well, their empirical evidence. This was achieved through identifying resources among work relational ties, followed by linking them with relational coordination via theory and empirical evidence.

In order to explicate the relationships between social capital and relational coordination, a research question was raised to guide the development of specific hypotheses: *How does social capital associate with relational coordination among health care providers in outpatient clinics?*

Table 2

Definition and Concepts within Relational Coordination and Social Capital

<table>
<tr><th></th><th>Relational Coordination</th><th colspan="2">Social Capital</th></tr>
<tr><td>Definition</td><td>A form of mutual adjustment (informal) coordination, a type of work process resulting from the presence of relational ties.</td><td colspan="2">A form of capital embedded within relational ties</td></tr>
<tr><td>Applications</td><td>A factor in work quality improvement
Settings: Work settings – Commercial airlines, criminal justice system, health care</td><td colspan="2">Social, political and economic development
Setting: Population, communities, work settings (organizations, work teams), recreation settings (sports teams, clubs)</td></tr>
<tr><th colspan="4">Sub-concepts</th></tr>
<tr><th colspan="2">Relational Coordination</th><th colspan="2">Social Capital</th></tr>
<tr><td rowspan="4">Relational Coordination: Quality Communication (RC communication)</td><td>Frequent communication</td><td colspan="2" rowspan="7"></td></tr>
<tr><td>Timely communication</td></tr>
<tr><td>Accurate communication</td></tr>
<tr><td>Problem-solving communication</td></tr>
<tr><td rowspan="3">Relational Coordination: Supportive Relationship (RC supportive relationship)</td><td>Shared goals</td></tr>
<tr><td>Shared knowledge</td></tr>
<tr><td>Mutual respect</td></tr>
<tr><td rowspan="5"></td><td rowspan="5"></td><td>Structural social capital</td><td>Network strength (open communication)</td></tr>
<tr><td rowspan="2">Relational social capital</td><td>Trust</td></tr>
<tr><td>Liking</td></tr>
<tr><td rowspan="2">Cognitive social capital</td><td>Shared language</td></tr>
<tr><td>Shared interpretation</td></tr>
</table>

Table 3

Timeline for the Development of Relational Coordination and Social Capital

Theory Development				
	Relational Coordination		**Social Capital**	
	Key authors		Key authors	
Before the 1950s			Hanifan (1910s)	Urged the importance of community involvement for successful schools
1950s – 1960s	March & Simon; Thompson	1. Provided a foundation for the study of coordination 2. Defined (inter)-dependency and its relationship with coordination		
1960s – 1970s	Lawrence & Lorsch; Van de ven & Delbecq	1. Validated previous coordination theories in office settings 2. Operationalized the constructs of coordination and interdependency	Loury	1.Provided an economic interpretation of social capital in his dissertation; 2.Analysed resources available in a community or organization and their impact on the development of young children
			Bourdieu	Suggested the idea of three forms of capital, they are social, cultural and economic capital. Flush out the concept of social capital
1980s to early 1990s	Shortell et al.	Validated previous theories and evidence of coordination in the intensive care unit	Coleman	Elaborated on the details of social capital. Argues that that social capital is anything created by networks of relationships, reciprocity, trust and social norms. Social capital, in turn, facilitates individual or collective action.
1990s	Young et al.	1. Validated previous theories and evidence of coordination in surgical inpatient units 2. Focused on the impact of coordination on performance 3. Validated Van de Ven & Delbecq's findings about the use of different coordination methods		
Late 1990s +	Bickell and Young	1. Provided information about specific coordination mechanisms used in caring for oncology patients 2. Provided information about coordinating care in outpatient care setting	Nahapiet & Ghoshal	Suggested the taxonomy of relational, structural and cognitive social capital
	Espinosa et al.	Proposed another taxonomy for coordination – implicit and explicit coordination; the mutually exclusive nature of implicit and explicit coordination helps researchers to categorize specific coordination mechanisms	Fukuyama	Linked trust with social capital
	Gittell et al.	Provided a comprehensive explanation in addressing *mutual adjustment* in feedback coordination	Putnam	Focused on social networks and argued about the positive influences of social capital on society
			Various	Applied the construct in work settings and management science

Hypothesized overall connection between social capital and relational coordination. Based on theory and empirical evidence presented in the following section, a model was created to describe and explain the overall relationship between social capital and relational coordination while accounting for the contributions from other factors (Figure 1). When examined individually, each dimension of relational coordination has been shown to correlate with at least one dimension of social capital. As such:

Hypothesis 1: Social capital predicts relational coordination in outpatient clinics.

Although relational coordination was often studied as a single-factor construct with seven dimensions, the current hypotheses were constructed based on a two-factor approach because relational coordination was conceptualized as a construct with two main foci: quality communication and supportive relationship (Gittell, 2011). This two-factor structure of relational coordination was validated using confirmatory factor analysis in this study (Chapter 4). The following section aims to draw associations between social capital and each focus of relational coordination (communication components and relationship components).

Connections between the communication dimensions of relational coordination and social capital. Findings from literature review suggest connections between relational ties and superior quality of communication (Nahapiet & Ghoshal, 1998; Oh, Chung, & Labianca, 2004; Sabatini, 2009). The empirical data, although non-specific to the type of social capital or dimension of relational coordination, provides a foundation for formulating the present hypotheses concerning social capital and communication dimensions of relational coordination. For instance, Benner (2007) suggested that relationship between physician and nurse is a key to patient safety as non-intimidating relationships facilitate communication and reduce errors (Benner, 2007). In addition, research of social capital also found positive correlation between social capital and enhanced communication (Godesiabois, 2007; S. H. Lee, Wong, & Chong, 2005; Nahapiet & Ghoshal, 1998).

Hypothesis 1a: Social capital predicts the four communication dimensions of relational coordination (frequent, accurate, timely and problem-solving communication) in outpatient clinics.

More specifically, frequent communication is predicted by *structural social capital* because structural social capital reflects how members in a relational network connect, including perceived closeness amongst members in the same network. It has been shown that tight knitted networks where members are exposed to more and easier ways to connect are characterized with more frequent communication (Lawson, Tyler, & Cousins, 2008; Zhuang, Zhou, Su, & Yang, 2008). Meanwhile, *relational social capital* concerns the personal qualities individuals possess within relationships, quality such as trust and positive feelings (liking) will prompt individuals to communicate more frequently (Cargill, 2000; Gilberg, 1993; Leonhardt, 2003). As such, relational social capital should predict frequent communication as well.

Accurate communication is predicted by cognitive social capital because the shared language and shared understanding are associated with more effective and accurate communication (Davalos & Griffin, 1999; Grant, 1996; Milligan, Gilroy, Katz, Rodan, & Subramanian, 1999; Moran, 2005) as shared language and interpretation minimizes discrepancies and the chance of misinterpretation.

Timely communication is predicted by both structural social capital and cognitive social capital. As discussed previously, closeness amongst individuals is reflected in structural social capital. A sense of closeness is related to communicating at the right time as fewer barriers exist for communication to occur (Gittell, 2000; Green, et al., 2001). As such, communication will become timelier when there are fewer barriers for communication. On the other hand, shared language, shared understanding and expectations about work as signified by cognitive social capital will enable individuals to communicate at the right time due to better judgment of when exchange should occur (Davalos & Griffin, 1999; Grant, 1996; Milligan, et al., 1999; Moran, 2005).

Problem-solving communication is predicted by all three types of social capital. First, a tight-knitted network of relationships with high degree of openness in communication (indicator of structural social capital) enables problem-solving communication because fewer barriers are present in disclosing to a colleague about a work issue (Denton, 1993; Gilberg, 1993). Second, positive relationships that are trusting and harmonious (relational social capital) will engender helpful behaviours, such as that seen in problem-solving communication (Braithwaite, Rick, & Jorm, 2007; Ding, Ng, & Cai, 2007). Third, a common language and shared knowledge about one another's work facilitates problem resolution (Davalos & Griffin, 1999; Grant, 1996; Milligan, et al., 1999; Moran, 2005). Gianvito (2007) reported that organizational citizenship behaviour, characterised by willingness to be helpful, is positively correlated with relational social capital ($r = 0.19$, $p < 0.05$). Given that intent to be helpful contributes to problem-solving (H. J. Lee & Nomura, 2006; Paquin, 1990; W. E. Watson, Ponthieu, & Critelli, 1995), Gianvito's finding implies a connection between problem-solving communication and all dimensions of social capital.

Connections between the supportive relationship dimensions of relational coordination and social capital. Overall, existing literature suggests that social capital predicts the supportive relational components of relational coordination. However, evidence does not specify the form of social capital or the dimension of relational coordination that are related to one another. Danchev (2005) reported that higher level of social capital and job satisfaction ($R^2 = 16.8\%$) predicted sustainable work behaviours in firms. Moreover, Oh, Chung and Labianca

(2004) studied both inter- and intra-group bonding and bridging activities (forms of social capital) in Korea found that group effectiveness, characterised by mutual understanding and performance, is maximized via optimal configurations of bonding and bridging social capital ($R^2 = 50.0\%$, $F = 6.40$, $p < 0.001$) (Oh et al., 2004). In health care, social capital is also associated with higher job satisfaction ($\beta = 0.172$ to 0.348, $p < 0.001$) (Farr-Wharton & Brunetto, 2007); less emotional exhaustion ($\beta = -0.26$, $p < 0.001$) and lower level of job tension ($\beta = -0.17$, $p < 0.10$) (Chang, Gotcher, & Chan, 2006). These outcomes are associated with relational behaviour.

Hypothesis 1b: Social capital predicts all three relational dimensions of relational coordination (shared goals, shared knowledge, mutual respect) in outpatient clinics.

To provide further empirical support for hypothesis 1b, goals are often shared in groups with high level of open communication (Denton, 1993; Gilberg, 1993) and it is considered to be a form of structural social capital. In network of relationships where trust and liking exist, individuals are more likely to strive towards a collective goal (Ding, et al., 2007; Langfred, 2007). In addition, Gianvito (2007) examined the association between affective organizational commitment and social capital and reported a positive correlation between affective organizational commitment and all dimensions of social capital (structural: $r = 0.22$, $p < 0.01$; relational: $r = 0.47$, $p < 0.01$; cognitive: $r = 0.35$, $p < 0.01$). Considering commitment is linked with a sense of obligation and trust (J. P. Meyer, Allen, & Smith, 1993; G. W. Watson & Papamarcos, 2002), it is reasonable to believe relational social capital will predict shared goals. Lastly, shared goals are similar to shared interpretation and shared language represented in cognitive social capital. These constructs are likely to be mutually reinforcing as they share the notion of a collective identity. Therefore, *shared goals* can be predicted by all three types of social capital.

Similar to shared goals, common language and mutual understanding depicted in cognitive social capital share the notion of collectivism. These cognitive social capital qualities, despite a lack of empirical evidence, are essential in the attainment of a shared body of knowledge related to accomplishing work or communicating about work. As such, *shared knowledge* can be predicted by cognitive social capital in outpatient clinics.

Last, but not the least, *mutual respect* can be predicted by all three types of social capital. Openness in communication (structural social capital) at work allows individuals to express their opinions freely and demand the attention of other individuals to whom the communication is targeted. This in turn engenders reciprocity, which is the foundation for mutual respect (Smyth, 2005; Wolff & Agree, 2004). On the other hand, relational social capital (e.g., liking and trust) fosters mutual respect amongst group members (Ding, et al., 2007; Langfred, 2007). Despite a lack of direct empirical evidence for mutual respect and social capital, preliminary study findings show that mutual respect is associated with superior teamwork evaluations that are related to shared cognition (Beach, Roter, Wang, Duggan, & Cooper, 2006; Tomasik, 2008; Williams, 2004). This suggests potential predictive relationship between cognitive social capital (shared cognition) and mutual respect, and between mutual respect and team performance.

Hypothesized Model

In the proposed model of relational coordination and social capital, social capital is expected to predict relational coordination. This model also examined the association between other factors and the main constructs of interest simultaneously. These associations include: a) formal coordinating mechanisms predicting relational coordination; as well, b) team tenure predicting social capital.

Scholars reported that formal coordinating mechanisms (e.g., boundary spanners, team meetings as well as routines) improve performance by increasing the level of relational coordination among participants (Gittell, 2002b; Gittell, Seidner, & Wimbush, 2010; Hagigi, 2007). These formal coordinating mechanisms enhance relational coordination because it is through these mechanisms that participants in work group are given more opportunities to develop ties with other participants and shared assets that are unique to the setting.

Hypothesis 2: Formal coordinating mechanisms predict relational coordination measures in outpatient clinics.

Several factors have been theorized for their influence on social capital and have been considered in the development of the present framework (Assudani, 2007; Bolino, et al., 2002; Evans & Carson, 2005; Hodson, 2005; Van Emmerik, 2006; Yuan & Gay, 2006). Amongst them, organizational citizenship behaviour and organizational harmonizing atmosphere will be excluded in this model because they have not been validated empirically (Bolino, et al., 2002; Mele, 2003). In addition, co-location, functional diversity and leadership behaviour will be excluded due to irrelevance – First, staff members at the ambulatory clinics work together in the same physical environment and therefore, co-location is expected to be consistent across target population; Second, the degree functional diversity does not vary drastically across the target population in the present study because a similar number of health care professionals are involved in patient care at the ambulatory clinics; and lastly, leader-member dynamics are not prevalent in interprofessional teams of ambulatory clinics as the nature of interprofessional collaborative practice is often non-hierarchical (Oandasan et al., 2004; Way, Jones, & Busing, 2000). An interprofessional patient care approach demands equal participation among all health care providers and thus, the role of nurse manager or a site group leader do not always conform to the convention leadership role in this setting.

Team tenure is included in the proposed model and is posited to be associated with a higher level of social capital ($r = 0.16 – 0.20$, $p < 0.05$) (Gianvito, 2007). It is believed that the length of time spent working in the same network is associated with a sense of familiarity and enhanced communication that enable shared resources (social capital) (Gianvito, 2007).

Hypothesis 3: Team tenure predicts social capital measures in outpatient clinics.

Chapter 2

Table 4

Associations between Social Capital and Relational Coordination

			Social Capital		
			Structural social capital (network strength/open communication)	Relational social capital (trust, liking)	Cognitive social capital (shared language, shared interpretation)
Relational Coordination	Quality Communication	Frequent communication	+	+	
		Timely communication	+		+
		Accurate communication			+
		Problem-solving communication	+	+	+
	Supportive Relationship	Shared goals	+	+	+
		Shared knowledge			+
		Mutual respect	+	+	+

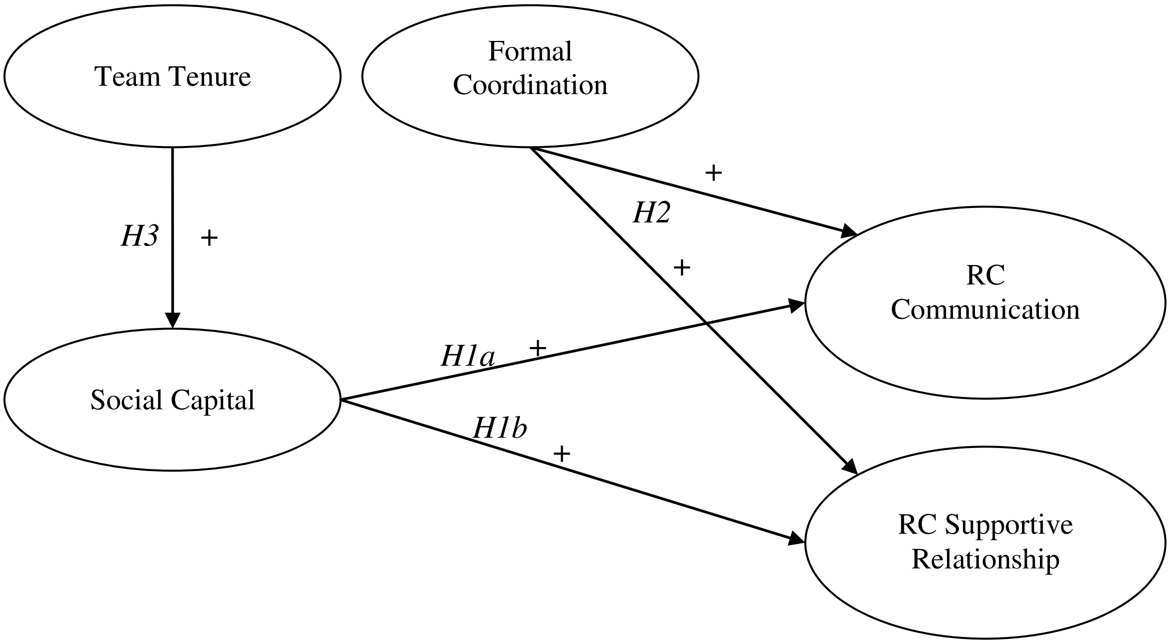
Team Tenure
Formal Coordination
H3
+
+
H2
+
RC Communication
H1a
+
Social Capital
H1b
+
RC Supportive Relationship

Figure 1. Path diagram depicting hypothesized relationships in the present study.

Conclusion

The emergence of relational coordination signifies an important step in understanding mutual adjustment coordination proposed by Thompson (1967). Nevertheless, gaps are found in the theory of relational coordination and one of the most common criticisms for relational coordination is its unclear theoretically underpinnings. While interpersonal relationship is the basis of relational coordination, concepts and entities that give rise to these relationships preceding relational coordination remain unclear and unexplored.

The present study aimed to investigate the theoretical underpinnings of relational coordination, a form of mutual adjustment coordination, by examining the relationship between social capital and relational coordination. This is a timely and important issue as mutual adjustment coordination mechanisms should be used more frequently in various work settings, particularly with the increasing amount of teamwork involved in health care delivery. In the past decade, interprofessional collaborative practice in outpatient clinics is especially challenged by mounting patient volume, high uncertainty, time and resource constraints. These additional demands and the increasing complexity in patient management warrant seamless coordination among caregivers to ensure optimal outcomes.

CHAPTER THREE: METHOD

The present study employed a cross-sectional design to examine the proposed relationships among social capital, relational coordination, team tenure and formal coordinating mechanisms. Data were collected from nurses and physicians in outpatient clinics at two university-affiliated health care centres in Southern Ontario. In this chapter, the methodology and data analysis strategies used in this study are described.

Setting and Sample

Setting. The present study was conducted in two health care centres in Southern Ontario. Both centres offered similar number and areas of outpatient services (Table 5). One centre had two sites and the other had three sites. Although the structure of these sites and outpatient clinics were similar, minor differences were noted in administrative and operation pattern (e.g., size of department, decision-making procedures, patient volume). Therefore, additional analyses were performed to describe differences in the sample setting and sample characteristics between the two sites (Chapter 4).

Study sample. Nurses and physicians assume the primary role in the provision of care at outpatient clinics as evident by: a) almost every patient interacts with at least one physician and/or a nurse during their visit at the clinic; and b) outpatient issues were best addressed by physicians and nurses (e.g., treatment decisions, symptom management, psychosocial support). In addition, most outpatient clinics in Ontario are staffed with only physicians and nurses and other health care professionals are not always present. As such, professionals of these two disciplines were the target of the present study.

Table 5
Characteristics of the Health Care Centres in Current Study

Characteristic		**Institution 1**	**Institution 2**
Areas of Care (Note: not all areas are surveyed)		Cancer care Cardiac care Critical and surgical care Medical and community care Musculoskeletal health and arthritis Neuroscience program Transplantation	Cancer care Cardiac care Critical and trauma care Musculoskeletal health Neuroscience program Perinatal and gynaecology care Veteran and community care
Location		City centre	Urban area, 15 kilometres from city centre
Size and Volume	Number of Beds	About 770	About 700 (excluding 500 beds in the veteran unit)
	Number of Nurses Employed (2007)	About 2500	About 2300
	Estimated Number of Nurses at Ambulatory Clinics	>100	80
	Number of Physicians Employed (2007)	>400	About 450
	Estimated Number of Physicians at Ambulatory Clinics	>200	>225

The sample for this study consisted of 144 nurses and 198 physicians (N = 342), including 85 nurse-physician clinic dyads. Inclusion criteria for participants were: a) staff nurses and physicians who work at outpatient clinics. Specifically, one doctor-nurse dyad was randomly recruited per outpatient clinic; b) ability to understand study procedures and provide informed, written consent for the study. Staff members were excluded from this study if they were enrolled in another research study.

The unit of measurement was at the individual level as physician and nurse participants provided survey responses individually. On the other hand, the constructs were theorized at the team level and as such, the unit of analysis was also the outpatient clinic represented by the nurse-physician dyad.

Sample size consideration. There is currently no agreed upon method for determining sample size for structural equation modeling (SEM) (Byrne, 2010; Kline, 2005), the main hypothesis testing method in the present study. It is believed that SEM requires a sample size of at least 100 to 150 cases and may require even larger sample size if model is complex (Kline, 2005). Considering model complexity, scholars (Kline, 2005; Schumacker & Lomax, 1996) suggested a minimum satisfactory sample should include 10 to 20 cases per parameter to be estimated in the path model.

The final path model to be tested consisted of six parameters (Figure 2), leading to a proposed sample size of 120. This number was also supported by Hayduk's opinion that a reasonable sample size for structural equation modeling should be greater than 100 (Hayduk, 1987).

Instrumentation

Overview. The present study aimed to examine the association between *social capital* and *relational coordination*. Additionally, participants' *demographic characteristics*, *team tenure* and *formal coordination mechanism* were measured. Demographic information served to describe the sample while team tenure and formal coordination mechanisms were considered control variables in the model examining the relationship between social capital (Gianvito, 2007) and relational coordination (Gittell, 2000, 2011).

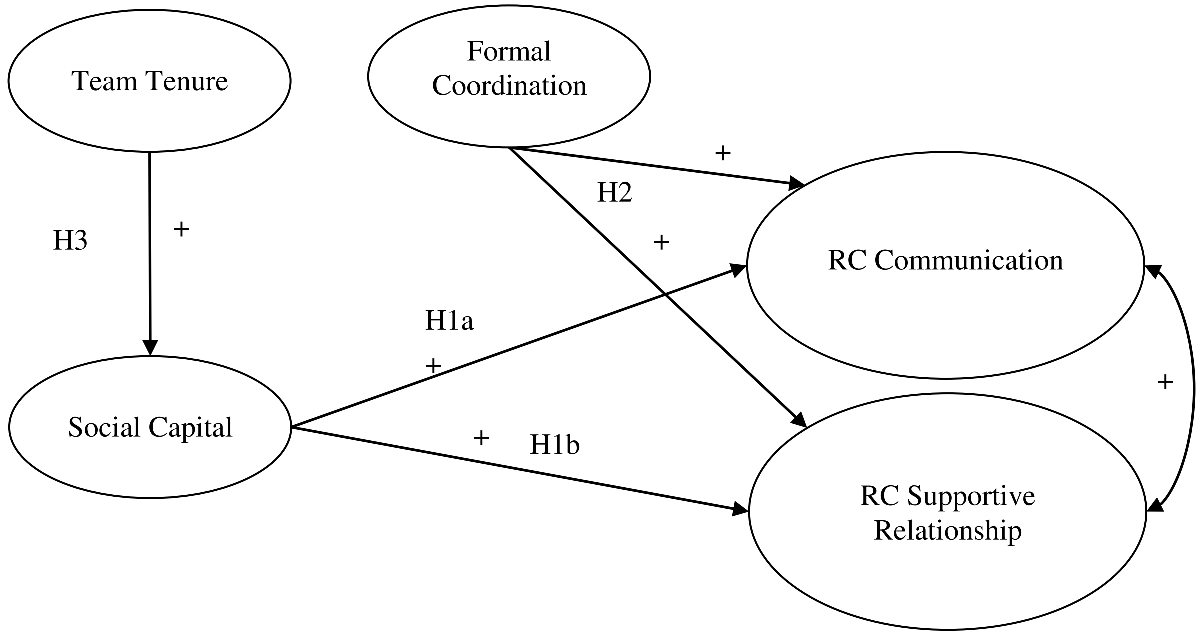

Figure 2. Path diagram tested in the present study.

In terms of instrumentation, relational coordination was measured using the relational coordination questionnaire (Gittell, 2000) and social capital was measured via the social capital survey (Gianvito, 2007; Shortell, Rousseau, Gillies, Devers, & Simons, 1991). Additionally, formal coordination mechanism was assessed through survey (Gittell, 2000); team tenure and demographic information were collected through the demographic questionnaire.

Relational coordination. Relational coordination was defined as the relational form of coordination (Gittell, 2000). At work, relational coordination encompasses dimensions of supportive communication (relational coordination: communication) and supportive relationship (relational coordination: supportive relationship). This concept was measured using a 6-item survey in the present study following confirmatory factor analysis where one item was removed from model testing (Chapter 4), each item in the survey measures a separate indicator of RC on a 5-point Likert scale. Physicians and nurses from outpatient clinics were asked to answer these questions with respect to the other professional group. For instance, physician A in clinic A was asked to answer the questions regarding working with his/her nursing colleague at the same clinic (and vice versa). An example of a survey item would be: 'How much does the (nurse/physician) share your goals for the care of patients at this clinic?'

For each participating dyad, two sets of RC ratings were obtained; one set from the nurse and one set from the physician member of the dyad. Each set of RC ratings from each individual should have included a total of seven individual scores. Each of these seven scores represented one dimension of RC in an outpatient clinic team and the mean of these seven scores provide the overall RC index as perceived by the participant. The average score between each nurse-physician dyad reflects the overall RC of the outpatient clinic team.

In this study, the Cronbach's alpha for RC communication (3 items) was 0.81 (0.78 for dyadic data) and for RC supportive relationship (3 items) was 0.84 (0.83 for dyadic data), indicating good level of reliability. Confirmatory factor analysis was conducted to verify construct validity, please see Chapter 4 for further details.

Social capital. Social capital is commonly examined as a construct with three dimensions: Structural, relational and cognitive social capital (Nahapiet & Ghoshal, 1998). In this study, structural social capital is represented by open communication; relational social capital is represented by trust and liking; and cognitive social capital is represented by shared language and shared interpretation.

The assessment of the three dimensions of social capital was made through measurements of specific indicators for each dimension. A total of 14 items were included in the present survey of social capital in outpatient clinic teams following the elimination of two items during confirmatory factor analysis (Chapter 4). First, *structural SC* was assessed by measuring the magnitude of open communication. Open communication reflects the strength of network, which is a key component of structural SC [according to the Social Network Theory (Contractor, Wasserman, & Faust, 2006; Parkhe, Wasserman, & Ralston, 2006)]. The survey of open communication consisted of four items, participants were asked to rate their responses to four statements concerning their communication at work on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Sample questions include: 'It is easy for me to talk openly with the staff members of this clinic.'; 'Communication between staff members in this clinic is very open.'; 'I find it enjoyable to talk with staff members of this clinic.' (Shortell, et al., 1991).

Relational SC was assessed by measuring the magnitude of trust and likings. These two constructs capture the personal characteristics of network ties and have been employed to assess relational SC (Gianvito, 2007; Tsai & Ghoshal, 1998). The present study employed a five-item survey used by Gianvito (2007): It consisted of Levin and Cross's (2004) three-item Benevolence-Based Trust Scale (e.g., 'Interacting with this staff member is a pleasure.') (Levin & Cross, 2004), one item adapted from Tsai and Ghoshal (1998; e.g., 'I can rely on this person without any fear that he/she will take advantage of me') and one item from Gianvito (2007) (i.e., 'I trust this person'). Participants were asked to use a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) to indicate the extent to which they agreed with each statement.

Magnitude of *cognitive SC* was reflected by the degree of shared language and shared interpretation among members of the team. The *cognitive SC* instrument used in the present study was adopted from Gianvito (2007). This instrument consisted of one items from Tsai and Ghoshal (1998), along with one item adapted from Moran (2005); 'This staff member shares my overall values', and three items from Gianvito (2007) (e.g., 'This staff member explains things using the same kind of language that I do'). Participants used a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) to indicate the extent to which they agreed with each statement. Items were averaged to form scale scores for each contact, which was then averaged across contacts to form cognitive social capital scale scores.

In this study, the Cronbach alpha reliability coefficient for the total scale of social capital consisting of 14 items was 0.97 (0.97 for dyadic data), indicating good internal consistency. Confirmatory factor analysis was conducted to verify construct validity and the results are reported in Chapter 4.

Demographics. Participants' demographics were collected to describe the study sample. The demographic survey consisted of questionnaires regarding the gender, age, education level and history with their present job. These items were commonly included in studies of nurses (Feskanich, Hankinson, & Schernhammer, 2009; Laschinger & Leiter, 2010) and responses were used to describe the study sample. Team tenure was measured as part of the demographic survey.

Formal coordinating mechanisms. The three types of pre-planned coordination mechanisms chosen and validated by Gittell (in a study of airline crew teams) included routines, boundary spanners and team meetings. Routines involve pre-specifying how and when to complete tasks in a particular sequence. Gittell identified clinical pathways and protocols as examples of routines in care provision. Boundary spanners, as indicated by the nomenclature, are individuals who are designated to work across boundaries; specifically, functional boundaries. In health care settings, case managers and clinical flow coordinators are individuals who liaise with care providers in different disciplines. Lastly, team meetings such as patient rounds and tumour boards are occasions where communication occurs directly among all members of a work group and facilitate the formation of relational coordination. The use of routine as coordination mechanisms was assessed via survey. Participants were asked about the frequency of using flow sheet, protocols or clinical pathways at their clinic. Participants were asked to rate the frequency of use on a 5-point Likert scale. The involvement of boundary spanner was assessed by obtaining the number of coordinators (or equivalent roles) at participants' clinics. Lastly, the frequency of team meetings was assessed via survey. Participants were asked about their attendance at patient rounds or tumour board. Response options were a 5-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5).

Table 6
Instrumentation

Construct	**Instrument**	**Description of content**	**Cronbach's α (dyadic data)**	**Previous Cronbach's α**
Relational Coordination	Relational coordination survey (Gittell, 2000) – 7 items	Frequency of communication	0.81 to 0.84 (0.76 to 0.80)	0.86 (Gittell, 2007)
		Problem-solving communication		
		Accuracy of communication*		
		Timeliness of communication		
		Shared language		
		Shared goal		
		Mutual respect		
Social Capital	Social capital survey (Gianvito, 2007; Shortell et al., 1991) – 16 items	Open communication (4 items)	0.97 (0.97)	0.83 to 0.95 (Gianvito, 2009)
		Trust (3 items)		
		Likings (3 items)**		
		Shared language (3 items)		
		Share interpretation (3 items)**		
Health Professionals Baseline Demographics	Demographics survey – 7 items	Age	n/a	n/a
		Gender		
		Education Level		
		Team Tenure		
		Months/Years Worked at the Present Institution		
		Practice Location		
		Subspecialty of Practice		
Formal Coordination Mechanism (Gittell, 2000)	Routines – 1 item	Use of protocol and/or clinical pathways*	0.21 (0.30)	n/a
	Boundary Spanner – 1 item	Number of coordinator or case manager at clinic		
	Team Meetings – 1 item	Attendance at rounds and/or tumour board*		

*excluded in structural equation modeling
**one item was excluded in structural equation modeling

Data Collection

Participants were recruited from ambulatory departments in two University affiliated hospitals. At the time of data collection, each attending physician's clinic was staffed with a designated nurse. As such, this designated partnership became the nurse-physician dyad targeted in the study, representing teamwork in outpatient clinics. Following the approval of research ethics boards at the hospitals and at the University of Toronto, study surveys were sent to 501 nurses and 187 physicians at 256 clinics via one of three methods as per specified by department chairs or administrators: e-mail, internal mail or in-person. Participants were given the option to complete the survey either in paper format or electronic format. Follow-up reminders were sent out at approximately three, five and seven weeks after the initial distribution of the surveys (Dillman, 2007). The overall response rate was 49.71% (342 participants, with 104 paper and 238 electronic surveys). A total of 85 clinic pairs were obtained.

Ethical Considerations

As mentioned previously, this study was approved by all relevant research ethics boards. The study was conducted in compliance with the Tri-Council Guidelines on Research, as well, specific guidelines from local research ethics boards. Participants were ensured the rights to be informed about the purpose and procedure of this study and that consent could be withdrawn at any point. To protect participants' privacy and ensure confidentiality, participants' information and their responses to the questionnaires were not and will not be shared with anyone outside the study unless required by law and participants' identity has been replaced by a study code to further ensure confidentiality. In addition, study documents and questionnaires are stored in a locked cabinet in a secured office space as per institution policies.

Data Analysis: Data Screening

Data were entered manually into an SPSS Version 18 data file where data screening was performed. The accuracy of data was verified through manual verification of all data by the author and a research assistant. Prior to the main analysis, the characteristics (frequencies and descriptive statistics) of all variables were examined to assess for accuracy of data entry, missing values and outliers. Statistical significant level was set at 0.05 for all analyses in this study.

Missing data analysis was conducted subsequent to the verification of data accuracy. Univariate statistics of missing variable analysis showed that the demographic variable of age was the only variable with more than 5% missing data. A total of 10.24% of respondents did not respond to the age question. Independent t-test was conducted to evaluate differences in other variables between the groups where variable 'age' is present and absent (Tabachnick & Fidell, 2007). No significant differences were noted. To further examine the pattern of missingness, Little's MCAR test was performed and yielded nonsignificant findings (Chi-square = 309.40, *df* = 361, *p* = 0.98), indicating that the missing data were missing completely at random (Tabachnick & Fidell, 2007).

Once the missing data were confirmed to be missing at random, missing data points were estimated. Missing team tenure (TT) data were estimated and then replaced via two methods: if feasible, missing TT values were replaced with the team tenure information provided by the other half of the dyad because their responses should be identical. Additionally, two missing data points of TT were imputed by multiple imputations with age and time in institution as predictors (Tabachnick & Fidell, 2007).

Missing data for the RC7 variable were also imputed by multiple imputations (Tabachnick & Fidell, 2007). For the demographic variable of age which had the most missing data points, no actions were taken as the variable was not involved in hypothesis testing. The remaining missing values for TT and formal coordination strategy could not be estimated from existing data because these cases were unmatched with the other half of the clinic dyad, as well, predicators were absent for imputations. Thus, 14 cases were excluded from hypothesis testing. This resulted in a sample size of 328 individuals (81 dyads).

Data normality, outlier and multicolinearity assessments. The distribution of all variables within the hypothesized model was examined to ensure they met the assumptions for structural equation modeling. Univariate skewness and kurtosis were assessed and found to be within acceptable ranges (Tabachnick & Fidell, 2007), while multivariate kurtosis was detected with *z* score well above five (Byrne, 2010). Transformation was attempted (Tabachnick & Fidell, 2007) but did not improve multivariate kurtosis. Extreme kurtosis affects the standard error estimates, modification indices and fit statistics of structural equation models (Browne, 1987; Kline, 2005) and thus, bootstrapping technique was used to generate adjusted parameter estimates and error estimates for the hypothesized model (Bollen, 1989; Byrne, 2010; Kline, 2005). However, subsequent to both transformation and bootstrapping, only minor differences were noted in the model fit indices, parameter estimates and standard error estimates (Appendix C). Therefore, report of study findings in Chapter 4 consisted of outputs from the original dataset.

The presence of univariate outliers, pairwise linearity, multicolinearity and singularity were also assessed with nonsignificant findings. Multivariate outliers were assessed using Mahanalobis distance, Mahanalobis *d* square indicated one multivariate outlier (case 288, subject 792). This outlier was removed from the dataset, resulting in a total of 327 cases (N = 327) for model testing.

Similar to the assessment of normality in individual data, the assessment of normality in dyadic data involved the distribution of all variables within the hypothesized model. The data were examined to ensure they met the assumptions for structural equation modeling. Univariate skewness and kurtosis were kurtosis were assessed and found to be within acceptable ranges (Tabachnick & Fidell, 2007), while multivariate kurtosis was detected with *z* score well above five (Byrne, 2010). Transformation was attempted (Tabachnick & Fidell, 2007) but did not improve multivariate kurtosis. Extreme kurtosis affects the standard error estimates, modification indices and fit statistics of structural equation models (Browne, 1987; Kline, 2005) but unlike the individual data, bootstrapping was not feasible due to a small sample size (Kline, 2005). The presence of univariate outliers, multivariate outliers pairwise linearity, multicolinearity and singularity were also assessed with nonsignificant findings.

Data Analysis: Descriptive and Inferential Statistics

Descriptive statistics and baseline analysis. Descriptive statistics and baseline analyses in this study consisted of a description of the sample and univariate characteristics, validation of unit of analysis and an assessment of baseline differences. In particular, validation of unit of analysis was completed using intra-class correlation (McGraw & Wong, 1996), and the assessment of baseline differences was made using analysis of variance (ANOVA) (Tabachnick & Fidell, 2007) (Chapter 4).

Hypothesis testing. Structural equation modeling (SEM) was the main statistical technique used to test the hypothesized model using AMOS Version 18 computer software program. SEM is a statistical technique that tests for and estimates a model of relationships using a combination of path analysis and confirmatory factor analysis (Hayduk, 1996). Although structural equation modeling shares similar purpose and use as multiple regression, it is more appropriate for the current investigation of predicting RC with SC while taking into account the variables that influence RC and SC, as well, taking into account the covariances of their respective indicators. In particular, confirmatory factor analysis within structural equation modeling accounts for the presence of multiple, inter-related indicators in a model for a single latent variables while path analysis enables the estimation of a model despite the presence of multiple, inter-related independent and dependent variables. In this study, SEM employed the maximum likelihood (ML) estimation method. ML is the most common method of estimating the best fitting parameters for SEM (Kline, 2005).

A two-step approach to SEM was suggested by Kline (2005). First, measurement models of the study constructs were tested using a factor analytic model approach (confirmatory factor analysis) to statistically test how and the extent to which the observed variables were linked to their underlying latent factors. The measurement models assessed the overall factorial structures utilizing fit indexes, and if necessary, ruled out any misspecifications which resulted in poor fit. Subsequently, the structural model was examined simultaneously with the validated measurement models, testing the specified relationships among the latent variables as posited by theory.

The evaluation of SEM included the examination of overall model fit, parameter estimates and misspecification of the hypothesized model (Byrne, 2010). There are numerous fit indices that evaluate the model fit to sample data. The use of a minimal of three fit indices in appraisal was recommended by Kline (2005). This study employed the following: Chi-square statistics, Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), the Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI).

Model Chi-square is the most basic fit statistic and is the product of the statistical criterion minimized in ML estimation and the overall degrees of freedom (Kline, 2005). It provides a comparison between the observed and predicted covariance matrices. While no specific cut-off value exists, a larger Chi-square value indicates poorer fit of an overidentified model (Kline, 2005). The observed (sample-based) and predicted (population-based) matrices should not be significantly different (i.e., the observed model has perfect fit in the population); thus, it is the failure to reject the null hypothesis that support the hypothesized model (i.e., $p < 0.05$).

Root Mean Square Error of Approximation (RMSEA) measures the error of approximation, the difference between the observed and predicted covariance matrices. A value of zero indicates the best fit and higher values indicate worse fit. Kline (2005) suggested RMSEA ≤ 0.05 indicates close approximate fit, values between 0.05 and 0.08 suggest reasonable error of approximation and RMSEA ≥ 0.10 suggests poor fit. In addition, the 90% confidence interval of RMSEA reflects the degree of uncertainty associated with RMSEA and should also be examined in conjunction with the RMSEA value. Ideally, the lower bound of a 90% confidence interval should be greater than 0.05 and the upper bound of the same confidence interval should not exceed the cut-off value (i.e., 0.10 in this study). When this occurs, RMSEA is believed to be subject to sampling error because the 90% confidence interval indicates repeated testing will produce RMSEA ranging from poor fit (zero) to good fit (0.10).

Standardized Root Mean Square Residual (SRMR) measures the mean absolute value of the correlation residuals (Kline, 2005). Similar to RMSEA, increasing SRMR values indicate worse fit. Kline (2005) recommended a cut-off value of SRMR 0.10 and Byrne (2010) recommended a cut-off value of 0.05 for ‘superior fit’.

Comparative Fit Index (CFI) compares the model fit between the hypothesized model and baseline (independence) model, which assumes zero population variances among the observed variables based on Chi-square statistics (Kline, 2005). CFI ranges from zero to 1.0. Kline (2005) suggested CFI of 0.90 or greater indicates reasonably good fit and Byrne (2010) recommended a cut-off value of 0.95 or higher. Tucker-Lewis Index (TLI) is a similar index but considers model parsimony. TLI ranges from zero to 1.0 as well and Byrne (2010) recommended a cut-off value of 0.95 or higher.

The Adjusted Goodness of Fit Index (AGFI) belongs to another class of fit indices that aims to reflect the proportion of variability in the sample covariance matrix explained by the model. AGFI values greater than 0.90 indicate good fit and values close to zero indicate very poor fit (Kline, 2005).

Table 7
Structural Equation Model Fit Indices for the Present Study

Type of Fit Index	**Fit Index**	**Acceptable (Cut-off) Value**
Comparison of sample and estimated matrices	Chi-Square	Looking for non-significance
Measurement of error based on approximation (population)	RMSEA	< 0.08 (need to assess confidence interval as well)
Measurement of correlation residuals	SRMR	< 0.10 (Kline, 2005) < 0.05 (Byrne, 2010) for superior fit
Estimation of variability explained	AGFI	> 0.90 (Kline, 2005)
Comparison of hypothesized and null model	CFI	> 0.90 (Kline, 2005) > 0.95 (Byrne, 2010) for excellent fit
Comparison of hypothesized and null model, accounting for parsimony	TLI	> 0.95 (Byrne, 2010)

In addition to the overall model fit, three aspects of the parameter estimates were assessed in evaluating the hypothesized model. First, parameter estimates included in the final model had to be within range (e.g., correlation coefficients greater than 1, negative variances) and coincide with theory (Byrne, 2010). Next, standard errors could not be too large or too small as these conditions implied inaccurate data and problems with test statistics respectively. Moreover, estimates were assessed for statistical significance (*z* score > 1.96) (Byrne, 2010).

The assessment of misspecification (used for post-hoc analysis to guide model re-specification) included the examination of covariance residuals and modification indices (Byrne, 2010; Kline, 2005). Covariance residuals greater than 2.58 suggested substantial error between two observed variables (Byrne, 2010), reflecting poor validity and potential cross loading (Kline, 2005). Both the modification indices and expected parameter change (EPC) value were evaluated for their theoretical merits and magnitude (Byrne, 2010). In fact, any changes made to the hypothesized model were fully supported by theory and empirical evidence. Re-specified models based on theory and post-hoc statistical analyses were evaluated based on a significant drop in Chi-square statistics according to its degree of freedom, as well, the significance and feasibility of the new parameter estimates (i.e., parameter estimates exhibiting the right sizes and signs and be consistent with underlying theories) (Byrne, 2010; Kline, 2005).

CHAPTER FOUR: RESULTS

Sample Characteristics

The sample of this study consisted of 144 nurses and 198 physicians (N = 342). Of the 342 participants, 85 nurse-physician clinic dyads were obtained. Following data screening, the dataset for hypothesis testing comprised 139 nurses and 188 physicians (N = 327). A total of 81 nurse-physician dyads were included in hypothesis testing.

Results revealed a sample of experienced health professionals in oncology and in outpatient care. The mean age of participants was 48.26 years-old (SD: 9.83; Range 26 to 73), mean time employed at current institution was 14.84 (SD: 10.11) years, and mean time spent working in the present clinic was 10.02 (SD: 7.76) years.

Table 8
Study Sample by Profession and Level of Analysis

	All Cases	**Dyads Only**
	N	N
MD	198 (57.89%)	85
RN	144 (42.11%)	85
Total	342 (100%)	172
For structural equation modeling	327 (188 MD, 139 RN)	81

In this study, the nurse participants were slightly older (49.61 versus 46.3 years-old) (College of Nurses of Ontario, 2009), more experienced (17.51 amongst Ontario and Alberta registered nurses versus 12.0 years in present institution) (Laschinger & Leiter, 2010) and better educated (38.35% amongst Canadian registered nurses versus 33.0% with bachelor’s degree) (Statistics Canada, 2005) than the general nursing population. A lower percentage of male nurses

(2.88% versus 4.8%) (College of Nurses of Ontario, 2009) was also noted than in the general Ontario nursing population. In terms of employment status, a higher percentage of participants worked full-time (72.46% versus 64.7%) when compared with Ontario statistics but a slightly lower percentage was noted when compared with nurses from the same region (74%) (College of Nurses of Ontario, 2009).

For physician participants, similar percentages of male physicians (65.97% versus 66.1%) were noted between the sample and Ontario data (Canadian Medical Association, 2010). Similar percentages were noted in physicians in full-time or part-time practice (89.78% versus 91.0%) (Canadian Medical Association, 2007). On the other hand, the sample included a younger group of physicians: 35 to 54 years-old physicians accounted for over 60% (63.91%) of participants while only 51.6% are in the 35 to 54 age group according to the Canadian Medical Association database (Ontario data). A limited amount of information was available to compare the highest education received with the general physician population in Ontario. However, it is expected that physicians within the sample would have more training in research for their academic affiliations with teaching institutions.

Baseline differences were assessed using analysis of variance (ANOVA) with gender, participant’s role, site and pairing status (with partnering physician or nurse in the same clinic) as between factors. No significant differences were noted between female and male participants, between physician and nurse participants, among participants in the five sites and between paired and unpaired participants, in scores for the constructs included in this study.

Table 9
Participant Demographics

	All cases **Means (SD)**	**Nurses** **Means (SD)**	**Physicians** **Means (SD)**
Mean age in years (SD) (n = 151)	47.91 (9.71) Range 26 – 73	49.61 (10.29) Range 26 - 67	47.08 (9.73) Range 32 – 73
% male	39.02%	2.88%	65.97%
Team tenure (in years)	10.02 (7.76) (range: 0.08 to 35.58)	9.00 (7.32) (range: 0.08 to 28.66)	10.51 (8.14) (range: 0.58 to 35.58)
Time at institution (in years)	14.84 (10.11) (range: 0.08 to 40.58)	17.51 (10.67) (range: 0.08 to 40.58)	16.06 (10.01) (range: 0.75 to 40.58)
% employed part-time	7.10%	12.32%	3.23%
% employed full-time	82.41%	72.46%	89.78%
Highest Education Received			
		RN (n = 133)	MD (n = 186)
College diploma	-	46 (34.59%)	0
Bachelors (including MD)	-	51 (38.35%)	107 (57.53%)
College diploma and specialty nursing certificate	-	10 (7.52%)	n/a
Bachelors and specialty nursing certificate	-	2 (1.50%)	n/a
Masters / Nurse Practitioner /equivalent	-	24 (18.05%)	49 (26.34%)
Doctorate	-	0	30 (16.13%)

Chapter 4

Table 10
ANOVA Results for Baseline Differences

Effect	**Wilks' Lambda Value**	***F***	**Hypothesis *df***	**Error *df***	**Sig.**
Site	0.91	0.94	28.00	1032.61	0.56
Dyad	0.98	0.82[a]	7.00	286.00	0.57
Gender (sex)	0.98	0.75[a]	7.00	286.00	0.63
Profession (role3)	0.98	1.03[a]	7.00	286.00	0.41
Site * dyad	0.93	0.79	28.00	1032.61	0.78
Site * SEX	0.93	0.76	28.00	1032.61	0.81
Site * role3	0.93	0.79	28.00	1032.61	0.78
dyad * SEX	0.97	1.29[a]	7.00	286.00	0.26
dyad * role3	0.97	1.42[a]	7.00	286.00	0.20
SEX * role3	0.98	0.77[a]	7.00	286.00	0.62
Site * dyad * SEX	0.97	0.63[a]	14.00	572.00	0.84
Site * dyad * role3	0.95	0.52	28.00	1032.61	0.98
Site * SEX * role3	0.97	0.68[a]	14.00	572.00	0.80
dyad * SEX * role3	0.97	1.30[a]	7.00	286.00	0.25

a. Exact statistic

Validating Group-Level Constructs from Individual-Level Data

Intraclass correlations (ICC) were assessed to confirm that relational coordination and social capital can be analysed as group-level phenomena, where, the variance of construct ratings within dyads should be less than the total variance. A two-way random model was selected for ICC testing and results indicated insufficient cohesiveness within the dyadic data for both relational coordination and social capital measurements (Fleiss, 1986; McGraw & Wong, 1996). Consequently, individual-level data were used for the majority of data analysis. The final structural model was tested with the dyadic data for comparison and validation, recognizing the limitation of combining the dyadic scores.

Table 11

Intra-class Correlation

Construct	**ICC (N = 86)**
RC: Communication	0.20 (average measure)
RC: Supportive relationship	0.26 (average measure)
Social capital	0.48 (average measure)
Formal coordination mechanisms	0.12 (single measure)
Team tenure	0.35 (single measure)

Table 12

Demographic Information of Dyadic Sample and Complete Sample

All Cases	RN	MD	Total (N = 342)
Male	4 (2.88%)	126 (65.97%)	130 (39.02%)
Female	139 (97.12%)	65 (34.03%)	204 (60.98%)
Mean age in years (SD)	49.61 (10.29)	47.08 (9.73)	47.91 (9.71)
Range	26 – 67	32 – 73	26 – 73
Dyads Only	RN	MD	Total (n = 170)
Male	2 (2.35%)	52 (61.17%)	54 (63.53%)
Female	83 (97.65%)	33 (38.83%)	116 (36.47%)
Mean age in years (SD)	49.15 (10.61)	47.52 (10.03)	48.36 (10.33)
Range	26 – 65	32 – 73	26 – 73

Table 13

Means of Main Study Variables

	Likert Scale Range	**All cases Means (SD)**	**Dyads Means (SD)**	**Unpaired cases Means (SD)**
Relational coordination: Communication	1 – 5	4.49 (0.55)	4.52 (0.50)	4.46 (0.60)
Relational coordination: Supportive relationship	1 – 5	4.32 (0.60)	4.35 (0.58)	4.28 (0.63)
Social capital	1 – 5	4.43 (0.61)	4.49 (0.54)	4.36 (0.67)
Use of Routine (Formal coordination mechanism)	1 – 5	3.33 (1.23)	3.45 (1.20)	3.22 (1.26)
Team tenure (in years)	n/a	10.02 (7.84)	10.51 (8.14)	9.56 (7.54)

Chapter 4

Structural Equation Modeling

Measurement model. Confirmatory factor analysis (CFA) was used to test the relational coordination and social capital measurement models. The measurement model, or factor model, specified the relationship among measured (observed) variables underlying the latent variables (Schumacker & Lomax, 2004). In the measurement model, the construct predicts the measured variables; thus, the relationship is depicted by connecting the construct (factor) to its indicators.

While social capital (SC) was tested as a single-factor construct (Ando, 2010; Nuno, 2008), two equivalent CFA models were tested to verify the factor structure of relational coordination (RC). Gittell (2007) hypothesized that RC was a one-factor construct with two main components: high quality communication and supportive attitude/behavior. As such, indicators were fitted on a one-factor (Model 1), and then a two-factor (Model 2) CFA models for comparison of best fit. Table 14 illustrates the initial model fit statistics for both models. With both approaches being theoretically sound, as well, all parameter estimates being significant and feasible, Chi-square difference test confirmed that a two-factor RC model has better fit (Chi-square = 160.67, $df = 2$, $p < 0.001$). Improved fit indices were also noted (CFI improved from 0.870 to 0.892; TLI improved from 0.856 to 0.880; AGFI improved from 0.680 to 0.717; RMSEA improved from 0.112 to 0.103) (Table 14). Figure 3 illustrates the final measurement model with social capital modeled as a one-factor construct and relational coordination as a two-factor construct.

When the fit and misfit of this measurement model was further evaluated via all chosen fit indices, regression weights (unstandardized and standardized coefficient estimates), residual estimates and modification indices, post-hoc modifications were made with the support of theory and empirical evidence (Appendix D). For example, the examination of the model misfit through modification indices suggested that the error terms for timely communication and problem-solving communication were correlated. This is possible as the wording for these two items were similar; and timely communication often leads to problem-solving, suggesting a common cause underlying these two indicators (Byrne, 2010; Kline, 2005). Also, indicators RC3, INT3 and LI3 for SC appeared to be cross loading on both constructs (SC and RC) as evident by high covariance residuals and high modification indices; these indicators were removed from the final measurement model to improve the overall model fit, and to ensure the convergent and discriminant validity of instruments.

Table 14
Measurement Model Fit-Indices

	Chi-Sq (*df*)	***p***	**CFI**	**TLI**	**AGFI**	**RMSEA**	**RMSEA 90% CI**	**SRMR**
Acceptable value	-	>0.05	>0.90	>0.90	>0.90	<0.08	0 - 0.10	<0.08
Model 1	1165.79 (229)	<0.001	0.870	0.856	0.680	0.112	0.106 - 0.118	0.051
Model 2	1005.12 (227)	<0.001	0.892	0.880	0.717	0.103	0.096 - 0.109	0.044
Final Model	366.11 (159)	<0.001	0.966	0.959	0.865	0.063	0.055 - 0.072	0.032

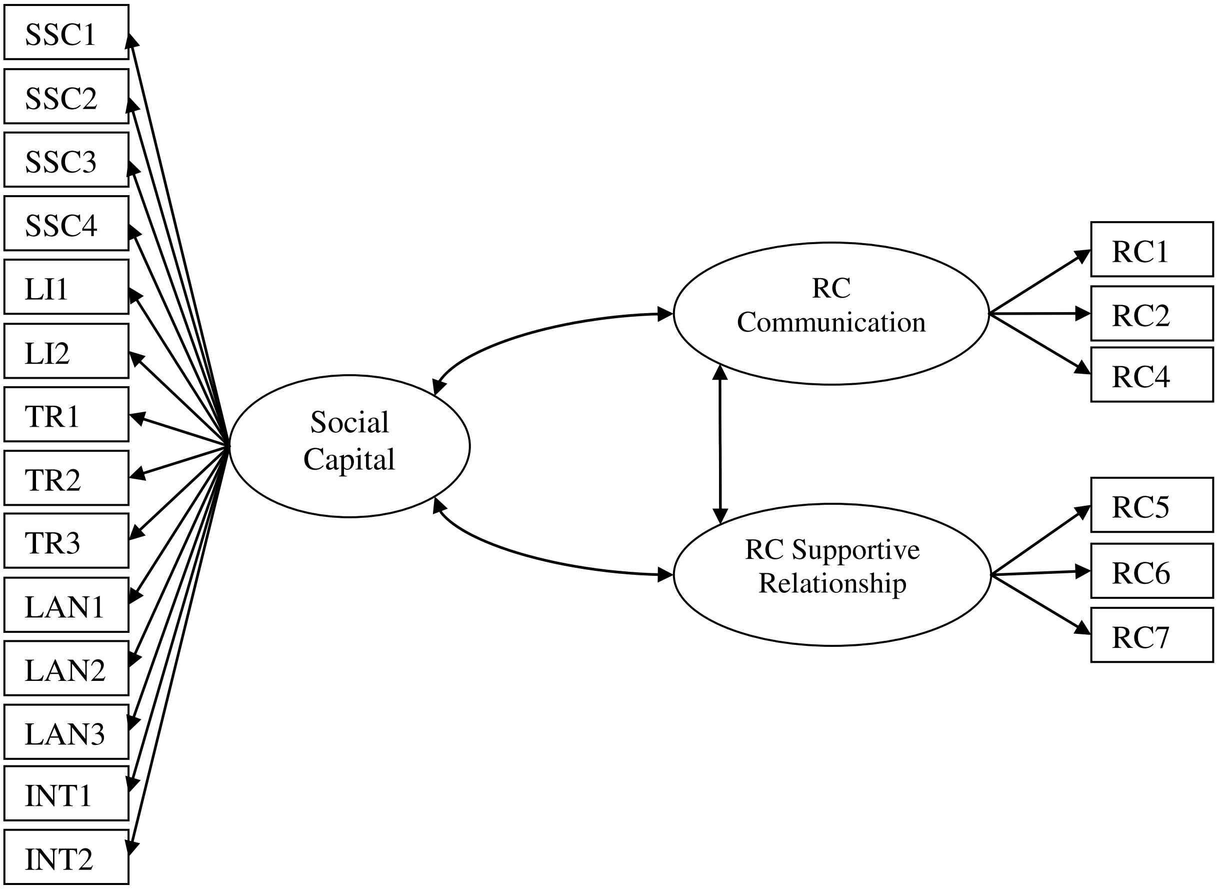
SSC1
SSC2
SSC3
SSC4
LI1
LI2
TR1
TR2
TR3
LAN1
LAN2
LAN3
INT1
INT2
Social Capital
RC Communication
RC Supportive Relationship
RC1
RC2
RC4
RC5
RC6
RC7

Figure 3. Final measurement model.

Cronbach's alpha was assessed again after the elimination of indicators. Minimal changes were noted in social capital instrument (Table 15). While a slight decrease in Cronbach's alpha was noted in the relational coordination instrument, the level remains acceptable at above 0.80 as per recommendation for non-exploratory studies (Gittell, 2011; Nunnally & Bernstein, 1994).

Table 15
Reliability of Instruments after CFA

Construct	**Cronbach's α prior to CFA (dyadic data)**	**Cronbach's α of final CFA model (dyadic data)**
RC Communication*	0.85 (0.83) (4 items)	0.81 (0.78) (3 items)
RC Supportive Relationship*	0.84 (0.83) (3 items)	0.84 (0.83) (3 items)
Social Capital	0.97 (0.96) (16 items)	0.97 (0.97) (14 items)

*Cronbach's α of a one-factor RC model with 7 items = 0.88 (0.87 for dyadic data)

Table 16

Regression Coefficients for Latent Variables after CFA

Construct	**Regression Weight (Standard error)**		**Standardized Regression Weight**		**Indicator**
	Individual	**Dyad**	**Individual**	**Dyad**	
Social capital (14 indicators)	0.97***(0.07)	1.16***(0.17)	0.82	0.86	Easy to talk openly SSC1
	0.99***(0.07)	1.12***(0.16)	0.85	0.88	Communication is open SSC2
	1.18***(0.08)	1.32***(0.19)	0.87	0.89	Enjoyable to talk with SSC3
	1.15***(0.08)	1.25***(0.18)	0.88	0.88	Easy to ask advice SSC4
	1.01***(0.07)	0.97***(0.14)	0.85	0.85	Trust this individual TR1
	0.97***(0.08)	0.86***(0.15)	0.69	0.69	Rely on this individual TR2
	1.27***(0.10)	1.31***(0.20)	0.80	0.84	This individual cares TR3
	0.99***(0.07)	1.02***(0.14)	0.88	0.91	Get along LI1
	1.24***(0.09)	1.30***(0.19)	0.89	0.89	Interacting is a pleasure LI2
	1.02***(0.08)	1.12***(0.18)	0.76	0.75	Use same jargon LAN1
	1.11***(0.08)	1.15***(0.17)	0.89	0.86	Easily communicate LAN2
	0.99***(0.07)	1.04***(0.16)	0.85	0.84	Understand expression LAN3
	1.08***(0.07)	1.09***(0.13)	0.80	0.78	Interpret work events INT1
	1.00	1.00	0.67	0.65	Perceive motives INT2
RC communication (3 indicators)	0.74*** (0.07)	0.69*** (0.15)	0.66	0.62	Frequent communication RC1
	1.08*** (0.08)	1.16*** (0.18)	0.92	0.95	Timely communication RC2
	1.00	1.00	0.84	0.83	Problem-solving communication RC4
RC supportive relationship (3 indicators)	0.91*** (0.06)	0.98*** (0.15)	0.78	0.77	Shared knowledge RC5
	0.94*** (0.06)	1.24*** (0.17)	0.83	0.89	Mutual respect RC6
	1.00	1.00	0.80	0.71	Shared goals RC7

***$p < 0.001$

Structural model. The initial model incorporating both the measurement models and structural paths (Model 3) was found to have reasonable fit, with several fit indices above the acceptable level: Chi-square = 435.12, *df* = 197, $p < 0.001$, NC = 2.2; CFI = 0.961; TLI = 0.955; AGFI = 0.860; RMSEA = 0.061 (90% C.I.: 0.053 to 0.069); SRMR = 0.0606. Parameter estimates were also assessed, and it appeared that the path predicting the relationship between coordinating strategy (routine) and relational coordination was nonsignificant and had high residual covariances with other indicators. After removing this path, the model (Model 4) was re-run and yielded an improved fit that was similar to the previous CFA model with both latent factors (Klein, 2005): Chi-square = 388.53, *df* = 178, $p < 0.001$, NC = 2.2; CFI = 0.966; TLI = 0.959; AGFI = 0.867; RMSEA = 0.060 (90% C.I.: 0.052 to 0.068); SRMR = 0.0326.

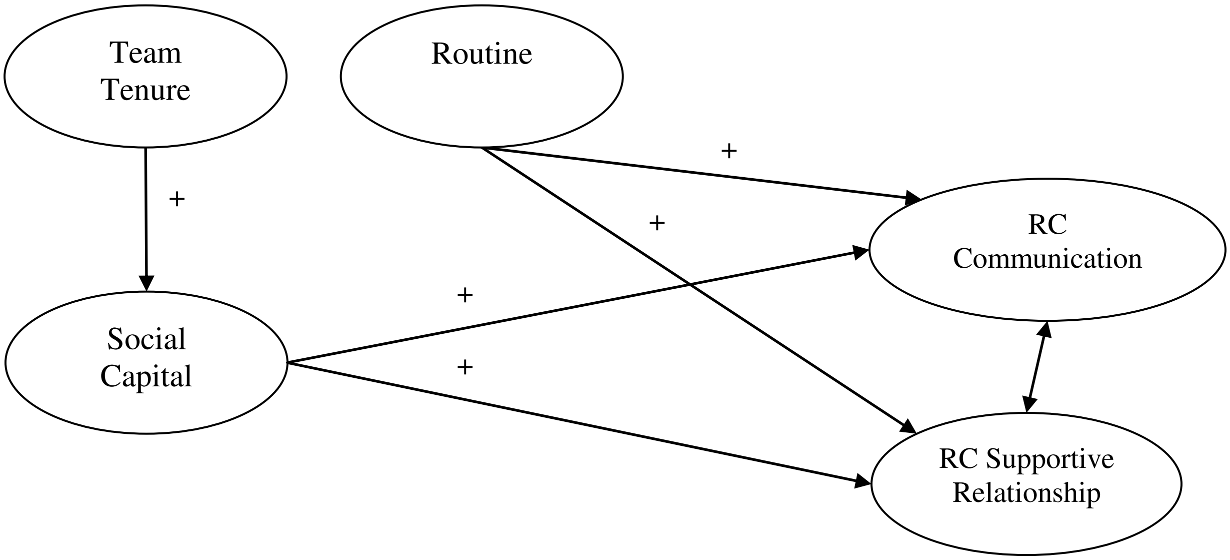

Figure 4. Path diagram of the initial structural model (Model 3).

Upon examining the effect decomposition, an indirect effect was noted between team tenure and RC supportive relationship (Table 18), suggesting mediation (social capital mediates the relationship between team tenure and RC supportive relationship). Mediation of social capital was supported by theory where the length of time working together as a team can potentially facilitate spontaneous coordination that involved supportive relationship (Smith-Jentsch, Kraiger, Cannon-Bowers, & Salas, 2009) (Please see Chapter 5 for further details).

To further examine the relationship amongst the three variables, a path was constructed between team tenure and RC supportive relationship (Figure 5). The resulting model revealed significant parameter estimates between team tenure and social capital, as well, between social capital and RC supportive relationship. This confirmed the presence of mediation (Iacobucci, Saldanha, & Deng, 2007). A Sobel test was then performed to determine the relative sizes of indirect (mediated) versus direct paths. Both Sobel test (test statistics = 8.5, $SD = 0.001$, $p < 0.001$) and direct path between independent variable and dependent variable are significant (Table 15), indicating partial mediation of social capital for the relationship between team tenure and RC supportive relationship. The overall fit of this final model (Model 5) also improved: Chi-square = 383.38, $df = 177$, $p < 0.001$, NC = 2.2; CFI = 0.966; TLI = 0.960; AGFI = 0.868; RMSEA = 0.060 (90% C.I.: 0.052 to 0.068); SRMR = 0.0316.

Dyadic data were tested in the same model following fitting the individual data and yielded acceptable fit for only CFI and SRMR (Table 18). The overall poorer fit in dyadic data was expected due to the very small sample size (n = 81). Kline (2005) suggested that insufficiently powered study would lead to the rejection of the alternative hypothesis even when it was true. Another possible cause for the borderline fit could be due to the nonsignificant paths between team tenure and social capital, between team tenure and RC supportive relationship, and between the covarying variables of RC communication and RC supportive relationship (Figure 7). These paths were kept in the final model due to its theoretical significance (Byrne, 2010; Kline, 2005).

Table 17
Means, Standard Deviations and Correlations for Variables in Structural Model (Individual-level Data)

		Mean	**S.D.**	**1.**	**2.**	**3.**	**4.**	**5.**
1.	Social capital+	4.43	0.61	1	-	-	-	-
2.	RC Communication+	4.49	0.55	0.66***	1	-	-	-
3.	RC Supportive Relationship+	4.32	0.60	0.75***	0.60***	1	-	-
4.	Team Tenure (years)	10.03	7.76	0.13*	0.09	0.18*	1	-
5.	Routine+	3.33	1.23	0.23***	0.21***	0.21***	-0.01	1

+ Likert scale, ranges from 1 to 5
**p* < 0.05 (2-tailed) ***p* < 0.01 (2-tailed) ****p* < 0.001(2-tailed)

Table 18
Fit Indices for the Final Structural Model

	Chi-Sq (*df*)	***p***	**CFI**	**TLI**	**AGFI**	**RMSEA**	**RMSEA 90% CI**	**SRMR**
Acceptable value	-	>0.05	>0.90	>0.90	>0.90	<0.08	0 - 0.10	<0.08
Model 3 Individual data	435.12 (197)	<0.001	0.961	0.955	0.860	0.061	0.053 - 0.069	0.061
Model 4 Individual data	388.53 (178)	<0.001	0.966	0.959	0.867	0.060	0.052 - 0.068	0.033
Model 5 Individual data	383.38 (177)	<0.001	0.966	0.960	0.868	0.060	0.052 - 0.068	0.032
Model 5 Dyadic data	321.79 (177)	<0.001	0.911	0.894	0.669	0.100	0.083 - 0.118	0.054

Table 19

Selected Parameter Estimates for the Final Model (Individual-Level Data)

	Unstandardized regression weight	**Standard error**	**Standardized regression weight**
Social capital ← Team Tenure	0.009*	0.004	0.13
RC communication ←Social capital	0.70***	0.07	0.70
RC supportive relationship ←Social capital	0.85***	0.07	0.81
RC supportive relationship ←Team tenure	0.01*	0.003	0.09
	Covariance	**Standard error**	**Correlation**
RC communication ↔ RC supportive relationship	0.03**	0.01	0.24
	Squared multiple correlations		
Social capital	0.02	-	-
Relational coordination1	0.49	-	-
Relational coordination2	0.69	-	-

*p < 0.05 (2-tailed) **p < 0.01 (2-tailed) ***p < 0.001 (2-tailed)

Table 20

Selected Parameter Estimates for the Final Model (Dyadic Level Data)

	Unstandardized regression weight	**Standard error**	**Standardized regression weight**
Social capital 🡐 Team Tenure	<0.001	0.01	-0.01
RC communication 🡐Social capital	0.69***	0.14	0.68
RC supportive relationship 🡐Social capital	0.83***	0.16	0.83
RC supportive relationship 🡐Team tenure	<0.001	0.01	-0.05
	Covariance	**Standard error**	**Correlation**
RC communication ↔ RC supportive relationship	0.02	0.009	0.28
	Squared multiple correlations		
Social capital	<0.001	-	-
Relational coordination1	0.46	-	-
Relational coordination2	0.69	-	-

***$p < 0.001$ (2-tailed)

Table 21

Standardized Total Effects of the Final Model (Individual-Level Data)

	Team Tenure (Direct / Indirect Effect)	**Social Capital (Direct / Indirect Effect)**	**RC supportive relationship (Direct / Indirect Effect)**	**RC communication (Direct / Indirect Effect)**
Social Capital	0.13 (0.13/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)
RC supportive relationship	0.20 (0.09/0.10)	0.81 (0.81/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)
RC communication	0.09 (0.00/0.09)	0.70 (0.70/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)

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Table 22

Standardized Total Effects of the Final Model (Dyadic-Level Data)

	Team Tenure (Direct / Indirect Effect)	**Social Capital (Direct / Indirect Effect)**	**RC supportive relationship (Direct / Indirect Effect)**	**RC communication (Direct / Indirect Effect)**
Social Capital	-0.01 (-0.01/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)
RC supportive relationship	-0.06 (-0.05/-0.01)	0.83 (0.83/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)
RC communication	-0.01 (0.00/-0.01)	0.68 (0.68/0.00)	0.00 (0.00/0.00)	0.00 (0.00/0.00)

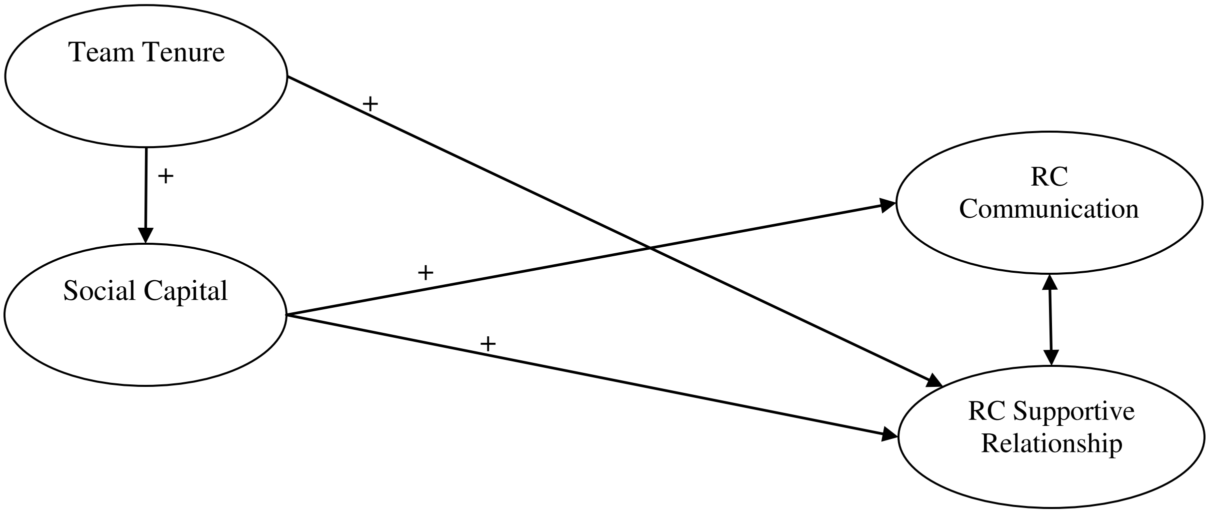
Team Tenure
+
+
RC
Communication
Social Capital
+
+
RC Supportive
Relationship

Figure 5. Path diagram of the final structural model (Model 5).

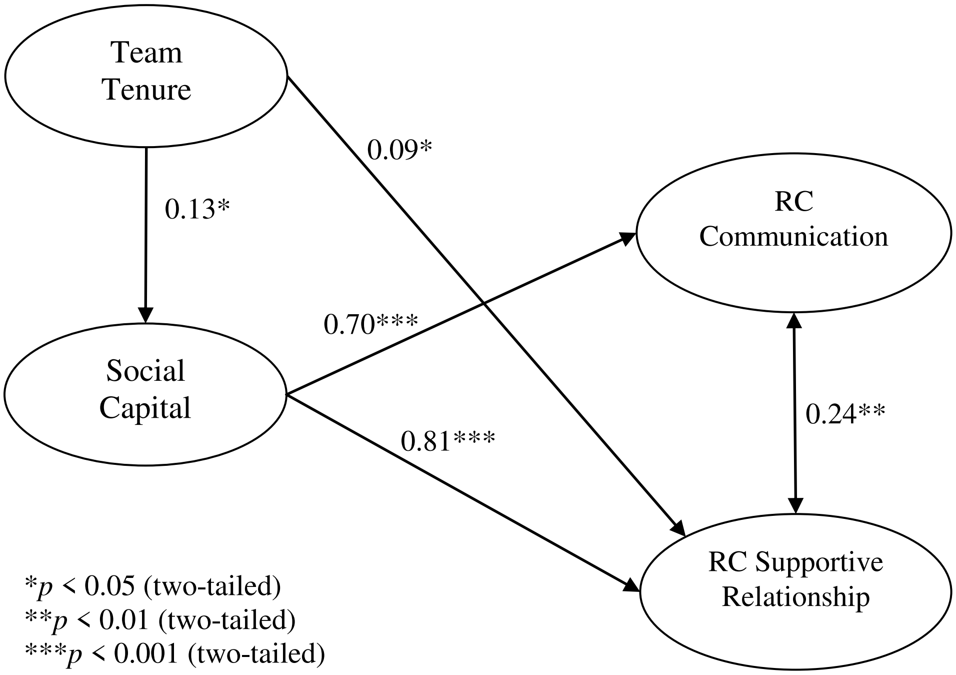
Team Tenure
Social Capital
RC Communication
RC Supportive Relationship
0.13*
0.09*
0.70***
0.81***
0.24**
*$p < 0.05$ (two-tailed)
**$p < 0.01$ (two-tailed)
***$p < 0.001$ (two-tailed)

Figure 6. Final structural model with standardized path estimates (individual-level data).

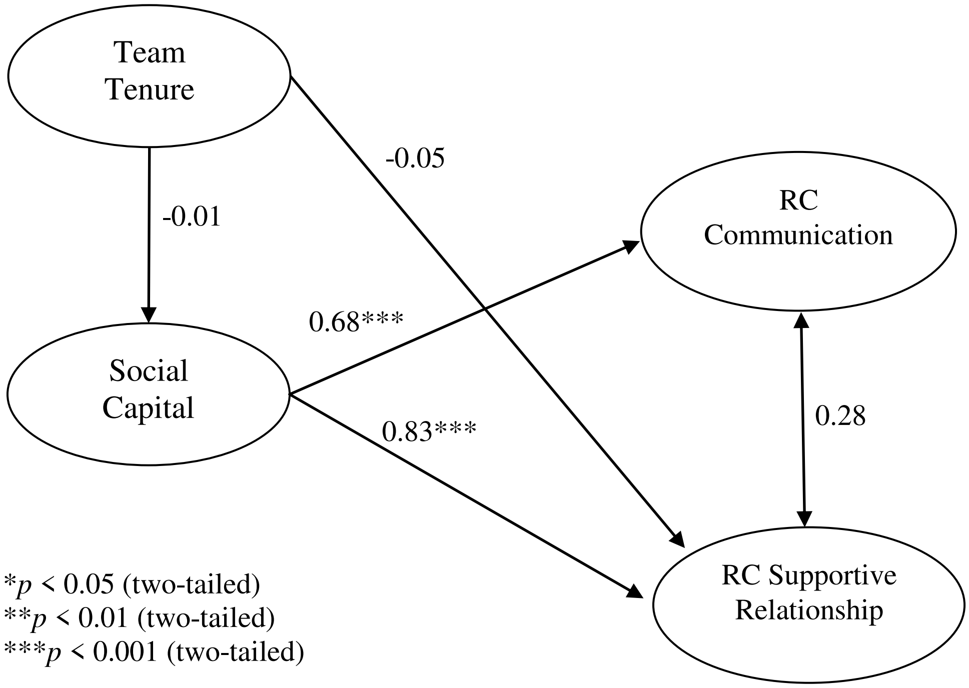
Team Tenure
Social Capital
RC Communication
RC Supportive Relationship
-0.01
-0.05
0.68***
0.83***
0.28
*$p < 0.05$ (two-tailed)
**$p < 0.01$ (two-tailed)
***$p < 0.001$ (two-tailed)

Figure 7. Final structural model with standardized path estimates (dyadic-level data).

Chapter 4

Summary

Analyses in this chapter were conducted to address the research hypotheses. First, descriptive statistics were presented to describe the study sample. In addition, correlations between key study variables were also presented and they were consistent with the parameter estimates presented in the final SEM model. In the initial step of SEM analysis, the factor structures of social capital and relational coordination were validated. When both latent variables were fitted together in the same measurement model, relational coordination was best fitted as a two-factor structure (RC communication and RC supportive relationship). Social capital, on the other hand, was best fitted as a one-factor structure. These findings indicated that RC communication and RC supportive relationship are distinct but related factors within the construct of relational coordination. Implications and significance of these measurement models will be discussed in Chapter 5.

SEM analysis of the structural model revealed that the hypothesized model was a reasonable fit to the data; however, the alternate (final) model was a better fit. The analyses using SEM validated the hypotheses that, social capital predicted both RC communication and RC supportive relationship (Hypothesis 1), and team tenure predicted social capital (Hypothesis 3). On the other hand, formal coordination (routine) did not predict relational coordination (Hypothesis 2). The final structural model also revealed that team tenure predicted RC supportive relationship, and this relationship was partially mediated by social capital. The path between team tenure and RC supportive relationship was supported by theory, where length of time served in the same team may foster mutual respect, shared knowledge and shared goals RC supportive relationship (Chapter 5). This relationship between team tenure and RC supportive relationship is facilitated by the establishment of relational ties and its possessions (social capital).

Last but not the least, when the final structural model was fitted in the dyadic data, acceptable fit in two indices and comparable parameter estimates were found. This confirmed that the relationships proposed in the final model are valid for both individuals and nurse-physician pairs in the present study. Nevertheless, a larger sample size for the dyadic data would improve the power and overall fit of the final model.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to test a theoretical model between social capital and relational coordination. The theoretical model contained predictors and outcomes. The outcome of relational coordination was expected to be predicted by social capital and formal coordination, while social capital was expected to be predicted by team tenure. Findings supported the main hypothesis between social capital and relational coordination but did not support the predictive hypothesis of formal coordination. Moreover, social capital was found to partially mediate the relationship between team tenure and the supportive relationship dimensions of relational coordination (RC supportive relationship).

In this chapter, limitations of the study, findings related to relational coordination, as well, findings related to the theoretical model and other hypotheses are discussed. Additionally, implications for practice, administration, education and research are also discussed, followed by a final summary.

Study Limitations

There are a few limitations in this study. The first limitation concerns potential selection bias. The present study examined physicians and nurses in the outpatient clinics and the sample was obtained through random selection of outpatient clinic physicians and nurses at two university-affiliated teaching institutions. Contact information of clinic nurses and physicians was provided by department chairs and nursing administrators. This poses risks for selection bias as participants identified by administrators may have different demographics or views on study constructs than those not selected by chairs and administrators. It is possible that the current sample does not represent the total population of all outpatient physicians and nurses, affecting generalizability of study findings. Generalizability of the current study findings is also limited to outpatient work environment in developed countries where work cultures and organizational and professional hierarchy are similar. Limitations in external validity due to contextual factors are noted and the implications will be discussed further in this chapter.

Another factor contributing to selection bias in this study was a response rate of less than 70%. Patel et al. (2003) recommended a response rate of 70% for providing an acceptable level of representation of the total population. Despite implementation of Dillman's survey methodology to maximize response rates, only 49.71% of eligible participants responded. This response rate was similar to one previous study of relational coordination involving physicians and nurses (51%) (Gittell, et al., 2000). Nevertheless, survey non-respondents may have differing personalities, demographic characteristics and attitudes towards the survey topic (Rogelberg, Luong, Sederburg, & Cristol, 2000), and it is unclear if these attributes were represented in study sample. The most credible way to confirm current study findings would be to replicate these results in future study in other samples. Alternatively, researchers can compare the sample to the membership statistics from professional associations to provide some evidence that the sample is representative of the population. Unfortunately, no demographic data were available for outpatient physicians and nurses to compare with study sample, making it difficult to examine similarities or discrepancies between the sample and population. Based on information from the College of Nurses of Ontario and Ontario Medical Association, study sample resembles the general membership with the exceptions that the mean age of sample (both physician and nurse practicipants) is slightly higher and physician participants received higher degrees than the general workforce. This is consistent with the understanding that nurses in the outpatient clinics often have the most seniority and therefore are older than nurses in inpatient settings. Staff physicians at teaching institutions tend to be older in age because of the additional clinical experience required to assume teaching roles in university affiliated institutions.

The self-report survey design of this study may increase the potential for common method variance or measurement bias. Common method variance, also referred to as monomethod bias (Cook & Campbell, 1979), is associated with the method of measuring variables that can lead to inflation of relationships among variables. This is a concern when predictor and criterion variables are measured using the same method of self-report in the present study (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). According to Podsakoff et al. (2003), some sources of common method variance include: respondents try to maintain consistency in responses, attempt to answer in accordance to the pre-existing theories about what the relationships of the variables should be, desire to present themselves favourably through their responses, and answer in accordance to the format of the items instead of the content.

Recommendations to minimize common method variance have been proposed by Spector (2006) and the following have been considered in the present study: First, common method variance can be minimized if a study is well designed, with a careful plan for the necessary measurement methods that address study purpose (Spector, 2006). In this study, it was necessary to collect self-report measures in order to assess perception of relationships and subjective communication pattern (e.g., timely communication). This monomethod approach is appropriate to the purpose of study and provided the appropriate data for testing the theoretical model. Secondly, Spector (2006) recommends that self-reports are to be assessed for accuracy, biases and reasonable conclusions. It is believed that method bias can be minimized through careful construction of survey items. Survey items used in this study have been previously validated for validity and reliability, and repeated testing was conducted in this study to confirm construct validity and internal consistency. This ensures accuracy of measurement. Next, different descriptors were used in the Likert scale responses for predicator and criterion variables; as well, the criterion variable (relational coordination) of this study was assessed through asking respondents to rate their perception of another team member instead of asking for self-perception. These features help to reduce method bias created by commonalities in scale descriptors and anchoring effect. Lastly, ensuring confidentiality and reporting group data reduced the likelihood that respondents would provide responses that are more socially desirable, positive or consistent with their perception of researchers' expectations. Confidentiality was ensured through the establishment of convenient, discreet means to return surveys. As well, participants were reassured that participation and identifiable data would not be shared with their institutions and there were no right or wrong answers to the study questions. Nevertheless, common method variance cannot be ruled out in the present study.

The cross-sectional design of the current study poses limitations in making inferences about causal relationships. Although cross-sectional data can confirm covariation of independent and dependent variables (a criterion to establish causal relationships), they fail to fulfill the second requirement of demonstrating precedence because data collected at one point in time cannot establish time sequence of variables or events. As such, the direction of relationship cannot be confirmed. The present study examined the association between social capital and relational coordination, with social capital as a predictor. The direction of relationship, although cannot be confirmed by the cross-sectional study design, is ascertained by theory and previous studies that interpersonal ties (social capital) precede the work process of relational coordination (Coleman, 1988; Godesiabois, 2007; S. H. Lee, et al., 2005).

Studies with longitudinal design are believed to be superior in confirming directional correlations and emergence of relationships (Kimberly, 1976; Spector, 1994; Zapf, Dormann, & Frese, 1996) and therefore, repetition of the present study with a longitudinal design will enable further theorizing on the association among study variables. However, longitudinal studies are not without flaws. Scholars argue it can be challenging to determine time duration and measurement intervals to rule out alternative factors, and that longitudinal studies are also subject to threats to internal validity (Kimberly, 1976; Zapf, et al., 1996). Spector (1994) argues that cross-sectional self-reports are useful in informing relationships between variables at the early stages of research where a snapshot of variables is provided, and that a well designed study that minimizes measurement errors and other biases is just as important as longitudinal measurements. Well developed theory was employed to guide the present study, together with valid, reliable data and a non-experimental, predictive method that is consistent with the purpose of the study, suggest that measurement errors and biases are minimized.

Lastly, although the individual items were not changed, alterations of factor structure and length of the relational coordination instrument may have affected validity in ways that cannot be estimated. In this study, a new factor structure was created for relational coordination and the instrument was shortened after eliminating one ambiguous item. Nevertheless, these changes were supported by theory and subsequent examination of reliability and confirmatory factor analysis indicated a good fit between the hypothesized model and data.

Overview of Relational Coordination

Relational coordination is defined as the coordination process that comprises dimensions of quality communication and quality relationships that are interactive (Gittell, 2011). Previous studies indicated that these dimensions were found to be a one-factor construct (Gittell, 2011; Gittell, et al., 2000; Gittell, Weinberg, Pfefferle, et al., 2008). In the present study, confirmatory factor analysis (CFA) revealed that a two-factor model provided better overall fit (Table 14) and improved parameter estimates (Table 27, Appendix D) for the construct of relational coordination. A two-factor structure suggests that the communication dimensions of RC, although significantly correlated with the relationship dimensions, do not covary with the latent construct of relational coordination in similar pattern. This finding is supported by the theoretical conceptualization of relational coordination. Gittell (2000) theorizes supportive relationship qualities and high quality communications are mutually reinforcing factors embedded in relational coordination, implying a distinction among the seven items. Moreover, the factor of supportive relationship (RC supportive relationship) has been used alone in one previous study in predicting learning from failures in graduate students and non-health care organizations (Carmeli and Gittell, 2009), suggesting differences from the factor of RC communication.

The two-factor structure proposed in this study implies that the construct of relational coordination has two related but distinct components: supportive relationship qualities which include shared goals, shared knowledge and mutual respect, as well, high quality communication which includes frequent, accurate, timely and problem-solving communication. The terms RC supportive relationship and RC communication have been used throughout this report to distinguish these two sub-concepts within relational coordination.

There are two explanations for the difference in factor structure found between the current study and what was reported (Gittell, 2011). First, the current distinction between RC communication and RC relationship could have been detected due to a more complex CFA used in the present study where measurement model of social capital was fitted simultaneously. Kline (2005) suggested this method of conducting CFA allows for the detection of misfit among the latent variables. Since social capital items depict qualities embedded in relationships, it is believed that social capital would have higher level of covariance with the RC dimensions of supportive relationship than RC coordination communication dimension. Differences between the covariance of social capital and RC supportive relationship, and the covariance of social capital and RC communication contributed to the distinction between these two RC factors.

The difference in factor structure can also be related to study design; in this case, the setting and composition of team in this study are different from those previously reported. Contextual differences such as job description in outpatient nurses may affect physician-nurse interactions and ultimately, the strength of association between the dimensions and the factor RC. That is, nuances unique to the outpatient settings contributed to a different factor structure of relational coordination. Similarly, the composition of team to include only nurses and physicians at clinics (as opposed to including six to 12 functional groups in previous studies) may have captured different patterns of interaction and thus different variation in scores for the seven items of relational coordination. For instance, a pair of nurse-physician work together and follows patients for a longer period of time than inpatient settings, their supportive attitude, shared goals may not be as closely associated with quality communication as what was found in inpatient settings. Further theorizing and empirical validation will confirm these proposed explanations for a two-factor model.

Last, but not the least, CFA findings also demonstrated discriminant validity for study variables and convergent validity for the social capital instrument. Further discussions regarding the significance of the two-factor structure in understanding the theoretical underpinnings of relational coordination, as well, the association between relational coordination and social capital can be found in the next section.

The overall results in the current study reflect a very high level of relational coordination (4.49 and 4.32 out of a 5-point Likert scale). Compared with the literature where RC means range from 1.99 to 3.99 [1.99 (SD: 0.57) in the nursing home, 3.99 (SD: 0.84) in the hospital, and 2.60 in 16 outpatient clinics], the current mean of RC appears to be exceptionally high. High level of RC may be related to the high team tenure noted in the sample (10.02 years). Gianvito (2007) demonstrated that job tenure is positively correlated with task mastery, role clarity, social integration and acculturation at work, suggesting that time spent working in the same environment predicts the ability to adjust. All these adjustment attributes are the foundation of communication and supportive relationship included within the concept of relational coordination.

Moreover, the current study was the first that assessed relational coordination in Canada, differences in practice, professional role description and organizational support (such as information technology) could have led to different levels of collaboration and relational coordination (Gittell, 2000). For instance, King et al. (2010) described differences in nursing and mid-wifery practice between the United States and Canada; and Jha et al. (2008) reported a lack of health information exchange among hospitals in the United States. Certainly, contextual factors may have influenced relational coordination in the current study.

Overall Theoretical Model

The model in the present study described the relationship between social capital and relational coordination, as well, confirmed predictors for these two variables. The hypothesized model was partially supported, demonstrating that social capital is predictive of relational coordination. However, predictors of relational coordination were more complex than hypothesized, with significant direct and indirect effects found. The specific findings are discussed in this section.

Structural equation modeling of the original hypothesized model indicated suboptimal fit between the model and the data, with only two fit indices meeting the acceptable level (Table 18). Formal coordination was removed from the model due to its statistically non-significant effect. Moreover, in the alternative revised model, a direct effect from team tenure to RC supportive relationship was added. The results of the alternative model indicated improved fit between the model and the data. Consistent with theoretical propositions, higher level of social capital and longer team tenure predicted higher level of RC supportive relationship; on the other hand, only higher level of social capital predicted higher level of RC communication.

Parameter estimates from structural equation modeling reveal that social capital is a strong predictor of both types of relational coordination ($\beta > 0.50$) (Kline, 2005) while team tenure had a relatively small effect in predicting social capital ($\beta = 0.13$, $p < 0.05$) (Kline, 2005), as well, in predicting RC supportive relationship ($\beta = 0.09$, $p < 0.05$). Moreover, social capital partially mediated the relationship between team tenure and RC supportive relationship. The additional path in the alternative model (i.e., direct path between team tenure and RC supportive relationship, mediated by social capital) was not originally hypothesized but is theoretically sound. The transactive memory theory states that team members develop consensus regarding the distribution of their relative expertise as well as confidence in that expertise over time and that this facilitates coordination processes (Smith-Jentsch, et al., 2009). This means that the longer the team members work in the same team, the more likely they will have higher level of mutual respect, shared knowledge and shared goals (RC supportive relationship). The creation of mutual respect, shared knowledge and shared goals is partially facilitated by social capital, reflecting the continuous development of relationship through time. On the other hand, predictive property of team tenure was not found for RC communication which is also consistent with theory because frequent, timely and problem-solving communication (RC communication) is contingent upon many factors other than length of time in team, such as education, training and organizational structure (Green, et al., 2001).

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Unfortunately, there is a dearth of literature comparing the impact of demographic characteristics, such as team tenure, on social capital and on teamwork process (e.g., communication) to verify this study finding. However, a general view that relational qualities and communication qualities are associated with different sources was suggested by Green, Ashton and Feelstead (2001), who found different determinants for problem-solving, professional communication, social and teamwork skills. Moreover, Gianvito (2007) showed significant correlation between job tenure and relational and cognitive social capital, which is consistent with the present findings. Also, Sutterfield (2010) found that demographic characteristics, including team tenure, do not predict team communication. This evidence provides preliminary support for the different associations found among team tenure, social capital and the two factors of relational coordination in this study.

Last, but not the least, the overall theoretical model provided further information about the theoretical underpinnings of relational coordination as intended by the study purpose. First and foremost, the predictive relationship between social capital and relational coordination confirmed a link between relational ties (as characterized by social capital in this study) and work coordination, as represented by relational coordination. The use of social capital theory in this study allows for more specific characterization of the qualities within relational ties that predict relational coordination.

Moreover, results from CFA confirmed that RC supportive relationship and RC communication are distinct but related factors within the construct of relational coordination. This means that future studies in relational coordination should involve examining and theorizing relationships between new variables and each of these two factors within the construct because the factors may associate with these variables differently. Indeed, findings from the present study supported more specific examination of RC supportive relationship and RC communication. For instance, path coefficients from the final structural model suggested that social capital is a stronger predictor for the supportive relationship than communication factor of relational coordination. As discussed previously, social capital is a stronger predictor for RC supportive relationship because mutual respect, shared goals and shared knowledge (RC supportive relationship) are more closely related concepts with social capital, which are understood to represent possessions embedded within relational ties. On the other hand, quality communication (RC communication) is contingent upon factors in addition to interpersonal relationships, such as education, training and organizational structure (Green, et al., 2001).

Differences between the two factors of relational coordination are also observed in their different associations with another study variable, team tenure; as well, confirmed by results of bivariate correlations, with correlation coefficient of social capital and RC supportive relationship ($r = 0.75$, $p < 0.001$) being consistently larger than that between social capital and RC communication ($r = 0.66$, $p < 0.001$). The smaller magnitude of correlation coefficient observed between RC supportive relationship and RC communication prompted speculations about compromised construct validity as a result of multicollinearity and measurement errors. After careful examination of theories and empirical evidence, it is thought that the present findings suggest overlaps in constructs rather than multicollinearity. Existing theories fully support for social capital as a distinct and well established construct in the social sciences, with dissimilar applications (e.g., sociological research for social capital versus organizational research for relational coordination), predictors (e.g., historical events or age versus the use of information technology or formal coordination) and associated outcomes (e.g., commitment or innovation versus fiscal outcomes or specific patient outcomes) (Adler & Kwon, 2002; Gianvito, 2007; Gittell, 2000; Hagigi, 2007; Lawson, et al., 2008; Turner, 2000; G. W. Watson & Papamarcos, 2002). Moreover, the magnitude of bivariate correlations between social capital and each of the relational coordination factor being less than 0.85 (Tabachnick & Fidell, 2007) also provided converging support that multicollinearity was an unlikely phenomenon responsible for the correlation findings in the present study.

Study Hypotheses

The main hypothesis specifying a relationship between social capital and relational coordination was supported by study findings. This implies that qualities possessed among team members' relational network facilitate informal coordination that requires quality communication and positive relationship among team members. When interprofessional team members have open communication, trust and shared cognition, they are more likely to coordinate spontaneously using informal means. Indeed, social capital has been found to be predictive of individual behavioural and teamwork outcomes. For instance, Gianvito (2007) reported that social capital was positively correlated with task mastery and predicted task performance at the individual level. Moreover, Oh, Chung and Labianca (2004) demonstrated that social capital predicted team effectiveness.

The effect sizes of social capital on both factors of relational coordination were large ($\beta > 0.50$) (Kline, 2005), with the effect size on RC supportive relationship ($\beta = 0.81$, $p < 0.001$) greater than that of RC communication ($\beta = 0.70$, $p < 0.001$). This is consistent with the previous discussion point where RC communication is contingent upon factors other than relational ties (social capital), and therefore, not as well predicted by social capital as RC supportive relationship.

Formal coordination was hypothesized to be a predictor of relational coordination but this association was statistically non-significant. Gittell (2000) used three indicators to measure formal coordination (use of routine, team meeting, boundary spanner) and these three items were adopted in the present study. Subsequent to data collection, data screening revealed poor internal consistency reliability among the three items (Cronbach's alpha = 0.21). Upon investigation, two of the three items were removed, resulting in only one indicator for assessing formal coordination. First, qualitative feedback from participants indicated that, although tumour boards (an example provided in the questionnaire) are recognized to be interprofessional, multidisciplinary team meetings, they are rarely attended by nurses and other allied health professional members due to schedule conflicts. Also, tumour boards involve discussions chaired by physicians and are mostly related to treatment and diagnostic decisions, thus it would be inappropriate to consider them as helpful as formal strategies in coordinating interprofessional care. Tumour boards should be considered as formal coordinating mechanism, primarily used for coordinating patient care within Medicine. Next, the item measuring boundary spanner was removed because boundary spanner such as patient care coordinators, were employed only in one site of the study. In fact, boundary spanners are rarely utilized in outpatient setting in Canada.

Findings in this study do not necessarily suggest a lack of association between formal coordination and relational coordination but rather, there needs to be a broader conceptualization of formal coordination mechanisms within the context of different practice settings. Using one item (the use of routine) to assess formal coordination may be deficient in capturing all the formal coordination mechanisms employed in outpatient setting and has implications on study validity. It is possible that formal coordination is associated with relational coordination but this effect was not detected by measuring the use of routine. According to Shortell (1991), other items that can be considered in measuring formal coordination include: 'written rules, policies', 'written schedules and procedures', 'efforts in coordinating interprofessional team members' activities', 'ad hoc clinic meetings', 'task forces and standing committees that include interprofessional team members', 'daily rounds for clinic patients'. Future research should aim to identify other means of formal coordination in outpatient clinics and retest its associations with relational coordination.

The hypothesis that team tenure predicts social capital was supported by study findings. This implies that possessions embedded within relational ties among health care professionals increase over time while working in the same team. When interprofessional team members have worked in the team for a longer period of time, they are more likely to develop open communication, trust, liking and shared cognition through an increasing amount of interaction. This finding is supported by a previous study where team tenure predicts social capital (Gianvito, 2007). However, it is important to balance demographic characteristics (such as team tenure) at the individual level with other group-level attributes, such as diversity in background and skills (Turner, 2000). Length of team tenure alone, does not guarantee higher level of social capital and superior performance. The small effect size for the path between team tenure and social capital ($\beta = 0.13$, $p < 0.05$) in this study supports this proposition.

Implications for Practice

Coordination is a vital process in health care work. Health care professionals are expected to work together to handle the interdependencies in providing care which involve sharing of expertise, resources and tasks. For decades, health care providers have been urged to improve coordination of care and a variety of coordination strategies have been implemented to ensure communication and coherent, timely services (Institute of Medicine, 2006). Formal coordination strategies, such as protocols and routine team meetings, are easier to understand and be adopted by health care professionals once they have been approved and implemented by administrators (Reeves & Lewin, 2004). On the other hand, informal coordination strategies, such as relational coordination that involves spontaneous behaviour and is contingent upon interpersonal ties, are less tangible and require interpersonal skills to initiate. Nevertheless, in the outpatient setting where uncertainty, patient volume and complexity are high, interpersonal skills ought to be developed to foster relational coordination to ensure high quality and spontaneous exchange of information.

Findings from this study revealed an association between relational ties and relational coordination; therefore, discussion on study implications focuses on determinants of positive work relationship. Skills that foster relational coordination should aim to engender positive relationships amongst health care professionals who work together in outpatient clinics. It is challenging to systematically examine the determinants for workplace relationships as there is no known theoretic framework that explicates relational ties at work. Employing the approach for examining the determinants of collaborative practice, determinants for workplace relationships can be grouped into three main categories: interactional, organizational and macro-structural (Oandasan, et al., 2004). This approach for conceptualizing collaborative practice is useful because collaboration is relational in nature (D'Amour, Goulet, Labadie, Martin-Rodriguez, & Pineault, 2008; D'Amour & Oandasan, 2005; Oandasan, et al., 2004).

From an interactional perspective, trusting and enduring relationships at work allows for open communication, sharing of good will and sharing of cognition and are elements of social capital. Work relationships with the aforementioned social capital at outpatient clinics account for unprompted, timely communication, problem-solving that is reinforced by mutual respect, shared goals and knowledge (relational coordination). To achieve high level of relational coordination by ways of enhanced social capital, health care professionals must possess solid interpersonal and communication skills, as well, adequate clinical competence that fosters trust and liking. Proficient interpersonal and communication skills refer to the ability to resolve conflicts, communicate effectively and convey respect (Neuman, 1999). Clinical competence can be achieved through continuing education and reflective practice (Bradshaw, 1998; Watkins, 2000). Mayer (1995) defined trust as the ‘willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party’. This supports the notion that team members who are clinically competent will more likely to be depended upon (willingness to be vulnerable) by other members. When working together as a team in clinics, staff members can provide each other with constructive feedback to identify areas that need improvement, and to identify behaviours that require attention before they become problems in maintaining harmonious work relationships.

Additionally, health care professionals’ attitudes play an important role in relationship building. Negative attitude translates to uncooperative, non-supportive behaviour, a lack of good will and ineffective communication that lead to poor team morale and interpersonal relationships (Lockhart-Wood, 2000). Almost (2010) suggested a cohesive and supportive team can be created through the recognition that each team member is important, valued and necessary to the team. This can be facilitated through the strengthening of interpersonal and communication skills as well as effective leadership (Baxter, 1988; Beach, et al., 2006; Gilberg, 1993; Li & Hung, 2009; Tomasik, 2008).

At the organizational level, fair procedures and treatment are also conducive to positive and lasting work relationships (Masterson, 2000). Derogatory judgments, deception, invasion of privacy and disrespect hinder communication, lower employees’ morale and create conflicts, resulting in distrust and negative relationships. Health care professionals should feel empowered to negotiate for policies that allows for open and honest communication.

Implications for Administrators

Findings from this study imply that qualities exist within relational ties (social capital) that are associated with informal coordination that is spontaneous in nature. Scholars have studied the role of interpersonal ties in conducting group work in the past several decades and yielded conflicting findings. While some argue that relational ties within team may pose harm to team process (Barnes et al., 2008), inadequate empirical evidence is available to support either the positive or negative role of interpersonal relationship. The current finding of social capital as a predictor of relational coordination provides further evidence to support the association between workplace relationship and performance. However, there is no known theoretical framework that explicates the role of workplace relational ties in enhancing team or organizational performance, and there are even fewer studies exploring predictors of workplace relationships. The few most commonly studied topics in this area are leadership style, leader-member exchange and personality in predicting relational outcomes (Kamdar & Van Dyne, 2007; Li & Hung, 2009). These topics, as well, the aforementioned factors that predict workplace relationships (i.e., interpersonal skills, clinical competence, attitude and organizational policy) provide useful information for administrators who wish to be proactive about their workplace. Administrators can assume an active role in enhancing relationships through the provision of training, leadership and development of relevant infrastructure and policy.

Interventions found within professional education programs that aim to enhance interpersonal and communication skills will be discussed in further detail in the next section. Administrators should recognize the potential impact of these training strategies on workplace relationships (McClough & Rogelberg, 2003). Leadership style, such as transformational leadership, has been found to positively correlate with leader-member exchange, coworker relationships and performance (Li & Hung, 2009). Being attentive to followers' concerns, articulating visions that appeal to followers, being charismatic and soliciting followers' ideas are transformational leadership attributes that facilitate the social identity process whereby followers identify with leaders' values, beliefs and visions. These attributes in turn creates more frequent interaction and a communication context among employees, increasing the level of coworker cohesion, interdependence and support (Li and Hung, 2009).

Administrators can also bring forth positive influence to workplace relationships by ensuring fair procedures are in place to resolve conflicts, and that staff members are encouraged to voice their opinions in a non-judgmental, non-threatening environment. Moreover, in considering team membership, administrators should be aware of the individual characteristics that affect team members' relationship. For instance, as discussed previously, knowledge, skills and attitude are modifiable factors that affect relational ties (McClough & Rogelberg, 2003). In addition, personality plays a role in predicting workplace relationship as it affects coping ability and attributional style (Welbourne, Eggerth, Hartley, Andrew, & Sanchez, 2007). Administrators can assist these team members by offering acceptance and assistance in adopting more effective coping mechanisms. And finally, findings from this study suggest that team tenure predicts social capital and relational coordination. Administrators should facilitate and endorse continuity of partnership in the outpatient clinics when teams exhibit satisfactory teamwork process and outcome measures.

Implications for Education

As discussed previously, relationship building and enhancement are contingent upon an individual's personality, skills, attitude and contextual factors. Of these factors, interpersonal skills, effective communication skills and positive attitude towards teamwork can be learnt (Cronenwett et al., 2009; Oandasan, et al., 2004) and should be included in education programs.

For instance, health care professionals should be able to exchange information accurately to the needs of the situation, to commit to team's goals, to resolve disagreements or conflicts that arise and to integrate the contributions of others who play a role in helping patients achieve health goals. Most of these objectives have been included and emphasized in interprofessional education that aims to promote collaborative practice (Cronenwett, et al., 2009; Oandasan, et al., 2004).

Another facet of interprofessional education includes enhancing the knowledge and understanding of the role assumed by members of another discipline. This is very important in relationship building and fostering relational coordination. When health care professionals are familiar with each other's role and skill set required to care for patients, they are more likely to engage in meaningful communication that engender trust and shared cognition which are indicators of positive relationship. Pryor (2008) found that a lack of connectedness among interprofessional team members was related to limited acknowledgement about one's professional role and divisive work practices. Results from this study coincide with the overall direction of the interprofessional education curriculum.

Interprofessional education curricula have been implemented at both pre- and post-licensure levels across all legislated health care professions in Canada (Oandasan, et al., 2004). A majority of post-licensure interprofessional education programs occur in inpatient hospital setting and their education interventions aim to improve communication and decision-making processes through didactic teaching or facilitated group work (Oandasan, et al., 2004), however, these interventions are not mandatory. For pre-licensure interprofessional education at academic institutions, there is an increasing amount of material being introduced to the core curriculum. These programs aim to improve communication skills and an understanding of other professions' role in care provision, through didactic teaching, facilitated group work and problem-based learning (Cronenwett, et al., 2009; Oandasan, et al., 2004; Sullivan, Hirst, & Cronenwett, 2009). However, evidence is lacking to support outcomes related to improved relationship, teamwork and clinical outcomes (Oandasan, et al., 2004; Reeves & Lewin, 2004).

When examining the specific evaluation tools for interpersonal and communication skills, it is obvious that much emphasis has been placed on provider-patient interaction and relationship as outcomes (Iramaneerat, Myford, Yudkowsky, & Lowenstein, 2009; Kyro, Laara, Tiuraniemi, & Lindeman, 2009; Yudkowsky, Downing, & Sandlow, 2006). The Quality and Safety Education for Nurses (QSEN) initiative is one of the few interprofessional education programs that measures explicit and comprehensive learning outcomes in the dimensions of knowledge, skills and attitude (Cronenwett et al., 2009). Preliminary data show that participants in the program gained an understanding of the perceived power differentials among health care team roles and its effect on teamwork (Sullivan et al., 2009). Certainly, further investigations are needed to validate the content, teaching strategies and outcome measurements of interprofessional education programs, including the interpersonal and communication skills training components in different health care disciplines.

Last but not least, education programs should be developed for administrators to incorporate relationship building in management practice. This includes knowledge in the determinants of positive workplace relationship, interpersonal and communication skills and leadership qualities associated with leader-member exchange and coworker relationships (Hunt & Baruch, 2003; Tews & Tracey, 2009). For instance, Hunt & Baruch (2003) suggested an intensive, five-day training program for executives that led to a modest improvement in participants’ skills in motivating, assessing and rewarding followers. Nevertheless, similar to the evaluation issue related to interprofessional education, no empirical evidence is available to prove that interpersonal skill training ultimately improves workplace relationships.

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Implications for Research

The purpose of the present study was to examine the theoretical underpinnings of relational coordination using social capital theory. Based on findings, the following future research recommendations are proposed: social capital at work, other predictors of relational coordination and further testing of the theoretical model.

The social capital theory has been applied the most frequently at the group level where scholars attempt to examine its application in communities of certain ethnic origins or socio-economic status (Coleman, 1988; Dasgupta & Serageldin, 2000; Putnam, 1995). This focus has led to an overwhelming emphasis on the benefits of this capital instead of its deficiencies and drawbacks. Putnam (1995) and Coleman (1988) suggested issues associated with this form of capital, such as alienation, segregation and constrained individual actions or choices. While most scholars focus on the positive attributes of social capital and have associated them with improved performance, it is important to keep in mind that existing quantitative measures of this construct do not capture the negative consequences of social capital. Findings from this study provide a specific focus on the few most common forms of social capital and their association with relational coordination. As such, future research needs to address the gap in identifying the potential negative forms of social capital, and how they may affect coordination and other aspects of teamwork.

The current study revealed new information about the predictors of relational coordination: a) formal coordination was not a predictor of relational coordination; b) Social capital predicts relational coordination, and; c) team tenure predicted the supportive relational aspects of relational coordination and is partially mediated by social capital. Future studies should examine the relationship between formal coordination and relational coordination by first, identifying formal coordination strategies in the outpatient clinics. As stated previously, findings in this study do not necessarily suggest a lack of association between formal coordination and relational coordination but rather, there is a need to widen the conceptualization of formal coordination given contextual differences. The validation of social capital and team tenure as predictors suggest that future research should investigate other factors that may have potential impact on the relational ties within teams. For instance, Gittell suggests the organizational factors of information technology, human resource practices and team selection predict relational coordination (Gittell, 2000).

Future studies can also be conducted at the organizational level and the current theoretical framework can be expanded to include some of the aforementioned organizational factors proposed by Gittell. Moreover, the demographic characteristic of team tenure as a significant predictor of relational coordination in this study suggests further investigations on the impact of demographic characteristics on relational coordination and social capital. In addition, future studies should be conducted in other clinical settings to identify contextual differences and their impact on social capital and relational coordination.

Lastly, a small dyadic sample size and low intra-class correlation (ICC) were noted in the present study and implications on future model testing were formed based on these observations. While the current sample size is large enough to generate sufficient statistical power for individual level analysis, only 81 pairs of nurse-physician dyads were available for model testing at the dyadic level. A sample size less than 100 is considered small and lacking in statistical power for SEM hypothesis testing (Kline, 2005). A lack of statistical power increases chances of Type II error, which may explain the poor overall fit in the dyadic-level model testing (Kline, 2005). As discussed previously, strategies have been incorporated to optimize response rates, and there is currently no known literature that investigates the most effective recruitment strategies for dyadic sample.

ICC is an index of measurement cohesiveness within groups. Measurements taken within the same class (group) should have a smaller variance than the between-group variance, as represented by the ratio of difference between within- and between-group variance to total variance (Shrout & Fleiss, 1979). Fleiss (1998) suggested an acceptable ICC is 0.70 or greater and previous studies in RC reported ICC of 0.81 (Gittell, 2010). The significantly lower ICC observed in the current study (ICC = 0.26 to 0.48) variables suggest that the collective nature of study constructs were not captured. The low ICC in the present study can be a result of the fact that the within group variance is calculated based on a group size of two (physician and nurse). A group size of two results in larger variance than that of a larger group because the mean of two measures creates disperse distribution for the group, resulting in a larger variance and lower ICC (because ICC reflects the ratio of within group variance to total sample variance). The outpatient clinic teams are generally smaller than teams in inpatient units, and physicians and nurses are the key care providers in outpatient clinics. Other potential team members that can be included in future research include clerical support staff, administrative assistants, physician assistants, medical trainees and psycho-social support staff. With a scarce amount of research on outpatient clinic teams, membership of work teams in this care setting awaits further investigations. As a result of the small dyadic sample size and modest ICC, the interpretation of current study findings was primarily based on those from the individual-level data. Future studies should confirm the present theoretical model in larger outpatient clinic teams by expanding the inclusion criteria of clinic team to include staff members that assume other roles at the outpatient clinics.

Conclusion

The purpose of this study was to examine the theoretical underpinnings of relational coordination by testing a theoretical model that links selected predictors (social capital and formal coordination) with relational coordination. This study contributes to the body of knowledge in coordination by testing a theoretical model derived from the literature that provides insights into a previously unexamined predictor of social capital, thus establishing a link between relational ties and work coordination in outpatient clinics. Findings in the present study were consistent with the theoretical propositions where higher level of social capital predicted high level of relational coordination. In addition, longer team tenure predicted higher level of social capital. Pathways added to the theoretical model that were not originally hypothesized, but were supported by theory included: a) a path between team tenure and RC supportive relationship, and b) a path of partial mediation between team tenure and RC supportive relationship via social capital. These findings have implications for professional practice and education, as well, practical implications for administrators in enhancing coordination in outpatient clinics. Future research opportunities were also proposed to help advance this body of knowledge.

Chapter 5

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Appendix A: Definitions of Social Capital

Table 23

Definitions of Social Capital (Adapted from Adler and Kwon, 2002)

Author(s)	**Definition of Social Capital (SC)**	**View SC as**
Baker	'a resource that actors derive from specific social structures and then use to pursue their interests; it is created by changes in the relationship among actors' (1990: 619)	External of network
Belliveau, O'Reilly & Wade	'an individual's personal network and elite institutional affiliations' (1996: 1572)	External of network
Bourdieu	'the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition' (1985: 248) 'made up of social obligations ('connections'), which is convertible, in certain conditions, into economic capital and may be insitutionalized in the form of a title of nobility' (1985: 243)	External of network
Bourdieu & Wacquant	'the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition' (1992: 119)	External of network
Boxman, De Graat & Flap	'the number of people who can be expected to provide support and the resources those people have at their disposal' (1991: 52)	External of network
Burt	'friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital' (1992: 9) 'the brokerage opportunities in a network' (1997b: 355)	External of network
Knoke	'the process by which social actors create and mobilize their network connections within and between organizations to gain access to other social actors' resources' (1999: 18)	External of network
Portes	'the ability of actors to secure benefits by virtue of membership in social networks or other social structures' (1998: 6)	External of network
Brehm & Rahn	'the web of cooperative relationships between citizens that facilitate resolution of collection action problems' (1997: 999)	Internal of network
Coleman	'social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure' (1990: 302)	Internal of network
Fukuyama	'the ability of people to work together for common purposes in groups and organizations' (1995: 10)	Internal of network
Inglehart	'a culture of trust and tolerance, in which extensive networks of voluntary associations emerge' (1997: 188)	Internal of network
Portes & Sensenbrenner	'those expectations for action within a collectivity that affect the economic goals and goal-seeking behaviour of its members, even if these expectations are not oriented toward the economic sphere' (1993: 1323)	Internal of network
Putnam	'features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit' (1995: 67)	Internal of network
Thomas	'those voluntary means and processes developed within civil society which promote development for the collective whole' (1996: 11)	Internal of network
Loury	'naturally occurring social relationships among persons which promote or assist the acquisition of skills and traits valued in the marketplace… an asset which may be as significant as financial bequests in accounting for the maintenance of inequality in our society' (1992: 100)	Both networks
Nahapiet & Ghoshal	'the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social capital thus comprises both the network and the assets that may be mobilized through that network' (1988: 243)	Both networks
Pennar	'the web of social relationships that influences individual behaviour and thereby affects economic growth' (1997: 154)	Both networks
Schiff	'the set of elements of the social structure that affects relations among people and are inputs or arguments of the production and/or utility function' (1992: 160)	Both networks
Woolcock	'the information, trust, and norms of reciprocity inhering in one's social networks' (1998: 153)	Both networks

Appendix B: Literature on Relational Coordination

Table 24

Studies on Relational Coordination (using relational coordination theory/ relational coordination measures, proposing relational coordination)

* quantitative ** qualitative

Author	**Study Title**	**Summary**	**Setting**	**Study Design**	**Instruments**	**Data Analysis**	**Key Findings / Conclusions**
*Gittell (2002)	Relationships between Service Providers and Their Impact on Customers	Assert that rovider-provider relationships are more important than provider-consumer relationships. Summarized a few other theories that support the positive influence of provider-provider relationships on outcomes. Introduced the concept RC and tested hypotheses regarding RC and performance.	Nine hospitals and their orthopaedic departments. Orthopaedic surgery patients (n=878/1367) and their health care providers (5 core disciplines, n=338/666)	Patients admitted for primary, unilateral total joint replacement with a diagnosis of osteoarthritis were randomly selected. Patients were mailed surveys between 6 and 10 weeks post discharge. Nonrespondents were sent up to three surveys. Care providers were surveyed by mail. Hospitalization records were obtained for each patients from hospital administrators. Hypotheses 1. RC between providers increases customer satisfaction, over and above the effects of customer-provider relationships 2. RC between providers increases the customer's intent to recommend the service to others, over and above the effects of customer-provider relationships.	1. Customer-provider relationship (alpha=0.77) 2. RC 3. satisfaction and intent to recommend 4. SF36 5. WOMAC	Descriptive statistics + ANOVA: variables across sites Zero-order correlation: 1. service relationship variables 2. RC, customer outcomes HLM: Impact of service relationships (RC) on customer outcomes – RC and customer satisfaction; RC and intent to recommend	ANOVA: overall index of customer-provider relationships varied across sites (p=0.010), RC varied across sites (p=0.0007) Zero-order correlation: 1. customer-provider relationships, 2. RC, 3. customer satisfaction, 4. customer intent to recommend significant. 1+ 2 (r=0.13, p<0.001); 1 + 3 (r=0.60, p<0.001); 1 + 4 (r=0.58; p<0.001); 2 + 3 (r=.23, p<0.001); 2 + 4 (r=.14; p<0.001); 3+4 (r=.65, p<0.001). HLM: RC is positively associated with customer satisfaction (.24, p<0.001) and intent to recommend (.18, p<0.001). RC adds significantly to the explanatory power of the customer satisfaction model Chi-sq(1)=35.82, p<.001, and the intent to recommend model Chi-sq(1)=17.10, p<.001. accounting for the effect of customer-provider relationships, RC still has positive association with customer satisfaction

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
							(.17, p<.001) and intent to recommend (.11, p<.01). customer-provider relationships are positively associated with customer satisfaction (.55, p<.001) and intent to recommend (.55, p<.001). Customer-provider relationships add to the explanatory power of customer satisfaction model, Chi-sq(1)=278.59, p<.001; intent to recommend model, Chi-sq(1)=245.16, p<.001. Mediated model: mediation of RC and customer satisfaction by customer-provider relationship is significant (p<.01); of RC and intent to recommend is also significant (p<.01).
*Gittell et al. (2000)	Impact of Relational Coordination on Quality of Care, Postoperative Pain and Functioning, and Length of Stay	Introduced the concept of relational coordination, determined its impact on quality of care, postoperative pain and functioning, and the length of stay for patients undergoing angioplasty	Nine hospitals and their orthopaedic departments. Orthopaedic surgery patients and their formal health care providers (5 core disciplines)	Patients were randomly selected. Questionnaires were mailed to patients between 6 and 10 weeks after discharge (avg response rate=64%, 878/1367). Questionnaires were mailed to care providers during the second month of the study with 1 repeat mailing (avg response rate=51%, 338/666). Patent questionnaires were matched with care providers'	1. Patient questionnaire 2. Quality of care index (omitted 10 out of 25 items) – alpha 0.844 3. WOMAC (omitted the stiffness scale) 4. RC (added 'accuracy of communication', deleted 'helping across disciplines') -alpha: 0.717-0.840; overall alpha: 0.849 5. Comorbidities questionnaire	RC: Individual questionnaire responses were weighted to reflect the interdisciplinary composition of care provider responsible for hip and knee arthroplasty patient in each hospital. Averages were taken for responses within disciplines, then across disciplines to create hospital-level measures of RC (range: 1 to 5) HLM of RC (n=9) as	Relational coordination was positively correlated with quality of care (coef=1.068, R^2=74%, 20%; p<0.001), post-operative pain (coef=10.914, R^2=46%, 37%; p=0.041), shorter length of stay (CI 95%: 44.41%, 61.45% reduction; R^2=81%, 26%; p<0.001). Dimensions of RC correlated with functional status were frequency of communication

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
					6. SF 36 (mental health component) *demonstrated high volume of surgical procedure	predictor of QoC (n=518); Covariates: age, comorbidities, mental health, surgical procedure, sex, race, marital status, volume of procedures) HLM of RC as predictor of LoS (n=599); same covariates as QoC HLM of RC as predictors of clinical outcomes (n=539) (postoperative pain and functional status); covariates: age, comorbidities, mental health, surgical procedure, preoperative pain, sex, race, marital status, number of days between surgery and questionnaire response, volume of procedure.	(p=0.044), strength of shared goals (p=0.035) and degree of mutual respect (p=0.030) among care providers.
*Gittell (2000)	Organizing work to support relational co-ordination	Addresses how organizations achieve or fail to achieve high levels of RC	Airline industry, process of flight departures. Four airlines, two airport sites (n=9)	Staff in the airline departure teams were surveyed once (354/400 surveys, 89%) + field observations.	1. RC	Survey response was weighted in accordance with the actual representation of the respondent's function in his or her site using analytic weights. Strength of ties between individual respondent and each of the functions asked about, on each dimension of RC. Average tie strength for the overall sample and for each dimension of RC, then an index was created	Significant correlations between RC and the use of cross-functional liaisons, IT, supervisors, cross-functional performance measurement, employee selection, conflict resolution and flexible work roles.

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
						for RC (alpha=0.878). Correlations were tested	
*Gittell (2001)	Supervisory Span, Relational Coordination and Flight Departure Performance	Author provided an argument for each case and tested whether broad or narrow span of supervisory control improves group process and performance	Airline cross-functional groups involved in flight departures	Semi structured interviews for span of control in 2 airline sites: 28 interviews in first site and 20 in second. Cross sectional survey of 9 flight departure groups, 5 functional roles were surveyed (N=354).	1. performance: gate time per departure, staff time per passenger, customer complaints, baggage handling and late arrivals 2. RC 3. supervisory span 4. control: flight loading, tons of cargo per flight, passenger connecting per month, average flight length	Multiple regression	Supervisor with narrow span of control improve performance through their positive effects on group process, such as relational coordination.
*Gittell (2002)	Coordinating Mechanisms in Care Provider Groups: Relational Coordination as a Mediator and Input Uncertainty as a Moderator of Performance Effects	Author proposed a model of how coordinating mechanisms work and tested it in the context of caring for orthopaedic surgery patients. The coordinating mechanisms of routines, boundary spanners and team meetings were tested; also, work process was measured as RC and the effect of uncertain was also studied	Orthopaedic surgery patients and their formal health care providers	Telephone interviews and surveys of patients and health care workers. Interviews are to measure coordinating mechanisms.	1. health care provider questionnaire – survey RC among care providers 2. patient questionnaire – measure input uncertainty, performance independent of supervisor or self-assessment.	Random effects linear regression (HLM). Patient is the unit of analysis with group (n=9). 1. relationship between coordinating mechanisms, RC and performance; 2. relationship between coordinating mechanisms and RC.	Consistent with organization design theory, boundary spanners and team meetings were mediated by RC. However, contrary to organization design theory, routine was also mediated by RC. Uncertainty, on the other hand, moderated performance. 1. routines are associated with increased quality of care (0.25, p <0.01) and reduced hospital lengths of stay (-0.23, p<0.01). 2. boundary spanners are associated with increased QoC (0.23, p<0.01; 0.19, p<0.01) and with reduced lengths of hospital stay

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
							(-0.28, p<0.01; -0.20, p<0.01). 3. team meetings are associated with increased QoC (0.18, p<0.01) and with reduced lengths of hospital stay (-0.26, p<0.01). When RC is added to each model, the effects of coordinating mechanisms on quality performance become nonsignificant, while RC itself has significant positive associations with quality performance.
**Gittell (2004)	Coordination Networks Within and Across Organizations: A Multi-level Framework	Author argued that coordination of patient care is a phenomenon the best suited for multi-level analysis. This paper describes intra- and inter-organizational coordination in health care institution; followed by discussion of a case study. RC is proposed as a measure for coordination in such multi-level model.	A hospital in Boston	15 interviews with middle and front line management staff in hospital, aiming to illustrate and support the model of multi-level study of coordination in patient care. Interviews also explored mechanisms of coordination used at different level of organization (inter and intra); as well, participants' view on the association between these mechanisms and performance.	none	none	Relational coordination was not the main focus of this study
Gittell (2000)	Paradox of coordination and control – case study	Author described the contrasting systems of coordination and control at American and Southwest Airlines.	American Airlines and Southwest Airline	Case study	None	n/a	Author suggested that the best way to achieve coordination in settings like airline industry is not to create an organization based on performance measurement and little

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
							supervision. Author introduced cross-functional accountability and adequate supervisory staffing to diffuse blame and provide coaching and feedback. Coordination (RC in particular) then will benefit from these aforementioned mechanisms.
*Weinberg et al. (2007)	Impact of Patient and Provider Coordination across the Continuum on Outcomes for surgical patients	Examined the relationship between informal care providers' sense of coordination (among formal care providers) and informal care providers' readiness to care for patients; as well, patients' clinical outcomes at 6- and 12-week post-surgery	Orthopaedic surgery patients (n=222/357), orthopaedic surgeons (interviews)	Surgeons were interviewed first to explore coordination problems among health care facilities. Patients were surveyed before their surgeries, at 6 weeks and at 12 weeks post-surgery (response rate: n=184, 154).	1. WOMAC 2. Care satisfaction (1-item) 3. Picker Post-Acute Care Survey for coordination (alpha=0.76 overall)	Hierarchical linear modeling OLS models – coordination problems and postsurgical outcomes @ 6 weeks and 12 weeks post surgery	1. Coordination problems were reported for: discharge (42%); at rehab facility (44%); with home health care (35%); at follow-up visit with surgeon (17%); global coordination (30%). OVERALL patient-perceived coordination problems=33% 2. Models of coordination problems and outcomes @ 6 weeks: negatively correlated with improved freedom from pain, functional status, and satisfaction (-0.14, $p<0.05$; -0.12, $p<0.05$; -0.02, $p<0.001$ respectively) 3. Models of coordination problems and outcomes @ 12 weeks: negatively correlated with freedom from joint pain (-0.12, $p<0.028$) but not functional status.
*Weinberg	Coordination	Explored the effects	Orthopaedic	Patients were selected	1. RC (alpha=0.97)	SEM: RC's effects on	SEM: RC has

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
et al. (2007)	between formal providers and informal caregivers.	of coordination (RC) between formal providers and informal caregivers on caregiver preparation to provide care at home, as well, the effect of caregiver preparation on patient outcomes	surgery patients (n=222, 62%; @ 12 weeks, response rate=164, 74%), their informal care givers (n=119, 63%) and their formal health care providers.	randomly. Followed patients from before surgeries to 12-week post surgery. Patients were surveyed at 6-week and 12-week follow up at the hospital. Informal caregivers were surveyed (by mail) at 6-week post surgery. Questionnaires were mailed to care providers during the second month of the study with 1 repeat mailing (avg response rate=51%, 338/666). Patent questionnaires were matched with care providers' (n=91).	2. Picker Post-Acute Care Survey of Joint Patients (adapted for caregivers) (alpha=0.78) 3. WOMAC (for pain and functional status) (alpha?) 4. SF-36 (for mental health)	clinical outomes at 6 weeks and 12 weeks post surgery. RC's effects on caregiver preparation	significant effect on 12-week pain ratings (p=0.035), functional ratings (p=0.032) and mental health ratings (p=0.06). RC is positively correlated with 6-week caregiver preparation (but nonsignificant). Caregiver preparation is positively related to positive patient outcomes at 12 weeks (but nonsignificant).
*Gittell et al. (2008)	Impact of Relational Coordination on Job Satisfaction and Quality Outcomes: A Study of Nursing Homes	Tested the impact of RC on job satisfaction and work outcomes.	Nursing home residents (n=105) and nursing aids (n=252) in 5 for-profit and 10 non-profit nursing homes.	Cross sectional survey of nursing aids and residents at nursing homes.	1. RC – 5 items 2. Resident quality of life – 14 items 3. Nursing aid job satisfaction – 1 item 4. Control variables: age, gender, length of stay	Random effects linear model, RC predicting job satisfaction, RC predicting quality of mlife.	RC is a significant predictor for both quality of life (r=.37; p<.01) and job satisfaction (r=.30; p<.001).
*Bond & Gittell (2010)	Cross-Agency Coordination of Offender Reentry: Testing Outcomes of Collaboration Policies	Examined the impact of cross-agency coordination (RC) on reentry outcomes.	Agencies coordinating on offender reentry issues – administrators (N=45) from probation, parole, police, employment and substance abuse agencies in Massachusetts.	Cross-sectional survey of administrators.	1. RC – 7 items 2. Collaboration – 4 items 3. Reactivism rates of offenders	Linear regression: RC predicting reactivism rates.	RC with corrections (B=-7.39; p<.05) and employment agency (B=6.55; p<.05) predicted reactivism rates. Also noted some differences in cross agency coordination between cities that were part of reenter policy efforts and those that were not.
*Carmeli & Gittell (2009)	High Quality Relationships, Psychological	Explored the relational underpinnings (high	Study 1: employees (N=100) in 3	Study 1: Cross-sectional survey. Study 2: Survey at two	1. Learning from failures – 5 items 2. Psychological	Regression analysis. Mediator analysis as per Baron and Kenny.	Study 1: quality relationship predicted learning from failure

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
	Safety and Learning from Failures in Work Organizations	quality relationship - RC) of learning from failures, and the mediating role of psychological safety.	organziations (software, electronics and finance) in Israel. Study 2: graduate students (N=128) who have full-time jobs from an academic institution in Israel.	time points (2 weeks apart)	safety – 7 items 3. RC – only the relational dimensions – 10 items 4. Control – gender, age, organization tenure		(B=.71, p<.001); partial mediation was noted. Study 2: quality relationship predicted learning from failures (B=.52; p<.001). Full mediation of psychological safety was noted.
*Gittell, Seidner & Wimbush (2009)	A Relational Model of How High-Performance Work Systems Work	Tested a model of high performance work systems on RC and work outcomes.	Nine orthopedics units in nine different hospitals in Massachusetts. High performance work systems – interviews with administrators. RC – care providers (n=338). Patient outcomes – patient survey (n=878) and chart review.	A combination of interviews and cross-sectional survey.	1. High performance system – from interviews (cross function selection, conflict resolution, performance measure, rewards, meetings, boundary spanners) 2. RC – 7 items 3. Outcomes – perceived QoC, LOS. 4. Control variables: # joint replacements in past 6 months, patient age, well-being (SF36) and other demographics	HLM – regressing RC on high performance practices; regressing QoC on high performance practices and RC; regressing LOS on high performance practices and RC.	High performance practices predicted RC (B=.31, p<.001). RC predicted LOS (B=1.19, p<.01) and QoC (B=1.93, p<.05). High performance practices did not predict LOS or QoC.
*Gittell et al. (2008)	Is the Doctor In? A Relational Approach to Job Design and the Coordination of Work	Testing the relationships among job design, RC and work outcomes. Job design: hospitalist versus private physician following patients who are hospitalized. This study is conceptualized as examining the association between relational job design	Health care providers (n=893 on 335 patients) in the medical unit of one hospital.	Cross-sectional survey and chart review.	1. job design – hospitalist versus traditional 2. Efficiency – excess LOS and total costs 3. Performance - mortality, readmission to the hospital within 7 days, and patient readmission within 30 days 4. RC	HLM. estimated the effects of job design on relational coordination and performance outcomes controlling for physician volume of admissions and patient severity of illness, age, and gender	1. job design predicted RC (B=.66, p<.01) 2. job design predicted excess LOS (B=-.46, p<.001), log total costs (B=-.07, p<.01), readmission within 30 days (B=-.33, p<.05). 3. RC mediated the association between job design and excess LOS.

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
		and coordination.			5. Control - patient severity of illness, age and gender, number of days the patient stayed in the intensive care unit (ICU), and a propensity score for being treated by a hospitalist rather than a traditional physician		
*Gittell (2008)	Relationships and Resilience: Care Provider Responses to Pressures from Managed Care	Explored the role that relationships play in enabling resilient responses to external pressures and the organizational practices that enable workers to respond in a resilient way when organizational change is required	Nine orthopedics units in nine different hospitals in Massachusetts. Reltional work systems – interviews with administrators. RC – care providers (n=338).	A combination of interviews and cross-sectional survey.	1. external stressors - % of managed care penetration 2. perceived work stress – 1 item 3. collective coping response – RC 7 items 4. relational work system - selection for cross-functional teamwork, rewards for cross-functional teamwork, cross-functional performance measurement, cross-functional conflict resolution, cross-functional team meetings, and cross-functional boundary spanners	HLM with four regression equations. 1. managed care predicting perceived stress 2. managed care predicting RC 3. managed care AND perceived work stress predicting RC (testing mediation) 4. managed care, perceived work stress and relational work system predicting RC	1. managed care predicted perceived work stress (B=.15, p<.05) 2. managed care predicted RC (B=.12, p<.05) 3. managed care did not predict RC but work stress (B=.17, p<.01) predicted RC 4. managed care did not predict RC but work stress (B=.13, p<.05) and relational work (B=.25, p<.001) system predicted RC. Workers engage in higher levels of relational coordination when they perceive this type of threat but that the presence of a particular type of high performance work system (a relational work system) strengthens this resilient response
**Gittell et	Relationships,	Discussed and	Airline industry.	Descriptive analysis	1. relational	n/a	Illustrated how the

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
al. (2006)	Layoffs and Organizational Resilience: Airline Responses to Crisis of September 11th,	provided a case study on the role of relational reserves and financial reserves on recovery post 9/11 crisis in the airline industry.	United airlines and southwest.	and qualitative data.	reserves 2. financial reserves 3. cut-back and lay-offs 4. stock prices		development of relational reserves enables organizations to establish viable business models and build up financial reserves over time, thus minimizing the need for layoffs in times of crisis, and reveal that the failure to build relational reserves leads to very different results. These cases also suggest that there are different managerial strategies underlying the observed data.
*Hagigi (2008)	Evaluating Coordination as a Key Driver of Performance in Ambulatory Care Clinics	Explored if coordinating mechanisms (both formal and relational) significantly affect performance while controlling for patient and provider characteristics.	Internal medicine clinics (n=16) in one academic institution. Physicians and all staff (N= 302) were surveyed.	Cross-sectional survey of physicians and staff at clinics. Data was collected during monthly team meeting.	1. RC 2.Outcomes: charges per patient, biomarker levels, hospitalization ate, mortality rates 3. other coordination mechanisms: clinical pathways, meetings, boundary spanner 4. control: patient characteristics (e.g., demographics, comorbidities), staff experience and % of FTE in clinic	HLM Coordination predicting quality, efficiency and costs. RC predicting performance. Formal coordination mechanisms predicting RC. Mediating role of RC in the relationship between formal coordination and performance. Moderating role of RC in the relationships between independent and dependent variables.	RC predicted log of costs (B=-3.784, p<.05). RC predicted hospitalization for heart failure patients (B=-6.42, p<.01). RC predicted documented action plan for asthma patients (B=26.81, p<.001). Mediation hypotheses were not supported. Moderation: RC moderates the association between lower income patients and fewer HF inpatient hospitalizations.
*Havens et al. (2010)	Relational coordination among nurses and other providers: impact on the quality of	Examined nurse reports of relational coordination between nurses and other providers and the impact of relational	five acute care community hospitals in rural Pennsylvania counties. All hospitals	Direct care registered nurses (RNs) (n=747) completed surveys to assess relational coordination across five provider functions and six types of patient	1.RC 2.perceived QoC (1) the overall quality of nursing care on their units (2) the frequency with which the	t-tests and OLS regression for QoC index	relational coordination between nurses and other providers was significantly related to overall quality (e.g., hospital acquired infections, medication

Author	Study Title	Summary	Setting	Study Design	Instruments	Data Analysis	Key Findings / Conclusions
	patient care	coordination on patient care quality	were private, non-profit, non-religious, and they ranged in size from 75 to 179 licensed and staffed beds.	care units. Nurses also reported perceptions about patient care quality.	wrong medication or dose was given involving the nurse or his/her patients in the past year (3) the frequency of patient and family complaints in the past year (4) the frequency of patient falls with injuries; and (5) the frequency of hospital-acquired infections		errors)

* quantitative ** qualitative

Appendix C: Bootstrapping

Table 25

Comparing Estimates from Bootstrapping and Default Program

Note: Analyses were performed on data prior to model trimming

Construct	Regression Weights (Standard error)	Bootstrapped Regression Weights (Standard error)	Bias (Standard error)	Indicators
Social capital (16 indicators)	1.0	1.0	0.0 (.0)	Easy to talk openly SSC1
	1.0** (.0)	1.0** (.0)	0.0 (.0)	Communication is open SSC2
	1.2**(.1)	1.3**(.1)	0.0 (.0)	Enjoyable to talk with SSC3
	1.2**(.1)	1.2**(.1)	0.0 (.0)	Easy to ask advice SSC4
	1.1**(.1)	1.1**(.1)	0.0 (.0)	Trust this individual TR1
	1.0**(.1)	1.0**(.1)	0.0 (.0)	Rely on this individual TR2
	1.3**(.1)	1.3**(.1)	0.0 (.0)	This individual cares TR3
	1.1**(.1)	1.1**(.1)	0.0 (.0)	Get along LI1
	1.3**(.1)	1.3**(.1)	0.0 (.0)	Interacting is a pleasure LI2
	1.1**(.1)	1.1**(.1)	0.0 (.0)	Like as a person LI3
	1.1**(.1)	1.1**(.1)	0.0 (.0)	Same jargon LAN1
	1.2**(.1)	1.2**(.1)	0.0 (.0)	Communicate easily LAN2
	1.0**(.1)	1.0**(.1)	0.0 (.0)	Understand expression LAN3
	1.1**(.1)	1.1**(.1)	0.0 (.0)	Interpret events INT1
	1.0**(.1)	1.0**(.1)	0.0 (.0)	Perceive motives INT2
	1.2**(.1)	1.2**(.1)	0.0 (.0)	Share vision INT3
RC communication (4 indicators)	1.0	1.0	0.0 (.0)	Frequent communication
	1.4** (.1)	1.4 (.1)	0.0 (.0)	Timely communication
	1.1** (.1)	1.1 (.1)	0.0 (.0)	Accurate communication
	1.3** (.1)	1.3 (.1)	0.0 (.0)	Problem-solving communication
RC supportive relationship (3 indicators)	1.0	1.0	0.0 (.0)	Shared knowledge
	1.0** (.1)	1.0 (.1)	0.0 (.0)	Mutual respect
	1.0** (.1)	1.0 (.1)	0.0 (.0)	Shared goals

*$p < 0.05$ **$p < 0.01$

Appendix D: CFA for Measurement Model

Table 26

Model Fit-Indices for Measurement Model

	Chi-Sq (*df*)	***p***	**CFI**	**TLI**	**AGFI**	**RMSEA**	**RMSEA 90% CI**	**SRMR**
Acceptable value	-	> 0.05	> 0.9	> 0.9	> 0.9	< 0.08	0 - 0.1	< 0.08
Two-factor model	1005.1 (227)	0.0	0.892	0.880	0.717	0.103	0.096 - 0.109	0.0441
RC2-RC4	993.2 (226)	0.0	0.894	0.881	0.719	.102	0.096 - 0.109	0.0439
SSC1-SSC2	818.3 (225)	0.0	0.918	0.907	0.759	0.090	0.083 - 0.097	0.0431
SSC2-SSC3	802.8 (224)	0.0	0.920	0.909	0.761	0.089	0.082 - 0.096	0.0429
SSC3-LI2	765.2 (223)	0.0	0.925	0.915	0.771	0.086	0.080 - 0.093	0.0422
LI1-LI2	726.2 (222)	0.0	0.930	0.920	0.826	0.083	0.077 - 0.090	0.0416
LAN1-INT1	707.4 (221)	0.0	0.933	0.923	0.792	0.082	0.075 - 0.089	0.0412
LAN2-LAN3	374.8 (220)	0.0	0.938	0.929	0.801	0.079	0.072 - 0.086	0.0408
INT1-INT2	626.6 (219)	0.0	0.943	0.935	0.812	0.076	0.069 - 0.083	0.0399
Remove RC3	574.1 (198)	0.0	0.946	0.937	0.817	0.076	0.069 - 0.084	0.0362
Remove LI3	463.5 (178)	0.0	0.956	0.948	0.837	0.070	0.062 - 0.078	0.0346
Remove INT3	366.1 (159)	0.0	0.966	0.959	0.865	0.063	0.055 - 0.072	0.0320
Final measurement model	366.1 (159)	0.0	0.966	0.959	0.865	0.063	0.055 - 0.072	0.0320

Table 27

Regression Coefficients Pre-CFA

Construct	**Regression Weight (Standard error)**		**Standardized Regression Weight**		**Indicator**
	Individual	**Dyad**	**Individual**	**Dyad**	
Social capital (14 indicators)	0.82***(0.04)	0.87***(0.08)	0.82	0.86	Easy to talk openly SSC1
	0.84***(0.04)	0.85***(0.07)	0.85	0.88	Communication is open SSC2
	1.00	1.00	0.87	0.89	Enjoyable to talk with SSC3
	0.97***(0.04)	0.94***(0.08)	0.88	0.89	Easy to ask advice SSC4
	0.84***(0.04)	0.77***(0.06)	0.88	0.91	Get along LI1
	1.05***(0.04)	0.98***(0.06)	0.89	0.89	Interacting is a pleasure LI2
	0.88***(0.04)	0.73***(0.07)	0.85	0.85	Trust this individual TR1
	0.79***(0.05)	0.65***(0.09)	0.69	0.69	Rely on this individual TR2
	1.07***(0.06)	0.99***(0.09)	0.80	0.84	This individual cares TR3
	0.87***(0.05)	0.84***(0.10)	0.76	0.75	Use same jargon LAN1
	0.94***(0.04)	0.87***(0.08)	0.89	0.86	Easily communicate LAN2
	0.83***(0.04)	0.89***(0.07)	0.85	0.84	Understand expression LAN3
	0.92***(0.05)	0.82***(0.09)	0.80	0.78	Interpret work events INT1
	0.85***(0.06)	0.75***(0.11)	0.68	0.65	Perceive motives INT2
Relational Coordination (6 indicators)	1.00	1.00	0.55	0.51	Frequent communication RC1
	1.31***(0.14)	1.50***(0.35)	0.69	0.69	Timely communication RC2
	1.27***(0.14)	1.42***(0.34)	0.66	0.66	Problem-solving communication RC4
	1.50***(0.15)	1.70***(0.38)	0.75	0.77	Shared knowledge RC5
	1.51***(0.15)	2.07***(0.44)	0.79	0.85	Mutual respect RC6
	1.63***(0.17)	1.68***(0.40)	0.78	0.69	Shared goals RC7

***$p < 0.001$

Appendix E: AMOS Diagrams

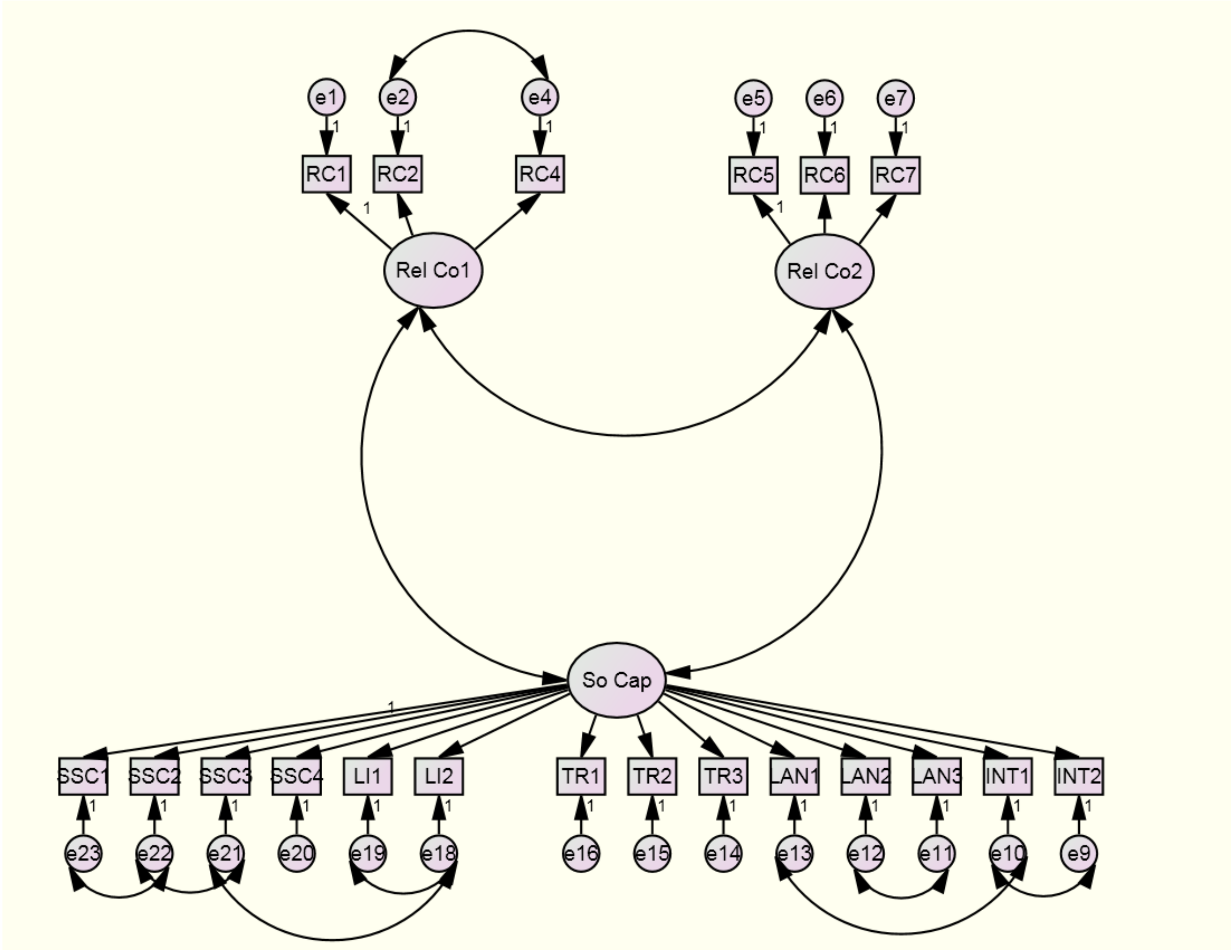
e1
e2
e4
e5
e6
e7
1
1
1
1
1
1
RC1
RC2
RC4
RC5
RC6
RC7
1
1
Rel Co1
Rel Co2
So Cap
1
SSC1
SSC2
SSC3
SSC4
LI1
LI2
TR1
TR2
TR3
LAN1
LAN2
LAN3
INT1
INT2
1
1
1
1
1
1
1
1
1
1
1
1
1
1
e23
e22
e21
e20
e19
e18
e16
e15
e14
e13
e12
e11
e10
e9

Figure 7: Measurement model.

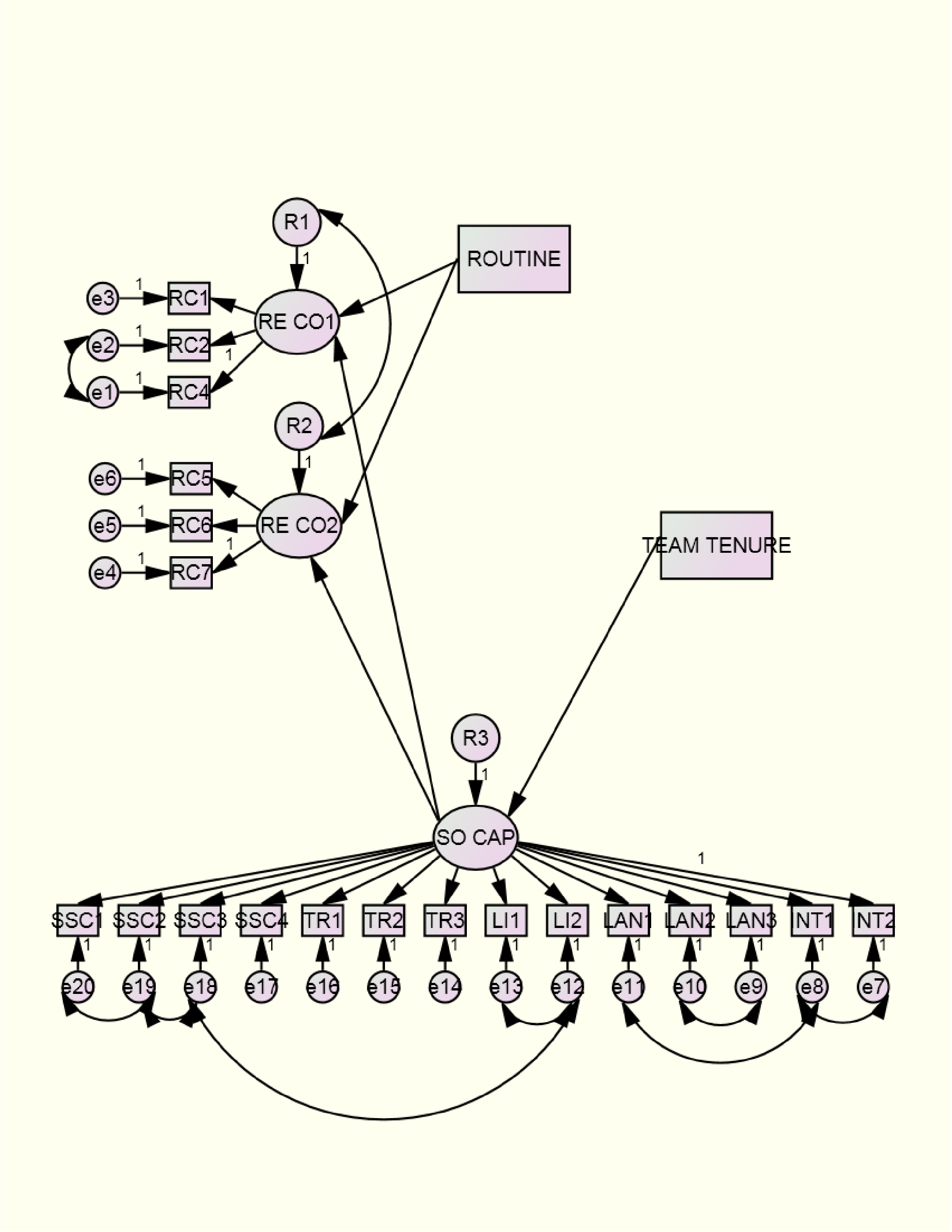
R1
1
ROUTINE
e3
1
RC1
RE CO1
e2
1
RC2
1
e1
1
RC4
R2
1
e6
1
RC5
e5
1
RC6
RE CO2
1
e4
1
RC7
TEAM TENURE
R3
1
SO CAP
1
SSC1
SSC2
SSC3
SSC4
TR1
TR2
TR3
LI1
LI2
LAN1
LAN2
LAN3
NT1
NT2
1
1
1
1
1
1
1
1
1
1
1
1
1
1
e20
e19
e18
e17
e16
e15
e14
e13
e12
e11
e10
e9
e8
e7

Figure 8: Initial structural model.

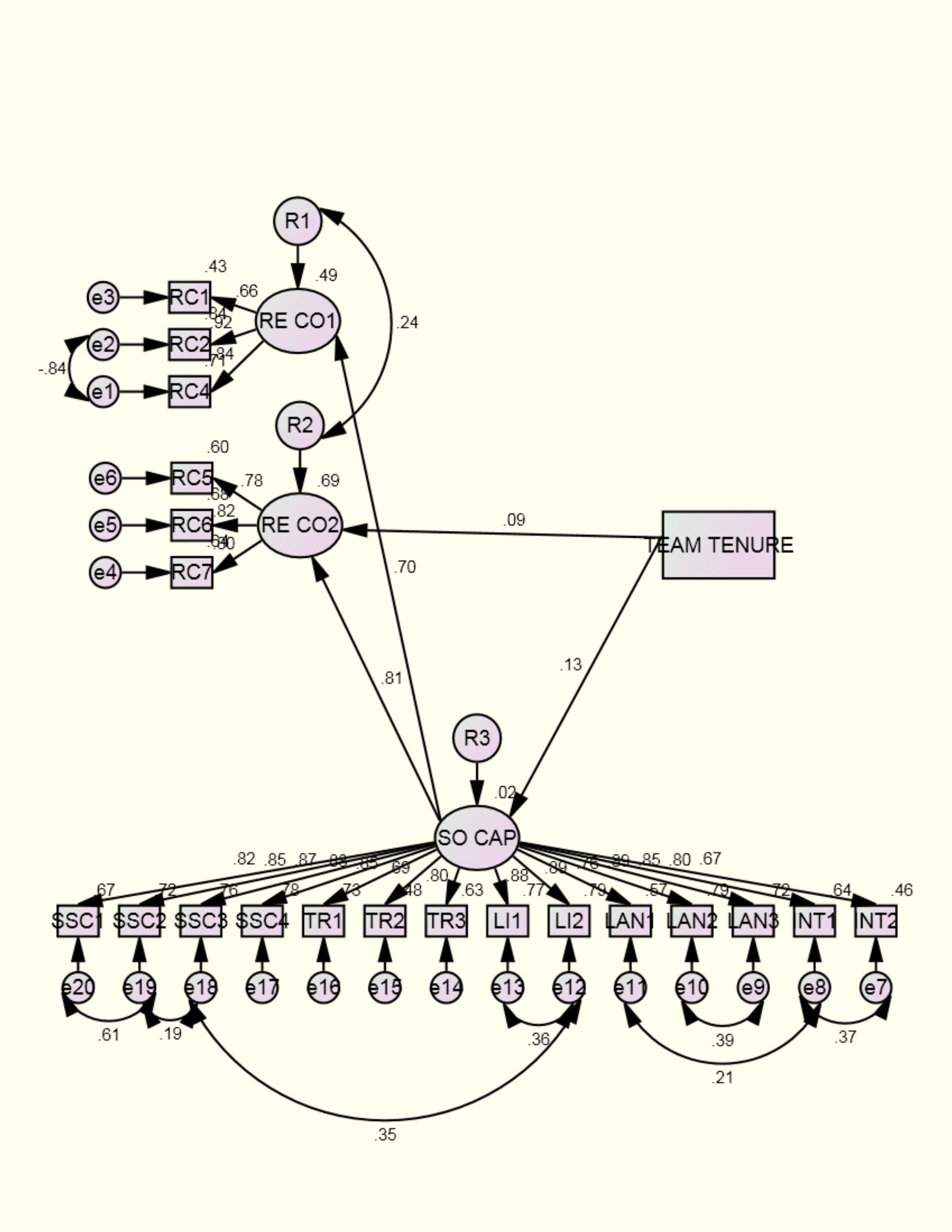
R1
.49
.24
.43
e3
RC1
.66
RE CO1
.84
.92
e2
RC2
.84
-.84
.71
e1
RC4
R2
.60
e6
RC5
.78
.69
.68
.82
e5
RC6
RE CO2
.09
TEAM TENURE
.64
.80
e4
RC7
.70
.81
.13
R3
.02
SO CAP
.82
.85
.87
.88
.85
.69
.80
.88
.89
.76
.89
.85
.80
.67
.67
.72
.76
.78
.73
.48
.63
.77
.79
.57
.79
.72
.64
.46
SSC1
SSC2
SSC3
SSC4
TR1
TR2
TR3
LI1
LI2
LAN1
LAN2
LAN3
NT1
NT2
e20
e19
e18
e17
e16
e15
e14
e13
e12
e11
e10
e9
e8
e7
.61
.19
.36
.39
.37
.21
.35

Figure 9: Final structural model with standardized estimates.

Appendices

Appendix F: Study Questionnaire for Nurse Participants

Relational Coordination in Outpatient Clinics
Study Survey

SECTION ONE: Relational Coordination Survey for Patient Care

Instructions: For each of the following statements, please check the box under the response that best reflects your judgment.

1. How *frequently* do you communicate with the physicians about patients at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

2. Do the physicians at this clinic communicate with you in a *timely* way about patients at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

3. Do the physicians communicate with you *accurately* about patients at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

4. When problems arise regarding the care of patients, do the physicians work with you to *solve the problem* at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

5. Our clinic has constructive work relationships with other groups in this hospital.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

6. Inadequate working relationships with other hospital groups limit our effectiveness.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

7. How much do the physicians *know* about your role in caring for patients at this clinic?

Nothing ☐	Little ☐	Some ☐	A lot ☐	Everything ☐

8. How much do the physicians *respect* the role you play in caring for patients at this clinic?

Not at all ☐	A little ☐	Somewhat ☐	A lot ☐	Completely ☐

9. How much do the physicians *share your goals* for the care of patients at this clinic?

Not at all ☐	A little ☐	Somewhat ☐	A lot ☐	Completely ☐

10. How much influence do(es) the hospital administrators have in this clinics?

Not at all ☐	A little ☐	Somewhat ☐	A lot ☐	Completely ☐

SECTION TWO: Survey of Coordination Strategies

Instructions: For each of the following statements, please check the box under the response that best reflects your judgment.

1. How *frequently* do you use flow sheet, pre-printed orders, clinical protocols or pathways at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

2. How *frequently* do you attend patient rounds or tumour boards associated with this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

SECTION THREE: Social Capital Survey

A. Structural Social Capital

Instructions: Please indicate the extent to which you agree with each statement below.

1. It is easy for me to talk openly with the physicians of this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

2. Communication with the physicians in this clinic is very open.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

3. I find it enjoyable to talk with the physicians of this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

4. It is easy to ask advice from the physicians in this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

B. Relational Social Capital

Instructions: Keeping in mind **only your coworkers at the clinic**, use the following response categories to indicate the extent to which you agree with each statement below.

1. I trust the physicians in this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

2. I can rely on the physicians in this clinic without any fear that he/she will take advantage of me.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

3. I feel that the physicians in this clinic care about what happens to me.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

4. I get along well with the physicians in this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

5. Interacting with the physicians in this clinic is a pleasure.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

6. I like the physicians in this clinic as a person.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

C. Cognitive Social Capital

Instructions: Keeping in mind **only your coworkers at the clinic**, use the following response categories to indicate the extent to which you agree with each statement below.

1. The physicians in this clinic explains work-related ideas or thoughts using the same kind of vocabulary/jargon that I do.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

2. The physicians in this clinic and I can easily communicate with each other at work.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

3. The physicians in this clinic express him/herself in a way that I can easily understand.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

4. The physicians in this clinic and I interpret clinic events and experiences similarly.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

5. The physicians in this clinic and I perceive the motives of other clinic members similarly.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

6. The physicians in this clinic and I share the same vision for what the clinic should accomplish.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

SECTION FOUR: Background Information

Please tell us more about yourself:

1. What is your gender?
   ☐ Male ☐ Female

2. What is your age? __________ years

3. What academic or professional degree(s) have you earned? (check all that apply)
   ☐ College diploma
   ☐ Bachelor's
   ☐ Nurse Practitioner certificate
   ☐ Master's
   ☐ Doctorate
   ☐ Others (please specify: ____

4. What is your current employment status?
   ☐ Temporary casual
   ☐ Temporary part-time
   ☐ Temporary full-time
   ☐ Permanent casual
   ☐ Permanent part-time
   ☐ Permanent full-time

5. When did you begin working at the present clinic?
   (Year) ______
   (Month) ______
   ☐ I don't work at this clinic on a regular basis

6. When did you begin working at this institution?
   (Year) ______
   (Month) ______

Appendix G: Study Questionnaire for Physician Participants

Relational Coordination in Outpatient Clinics
Study Survey

SECTION ONE: Relational Coordination Survey for Patient Care

Instructions: For each of the following statements, please check the box under the response that best reflects your judgment.

1. How *frequently* do you communicate with the nurses about patients at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

2. Do the nurses at this clinic communicate with you in a *timely* way about patients at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

3. Do the nurses communicate with you *accurately* about patients at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

4. When problems arise regarding the care of patients, do the nurses work with you to *solve the problem* at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

5. Our clinic has constructive work relationships with other groups in this hospital.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

6. Inadequate working relationships with other hospital groups limit our effectiveness.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

7. How much do the nurses *know* about your role in caring for patients at this clinic?

Nothing ☐	Little ☐	Some ☐	A lot ☐	Everything ☐

8. How much do the nurses *respect* the role you play in caring for patients at this clinic?

Not at all ☐	A little ☐	Somewhat ☐	A lot ☐	Completely ☐

9. How much do the nurses *share your goals* for the care of patients at this clinic?

Not at all ☐	A little ☐	Somewhat ☐	A lot ☐	Completely ☐

10. How much influence do(es) the hospital administrators have in this clinics?

Not at all ☐	A little ☐	Somewhat ☐	A lot ☐	Completely ☐

SECTION TWO: Survey of Coordination Strategies

Instructions: For each of the following statements, please check the box under the response that best reflects your judgment.

1. How *frequently* do you use flow sheet, pre-printed orders, clinical protocols or pathways at this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

2. How *frequently* do you attend patient rounds or tumour boards associated with this clinic?

Never ☐	Rarely ☐	Occasionally ☐	Often ☐	Constantly ☐

SECTION THREE: Social Capital Survey

A. Structural Social Capital

Instructions: Please indicate the extent to which you agree with each statement below.

1. It is easy for me to talk openly with the nurses of this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

2. Communication with the nurses in this clinic is very open.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

3. I find it enjoyable to talk with the nurses of this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

4. It is easy to ask advice from the nurses in this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

B. Relational Social Capital

Instructions: Keeping in mind **only your coworkers at the clinic**, use the following response categories to indicate the extent to which you agree with each statement below.

1. I trust the nurses in this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

2. I can rely on the nurses in this clinic without any fear that he/she will take advantage of me.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

3. I feel that the nurses in this clinic care about what happens to me.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

4. I get along well with the nurses in this clinic.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

5. Interacting with the nurses in this clinic is a pleasure.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

6. I like the nurses in this clinic as a person.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

C. Cognitive Social Capital

Instructions: Keeping in mind **only your coworkers at the clinic**, use the following response categories to indicate the extent to which you agree with each statement below.

1. The nurses in this clinic explains work-related ideas or thoughts using the same kind of vocabulary/jargon that I do.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

2. The nurses in this clinic and I can easily communicate with each other at work.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

3. The nurses in this clinic express him/herself in a way that I can easily understand.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

4. The nurses in this clinic and I interpret clinic events and experiences similarly.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

5. The nurses in this clinic and I perceive the motives of other clinic members similarly.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

6. The nurses in this clinic and I share the same vision for what the clinic should accomplish.

☐ Strongly disagree	☐ Disagree	☐ Neither disagree nor agree	☐ Agree	☐ Strongly agree

SECTION FOUR: Background Information

Please tell us more about yourself:

1. What is your gender?
   ☐ Male ☐ Female

2. What is your age? __________ years

3. What academic or professional degree(s) have you earned? (check all that apply)
   ☐ College diploma ☐ Master's

   ☐ Bachelor's ☐ Doctorate
   ☐ Post-graduate professional degree (e.g., MD)
   ☐ Others (please specify: ____)

4. What is your current employment status?
   ☐ Temporary casual
   ☐ Temporary part-time
   ☐ Temporary full-time
   ☐ Permanent casual
   ☐ Permanent part-time
   ☐ Permanent full-time

5. When did you begin working at the present clinic?
   (Year) ______
   (Month) ______

6. When did you begin working at this institution?
   (Year) ______
   (Month) ______