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## The Importance of Relational Coordination and Reciprocal Learning for Chronic Illness Care within Primary Care Teams

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### Abstract

**Background**—Recent research from a complexity theory perspective suggests that implementation of complex models of care, such as the Chronic Care Model (CCM), requires strong relationships and learning capacities among primary care teams.

**Purposes**—Our primary aim was to assess the extent to which practice member perceptions of relational coordination and reciprocal learning were associated with the presence of CCM elements in community-based primary care practices.

**Methodology/Approach**—We used baseline measures from a cluster randomized controlled trial testing a practice facilitation intervention to implement the CCM and improve risk factor control for patients with type 2 diabetes in small primary care practices. Practice members (i.e., physicians, non-physician providers, and staff) completed baseline assessments, which included the Relational Coordination Scale, Reciprocal Learning Scale, and the Assessment of Chronic Illness Care (ACIC) survey, along with items assessing individual and clinic characteristics. To assess the association between Relational Coordination, Reciprocal Learning, and ACIC, we used a series of hierarchical linear regression models accounting for clustering of individual practice members within clinics and controlling for individual- and practice-level characteristics, and tested for mediation effects.

**Findings**—283 practice members from 39 clinics completed baseline measures. Relational Coordination scores were significantly and positively associated with ACIC scores (Model 1).

When Reciprocal Learning was added, Relational Coordination remained a significant yet notably attenuated predictor of ACIC (Model 2). The mediation effect was significant ( $z = 9.3, p < .01$ ); 24% of the association between Relational Coordination and ACIC scores was explained by Reciprocal Learning. Of the individual and practice level covariates included in Model 3, only the presence of an electronic medical record was significant; Relational Coordination and Reciprocal Learning remained significant independent predictors of ACIC.

**Practice Implications**—Efforts to implement complex models of care should incorporate strategies to strengthen relational coordination and reciprocal learning among team members.

## Keywords

primary care; chronic care model; relational coordination; reciprocal learning; diabetes

## Introduction

The Chronic Care Model (CCM) has become a widely accepted framework for organizing and delivering patient-centered, evidence-based care for chronic illnesses within the primary care setting (Coleman et al., 2009). The model describes six elements that health care organizations need to deliver optimal chronic illness care: decision support, self-management support, clinical information systems, delivery system design, organizational leadership and support, and community linkages (Wagner & Groves, 2002). A basic premise of the CCM is that health care settings where these elements are strong are likely to have prepared, pro-active primary care practice teams, and informed, activated patients who accept responsibility for being part of that team in the management of their chronic illness (Wagner & Groves, 2002). As a result of productive interactions between these teams and patients, both the quality and outcomes of care for patients with a chronic illness should improve.

Unfortunately, the CCM does not provide guidance regarding implementation of the care elements that it describes. Traditional quality improvement implementation efforts have focused primarily on the CCM elements with limited success (Chin et al., 2007). Suggested barriers to improving chronic illness care include competing demands, resource and staffing limitations, and disincentives within the reimbursement system (Wagner et al., 2001; Østbye et al., 2005). Surprisingly, efforts to implement the CCM have largely neglected the issue of how to develop prepared proactive teams responsible for delivering and coordinating chronic illness care. Some have suggested that the tendency to apply frameworks that undervalue or overlook relationships and learning in health care teams may limit the success of quality improvement efforts (Crabtree et al., 2010; Nutting et al., 2011). In particular, recent research suggests that the provision of complex, high quality health care requires healthy relationships among team members, as well as a capacity to learn together and adapt to change (Crabtree et al., 2010; Jordan et al., 2009, Lanham et al., 2009, Nutting et al., 2010).

The importance of focusing on relationships within teams when implementing the CCM may best be understood by considering primary care teams as complex adaptive systems. Complexity theory is a perspective that enables a focus on the relationships among individuals in a team (Lanham et al., 2009) and on the learning that occurs among team members as they interact (Leykum et al., 2011). Health care delivery organizations have been well-studied from a complexity theory perspective (McDaniel et al., 2009; Plesk, 2000) and there is growing recognition that primary care teams are complex adaptive systems (Miller et al., 2001; Stroebel et al., 2005). Complex adaptive systems (CAS) are a diverse collection of agents who have the capacity to learn and adapt or co-evolve with their environment, whose relationships are highly interconnected or inter-dependent, and who

self-organize to complete tasks (Plesk, 2000; Miller et al., 2001; Stroebel et al., 2005; Litaker et al., 2006). Complexity theory draws attention toward nonlinear phenomena, self-organization processes, emergent properties and co-evolution (Anderson & McDaniel, 2000). Exploring the nature of the relationships among agents in a CAS and the learning that occurs as agents interact with each other is essential to understanding these aspects of system function (Cilliers, 1998).

Prior research in diverse health care delivery settings demonstrates the importance of relationships among health care team members in care quality and safety (Gittell et al., 2010; Lanham et al., 2009). Work by Gittell and colleagues (2000, 2002, & 2008) have demonstrated that a property known as “relational coordination” is an important predictor of a team’s ability to achieve its performance objectives. Gittell and colleagues have suggested relational coordination as a model of work relationships in organizational contexts where tasks are interdependent and where requirements for coordinating tasks are high (Gittell et al., 2000; Gittell, 2002). Relational coordination is defined as a mutually reinforcing process of interaction between communication and relationships within a team carried out for the purpose of task integration. It describes cross-role or cross-task shared knowledge, shared goals and mutual respect among team members. Relational coordination has been examined in work settings (both healthcare and non-healthcare) that require efficient interaction among team members and is associated with quality of care and patient outcomes (Gittell et al., 2002; Gittell et al., 2008).

Considering primary care teams as a CAS also informs the distinction between the nature or quality of relationships in a team and the learning that occurs within a team. The relationships among agents in a CAS allow for learning among the team members in a manner that is often emergent and difficult to predict (Jordan et al., 2009). As health care teams learn by interacting with each other, they become more capable of adapting in a manner that improves patient care (Edmondson, 2003). Learning in health care teams has been shown to be fundamental in team performance (Edmondson, 1996; 2003), and our prior work has demonstrated that primary care practices with higher levels of reciprocal learning have more complete implementation of the CCM (Leykum et al., 2011). Leykum and colleagues have suggested reciprocal learning as a model of learning in health care delivery settings characterized by high levels of uncertainty and ambiguity (Leykum et al., 2011). The notion of reciprocal learning goes beyond traditional definitions of learning, as it describes learning as a give-and-take process that builds upon itself, and through which team members continuously exchange information and learn together. Reciprocal learning is a type of learning where insights from one person trigger additional insights from others and develop in an ongoing, iterative manner.

In this analysis, we examined the role of both relational coordination and reciprocal learning in chronic illness care in order to expand upon our understanding of primary care practices as complex adaptive systems. Our primary aim was to assess the extent to which perceptions of relational coordination and reciprocal learning among practice members were associated with the presence of the CCM in small, community-based primary care practices. We hypothesized that: 1) the presence of CCM elements would be stronger in primary care practices with higher levels of relational coordination than in practices with lower relational coordination; and that 2) the association between relational coordination and the presence of the CCM would be at least partially mediated by reciprocal learning, in that the association between relational coordination and CCM would be explained, in part, by reciprocal learning.

## Methods

### Study Design, Setting, and Participants

We used baseline surveys from a cluster randomized controlled trial testing an intervention to implement the CCM and improve outcomes for patients with type 2 diabetes. The study design of this trial and details about the intervention have been previously reported (Parchman et al., 2008). Briefly, the study was conducted at small, primary care clinics or “practices” in South Texas. These small urban, suburban and rural practices serve a population of primary care patients diverse in demographic characteristics, insurance coverage, and health care needs. Subjects for this study were the physician providers, non-physician providers, and staff at participating practices. The intervention consisted of an external practice facilitator who met at least monthly for up to one year with all of the members of each practice to assist them with CCM implementation.

### Data Collection and Measures

After study enrollment but prior initiation of the facilitation intervention, we conducted baseline evaluations at each practice. These included a “Practice Member Survey” that was distributed to all the providers and staff at each practice. The survey included the Relational Coordination Scale, the Reciprocal Learning Questionnaire, the Assessment of Chronic Illness Care (ACIC) scale, as well as individual items assessing the sociodemographic and professional characteristics of the practice members. In addition, we collected information about practice characteristics and operations with a Practice Environment Checklist. Each measure is described below in detail. All practice member participants provided informed consent for the study, which was approved by the Institutional Review Board at the University of Texas Health Science Center at San Antonio.

**Relational Coordination**—This 7-item questionnaire, created by Gittell and colleagues (2000), was used to measure the quality of the relationships among practice members at each practice. The questionnaire encompasses 4 communication dimensions (frequency, timeliness, accuracy, and problem-solving communication) and 3 relationship dimensions (mutual respect, awareness of each others’ work, and shared goals). Relational coordination has been validated in work settings (both healthcare and non-healthcare) that require efficient interaction among team members and is associated with quality of care and patient outcomes (Gittell et al., 2002; Gittell et al., 2008). Each of the 7 items on this version adapted for primary care practices asks the respondent to indicate on a 5-item rating scale (1-5) the manner in which individuals in 6 different types of professional role (i.e., physicians, nurses, medical assistants, front desk staff, billing personnel, office manager/administrator) who work at the practice communicate or relate to the respondent (Gittell et al., 2000). A “N/A” option is included for cases in which a particular type of professional may not be employed at a particular practice.

The average of ratings across the 7 dimensions provides scores ranging from 1-5 for each professional role. For example, ratings for the physician-role assess respondents’ perceptions of how the physician or physicians with whom they work communicate and relate to them. Higher scores indicate that respondents perceive the physician(s) to engage in more timely, frequent, accurate, and problem-solving communications, and to be more likely to be aware of their work, share goals, and demonstrate mutual respect. The scores for each professional role can in turn be averaged to yield a total score indicating the respondent’s overall perception of the quality of relationships and communication among everyone who worked in the practice. Gittell et al. (2000) have reported a Cronbach’s alpha of 0.849 for the total score.

**Reciprocal Learning**—This previously validated 5-item scale was created to capture the extent to which practice members view learning in their practices as a shared, ongoing and interactive process among all providers and staff (Leykum et al., 2011). The items in the scale focus on learning, sharing, and applying new knowledge and understanding; they represent a type of learning where insights from one person trigger additional insights from others and develop in an iterative manner. The instructions ask respondents to indicate their level of agreement with each statement using a 5-point Likert scale. Responses for each item are scored from one (strongly agree) to five (strongly disagree). Cronbach's alpha (0.79) for the 5 items indicates good internal consistency (Leykum et al., 2011).

**Chronic Illness Care**—The extent to which the care delivered in each practice is consistent with the elements of the CCM was measured with the Assessment of Chronic Illness Care survey (ACIC; Bonomi et al., 2002). The ACIC is a 25 item survey that measures the presence of the 6 elements of the CCM. Each item is scored on a 0 to 11 scale and provides subscale scores for each of the 6 CCM components as well as a total score. Scores from 0 to 2 represent "limited support," 3 to 5 represent "basic support," 6 to 8 is "good support," and 9 to 11 represent "fully developed support" (Bonomi et al., 2002). Version 3.5 of the ACIC (MacColl Institute, 2000) was used in this study; in addition to the six subscales, it also includes items that address how well a practice integrates the CCM elements. Recent studies indicate that in practices with higher ACIC scores, patients with diabetes have better control of their glucose, and have a lower risk of cardiovascular complications (Parchman et al., 2007a; Parchman et al., 2007b). Limited data also suggest that the ACIC is responsive to quality improvement changes for diabetes (Wagner et al., 2001).

**Sociodemographic and Professional Characteristics of Practice Members**—In addition to the measures above, the Practice Member Survey also contained items asking each practice member to indicate his or her age, gender, level of education, professional role, percent time spent in direct patient care versus other activities, and how long they had worked at the practice. The survey also instructed practice members to indicate which professional role they served in their practice from the following list: Physician, Physician Assistant, Nurse Practitioner, RN, LVN, Medical Assistant, Receptionist, Office Manager, and "Other."

**Practice Environment Checklist**—A Practice Environment Checklist (PEC) was completed by the lead physician or office manager to capture information about the characteristics and operations of each practice. Items included the number of providers and staff, total number of unique patients, frequency of meetings to discuss clinical issues, and whether or not medical records are computerized, as well as characteristics of the practice's patient population: percent of minorities, percent of patients 65 and older, and percent of patients using Medicare or Medicaid.

## Analytic Plan

Descriptive statistics were assessed on individual practices and staff characteristics. Bivariate associations among Relational Coordination, Reciprocal Learning, and ACIC scores were calculated. Subscales for the ACIC and Relational Coordination measures were created by summing items in the scale and dividing by the number of items in order to maintain the original metric of the survey for ease of interpretation. Subscale scores for respondents with missing values were included only if they responded to a majority of items that comprised the subscale. The missing values were substituted with the collective mean of the other items in the subscale. While regression based methods have also been recommended for replacing missing data, mean substitution of missing values is a viable

tool for studies with few missing data points, e.g. < 5% (Little and Rubin 2002; Schafer and Graham, 2002). Rates of missing data within any particular subscale in our study were less than 5%. Total scale scores (e.g. total ACIC and Relational Coordination scores), were then created by summing and averaging the subscales.

To assess the association between Relational Coordination, Reciprocal Learning, and level of CCM implementation (ACIC scores), we used hierarchical linear regression models to account for nesting of staff within practices. This was done to obtain unbiased standard errors of the regression coefficients. Intraclass correlation coefficients (ICCs) were derived from the variance estimates of hierarchical models by dividing the level 2 variance by the total variance. This yields estimates of the degree to which individuals in the same clinics are similar. ICCs greater than .05 indicate that the data should be analyzed using hierarchical methods in order to avoid artificially low standard errors of the regression estimates. In the first regression model, Relational Coordination total score was regressed on ACIC to assess its direct effect. In the second model, Reciprocal Learning was added as a predictor. The mediation effect, which was calculated according to the procedures outlined by Baron and Kenny (1986) and Mackinnon (2008), would be implied if the direct effect of Relational Coordination was reduced, but remained significant. To further investigate Reciprocal Learning as a mediator of the association between Relational Coordination and ACIC, another model was run regressing Reciprocal Learning onto Relational Coordination. Covariates were added to the final model (model 3) to control for individual practice staff member and practice-level characteristics. MIWin software (Rasbash et al., 2005) was used for the hierarchical regression analysis.

## Findings

Forty practices agreed to participate in the study, but one small practice withdrew from the study due to a re-organization before baseline measures were completed. Of the remaining 39 practices, 32 were led by a single physician, 6 were led by two physicians, and 1 practice had three physicians. One of the practices was part of a larger clinic comprised of multiple primary care practice teams that were led by 1 physician each and that functioned independently; only 1 primary care practice team from this clinic was recruited for the study.

Two hundred and ninety-six providers and staff members from the 39 practices were invited to a “Welcome Visit” at each practice to sign consent forms and complete baseline surveys. Five of the 296 practice members declined. In 3 of the practices, one of two physicians declined to attend the Welcome Visits (although all other providers and staff from these clinics attended). Two additional nonphysician staff members from different practices decided not to participate after attending the Welcome Visit. Thus, a total of 291 of 296 practice members (98%) completed baseline surveys. Eight of the 291 practice members who completed baseline surveys were later determined to be temporary or part-time employees who would be unable to participate in the facilitation intervention (e.g., contract workers or students), and these cases were deleted. Characteristics of the 283 remaining individual practice members and the 39 practices are reported in Table 1.

Of the practice members, 15.6% were physicians 6.3% were non-physician primary care providers (NPs, PAs), 37.4% were nurses and medical assistants, 19.5% were receptionists and office managers, and 21.2% described themselves as “other” (e.g., laboratory and x-ray technicians, medical record and billing staff). Because of the large number of “other” profession, we re-categorized these and the other nonprovider staff into direct care and non-direct care staff. The number of physician and non-physician providers for each practice ranged from 1 to 4, while the number of direct and non-direct care staff ranged from 2 to 30. Approximately one-half of the practices (51.3%) had electronic medical records and 48.7%



held meetings to discuss clinical issues at least once a month. The patient populations served by these practices are also described in Table 1.

The means, standard deviations, and ICCs for the Relational Coordination, Reciprocal Learning, and ACIC scores are presented in Table 2. Relational Coordination and Reciprocal Learning were modestly correlated (.37) suggesting that these two measures reflect distinct, albeit related constructs. The ICC values in this study were sufficiently high to warrant the hierarchical linear regression models presented in this analysis. This method corrects for clustering or subject dependence within each practice.

Table 3 shows the results of the regression models. In the direct effects model (Model 1), Relational Coordination was significantly and positively associated with total ACIC scores. In Model 2, Reciprocal Learning was added as a predictor and was independently and significantly associated ACIC. The direct effect of Relational Coordination remained significant yet notably attenuated implying a mediation effect. To further investigate Reciprocal Learning as a mediator of the association between Relational Coordination and ACIC, another model was run regressing Reciprocal Learning onto Relational Coordination. This was also significant ( $b = 0.14$ ,  $se = .02$ ,  $p < .01$ ). The mediation effect was significant ( $z = 9.3$ ,  $p < .01$ ). Twenty-four percent (24.0%) of the association between Relational Coordination and ACIC scores was explained by Reciprocal Learning. Individual and practice level characteristics were added as covariates in the final model (Model 3). Of these, the only covariate that was significant in Model 3 was the indicator for whether or not practices had an electronic medical record (0.20;  $p < 0.05$ ). Relational Coordination and Reciprocal Learning remained significant independent predictors of ACIC.

## Practice Implications

Although the importance of teams in primary care has been recognized, exactly how high functioning teams achieve high levels of performance has not been clearly understood (Grumbach & Bodenheimer, 2004). These findings may help to advance our understanding of high performing teams. They suggest that in primary care practices, both relational coordination and reciprocal learning are associated with the delivery of chronic illness care as described by the CCM. In addition, the relationship between relational coordination and presence of CCM elements is mediated by reciprocal learning among practice members. That is, the association between relational coordination and presence of CCM elements is explained in part by reciprocal learning. These findings are consistent with complexity theory, which suggests that the interactions among agents in a CAS, as measured by relational coordination in this study, and the learning that emerges, are mutually reinforcing and work together to influence overall performance.

Our finding that the quality of practice members' relationships is associated with the presence of CCM elements is consistent with prior research. Studies conducted in other health care settings such as nursing homes, orthopedic inpatient units, and operating rooms all suggest that the quality of relationships and communication among team members is an important predictor of health care quality (Anderson et al., 2005; Gittel et al., 2000; Edmondson et al., 2003; Gittel et al., 2008; Lanham et al., 2009; Jordan et al., 2009). Similar findings have also been found in non-health care settings such as aircraft carrier flight decks (Weick & Roberts, 1993). Our results extend this previous research by demonstrating the importance of reciprocal learning in the association between practice member relationships and chronic illness care. A practice characterized by reciprocal learning is one where people are open to learning new things from each other, where people learn frequently through conversations, and where people take time to examine problems carefully together.

Although both relational coordination and reciprocal learning reflect aspects of interactions among team members, they are conceptually distinct. Whereas the items on Relational Coordination Scale focus on frequent, timely, accurate, and problem-solving communication, mutual respect, shared goals, and awareness of each other's work, the Reciprocal Learning scale focuses more specifically on learning, sharing, and applying new knowledge and understanding (Leykum, et al 2011). Our measures of relational coordination and reciprocal learning were only modestly correlated ( $r=0.37$ ). In addition, we conducted an a priori factor analysis of our data (not shown), which included all items from both the Reciprocal Learning Scale and the Relational Coordination Scale. The 5 reciprocal Learning items demonstrated simple structure in that each variable loaded strongly (between .6 and .8) on only one unique factor. None of the relational coordination items loaded on this factor, providing further evidence that these are distinct constructs.

Complexity theory provides a useful framework to advance our understanding by focusing our observations on the interactions and relationships among team members, instead of focusing on individual knowledge and skills. In a CAS, the relationships among individuals, or agents, working together are as important, if not more important, than their individual characteristics in understanding system outcomes. More specifically, the relationships, interactions, communication patterns, and flow of information among the individuals or agents within the health care team appear to be critical to its functioning (Lanham et al., 2009; Gittel et al., 2000). Conceptualizing primary care practices as complex adaptive systems can inform the development and implementation of interventions to improve chronic illness care by concentrating efforts to strengthen relationships and foster reciprocal learning among practice members.

Limitations of our findings include the observational, cross-sectional nature of the analysis. In addition, the primary independent and dependent variables are derived from the same source (i.e., self-reported questionnaires), which may significantly inflate findings. Furthermore, our dependent measure of quality of chronic illness care reflected team members' perceptions, rather than more objectively measured indicators of care quality or patient outcomes. Although suggestive, our findings indicate that optimal chronic illness care requires high quality relationships and a capacity for learning. Although we found that the presence of an electronic medical record was associated with the degree of CCM implementation, the magnitude of this association was modest at best and may reflect items within the ACIC scale concerning the presence of clinical information systems within the clinic. It is possible that electronic medical records may function as important structural tools in the delivery of the CCM, but their mere presence is clearly not sufficient in and of itself for optimizing chronic illness care. For example, studies indicate that making time for reflection and conversations among team members is important for team members to understand how resources such as electronic information systems can be used to improve chronic illness care (Jordan et al., 2009). This is often very difficult in busy primary care settings with high levels of competing demands (Østbye et al., 2005; Parchman et al., 2007c). For example, only one-half of the practices in this study held meetings at least monthly to discuss clinical issues at the start of this study.

It will be important for future research to examine if interventions that focus on improving relational coordination and/or reciprocal learning also increase the capacity and ability of primary care practice to improve the care it delivers to patients such as those with one or more chronic illnesses. The cluster randomized controlled trial from which these baseline data were derived is testing the use of a practice facilitation intervention to improve chronic illness care and outcomes for patients with diabetes (Parchman et al., 2008). A trained practice facilitator meets with clinicians and staff to identify quality gaps, set goals, and implement changes. As noted in a recent review of the literature, relationship building and



communication is one of the 5 strategies commonly employed in practice facilitation (Dougherty et al., 2010). Practice facilitation promotes healthy relationships and learning by providing time and space for reflection and sharing, engaging practice members in conversations about patient care, and modeling effective meetings (Parchman et al., 2008). This ongoing trial will provide direct evidence as to whether the practice facilitation strategy can actually improve the quality of diabetes care and cardiovascular risk factors for patients with diabetes by improving relational coordination and promoting an environment that is conducive to reciprocal learning in these small primary care practices.

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**Table 1****Characteristics of Practice Members and Practices**

<b>Practice Member Characteristics (N=283)</b>	
Profession	
MD or DO (%)	15.6
Physician Assistant (%)	2.8
Nurse Practitioner (%)	3.5
Registered Nurse (%)	2.1
Licensed Vocational Nurse (%)	3.5
Medical Assistant (%)	31.8
Receptionist (%)	11.7
Office Manager (%)	7.8
Other (%)	21.2
Female (%)	83.8
Level of Education	
High School (%)	44.3
Some College (%)	20.6
College Degree (%)	35.1
Mean (SD) Age in Years	37.5 (12.0)
Mean (SD) Years Worked at Practice	4.6 (5.9)
<b>Practice Characteristics (N=39)</b>	
Number of providers, Mean (SD)	2.17 (1.1)
Number of nonprovider staff, Mean (SD)	8.5 (6.8)
Percent of Medicaid patients, Mean (SD)	12.3 (16.2)
Percent of Medicare patients, Mean (SD)	32.8 (21.5)
Percent of White patients, Mean (SD)	28.9 (18.7)
Practices with electronic medical record (%)	51.3
Practices holding meetings at least monthly to discuss clinical issues (%)	48.7

**Table 2**

## Relational Coordination, Reciprocal Learning, and ACIC Scores

Measure/Subscale	Mean (SD)	ICC	Correlation with ACIC
Relational Coordination			
Physician	4.4 (0.60)	.06	.25
Nurse	4.2 (0.62)	.08	.26
Medical Assistant	4.2 (0.64)	.15	.25
Front Desk Staff	4.0 (0.71)	.18	.25
Billing Personnel	3.8 (0.84)	.17	.15
Office Manager/Administrator	4.1 (0.69)	.13	.20
Total Relational Coordination Score	4.1 (0.58)	.15	.26
Reciprocal Learning	3.8 (0.68)	.13	.41
Assessment of Chronic Illness Care			
Community linkages	6.1 (2.6)	.10	-
Self-management support	6.2 (2.4)	.06	-
Decision support	6.0 (2.5)	.18	-
Delivery system design	6.5 (2.2)	.16	-
Clinical information systems	5.8 (2.6)	.11	-
Health system support	6.8 (2.4)	.16	-
Integration of elements	6.0 (2.5)	.10	-
Total Score	6.2 (2.1)	.11	-

**Table 3**

Hierarchical linear regression models predicting ACIC scores

Model	Regression Coefficient	Standard error	Standardized coefficient	p
<i>Model 1 (direct effect)</i>				
Relational Coordination	0.79	(.20)	0.26	<.001
<i>Model 2 (mediation)</i>				
Relational Coordination	0.55	(0.19)	0.16	<.001
Reciprocal Learning	1.11	(0.17)	0.37	<.001
<i>Model 3 (adjusted for covariates)</i>				
Relational Coordination	0.45	(0.22)	0.13	<.05
Reciprocal Learning	0.88	(0.18)	0.32	<.001
<i>Staff characteristics</i>				
Age	-0.01	(0.01)	-0.06	ns
Gender	-0.03	(0.35)	0.02	ns
Education	0.04	(0.12)	0.03	ns
Years in practice	0.02	(0.03)	0.05	ns
Professional Staff Role				
NP/PA vs physician	-0.05	(0.53)	-0.01	ns
DCS vs physician	0.83	(0.46)	0.04	ns
NDCS vs physician	0.98	(0.47)	0.05	ns
<i>Practice Characteristics</i>				
Number of primary care providers	-0.22	(0.27)	-0.05	ns
Number of non-primary care provider staff	0.02	(0.04)	-0.03	ns
Patients of white, nonHispanic race/ethnicity (%)	-0.01	(0.01)	-0.05	ns
Patients on Medicare (%)	0.01	(0.01)	0.01	ns
Patients on Medicaid (%)	0.01	(0.01)	0.06	ns
Holds regular meetings to discuss clinical issues	0.16	(0.32)	0.09	ns
Has electronic medical records	0.83	(0.31)	0.20	<.05

Abbreviations: NP: nurse practitioner, PA: physician's assistant, DCS: direct care staff, NDCS: non-direct care staff