

Telemedicine as an Antecedent of Relational Coordination: Evidence from an Italian Survey

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Keywords: relational coordination, organization, telemedicine, healthcare

Abstract

Telemedicine influences the organization of medical work through logics of coordinated care and multidisciplinary. Teleconsultation, for instance, facilitates communication and data sharing among healthcare professionals, who share different responsibilities for the same patients – e.g., Specialist Doctors (SDs) and General Practitioners (GPs) – such as in the management of chronic diseases. It also allows seeking professional advice from medical peers who possess specific knowledge in a particular specialization or sub-specialization. Despite its relevance, there is a gap in the extant debate on the role of teleconsultation in healthcare coordination. We aim at expanding our current knowledge on this issue through the lens of Relational Coordination Theory. In particular, we aim to understand whether the use of teleconsultation strengthens relational coordination, distinguishing interaction between SDs and GPs and among SDs. We test our hypotheses through a survey administered to a sample of 489 Italian SDs. Findings support our hypotheses, adding that the relationship between relational coordination and the frequency of use of teleconsultation is stronger in the case of interaction between SDs and GPs. Theoretical and practical implications are discussed.

Introduction

In the healthcare sector there has been a growing trend toward specialization that complicates the delivery of care for patients with complex needs, such as chronicity and comorbidity (Oborn et al., 2021). To address this challenge, policies advocated for a more coordinated model of care.

In the last years, telemedicine has been shown to influence the organization of medical work through logics of coordinated care and multidisciplinary (cf. Cannavacciuolo et al., 2022; Nicolini, 2006).

In particular, teleconsultation¹ facilitates communication and data sharing among healthcare

¹ Teleconsultation can be defined as “synchronous or asynchronous consultation using information and communication technology to omit geographical and functional distance” (Deldar et al., 2016). The term has been interchangeably used with reference to patient-doctor consultation or consultation among health professionals. The focus of this research is only on the latter, in particular on doctor-to-doctor (D2D) communication.

professionals who share different responsibilities for the same patients – e.g., Specialist Doctors (SDs) and General Practitioners (GPs) – such as in the management of chronic diseases. It also allows to seek professional advice from medical peers who possess specific knowledge in a particular specialization or sub-specialization.

Despite its relevance, there is a gap in the extant debate on the role of teleconsultation in healthcare coordination. We aim to expand our current knowledge of the issue through the lens of Relational Coordination Theory, RCT (Gittell, 2000). RCT explores coordination as a process of ‘interaction’ among group participants (Gittell, 2002, p. 1410), in situations where tasks of various agents of the process are interdependent. Relational coordination is intended as a “mutually reinforcing process of communicating and relating for the purpose of task integration” (Bolton et al., 2021, p.292).

In particular, we ask: does the use of teleconsultation strengthen relational coordination? To answer this question, we performed statistical analysis on data from a national survey in Italy, targeted at a sample of 489 Specialist Doctors (SDs).

Theoretically, this research contributes to our understanding of the organizational structures (cross-cutting organizational arrangements, such as shared meetings, boundary spanning roles, etc.) that impact relational coordination (Bolton et al., 2021), generating new evidence on the role of teleconsultation in medical practice. In particular, teleconsultation has distinctive characteristics that pose it at the intersection of evidence on the role of ‘shared meetings’ (Jakobsen et al., 2018; Schölmerich et al., 2014) and ‘shared information systems’ (Cramm & Nieboer, 2012; Romanow et al., 2018) within the literature on RCT.

Empirically, we shed light on the relational aspects related to the introduction of teleconsultation within coordinated care practice. Policymakers and managers are often focused on the organizational design of integrated care models, yet, according to RCT, “coordination may be facilitated by certain design elements, but it is more fundamentally a process of interaction among participants” (Gittell, 2002, p.1410) and therefore has a strong ‘explanatory power’ for the effectiveness of coordination practice.

Background and Hypotheses

Developed in the early 90s, RCT proposes that “relationships characterized by shared goals, shared knowledge, and mutual respect tend to support frequent, timely, accurate, problem solving communication and vice versa, enabling stakeholders to effectively coordinate their work” (Bolton et al., 2021, p. 291; cf. Gittell, 2000).

The theory asserts that coordination mechanisms are “arguably the central elements of what effective groups do” (Gittell, 2002, p. 1410) in managing task interdependencies. RCT provides a perspective on coordination that “refers to the interactions among participants rather than the mechanisms for supporting or replacing those interactions” (Gittell, 2002, p.1410).

Relational coordination is the core construct of this theory and it may be defined as a “mutually reinforcing process of communicating and relating for the purpose of task integration” (Bolton et al., 2021, p.292). Relational coordination includes specific dimensions through which agents coordinate their work: shared goals, shared knowledge, and mutual respect reciprocally support frequent, timely, accurate, problem-solving communication, enabling effective coordination. In the same way, detrimental relationships are expected to undermine coordination.

The second ‘component’ of RCT involves cross-cutting organizational structures, meant as the arrangements that transversely support coordination, such as coordination mechanisms (e.g., protocols, shared spaces) and human resource practices (e.g., job design, accountability, rewards) (Gittell et al., 2010).

Lastly, the third ‘component’ of RCT involves the improvement of outcomes that derive from a strong relational coordination, as a result of better management of interdependencies and consequently a reduction of errors, delays, redundancies, etc. (Deming, 1986).

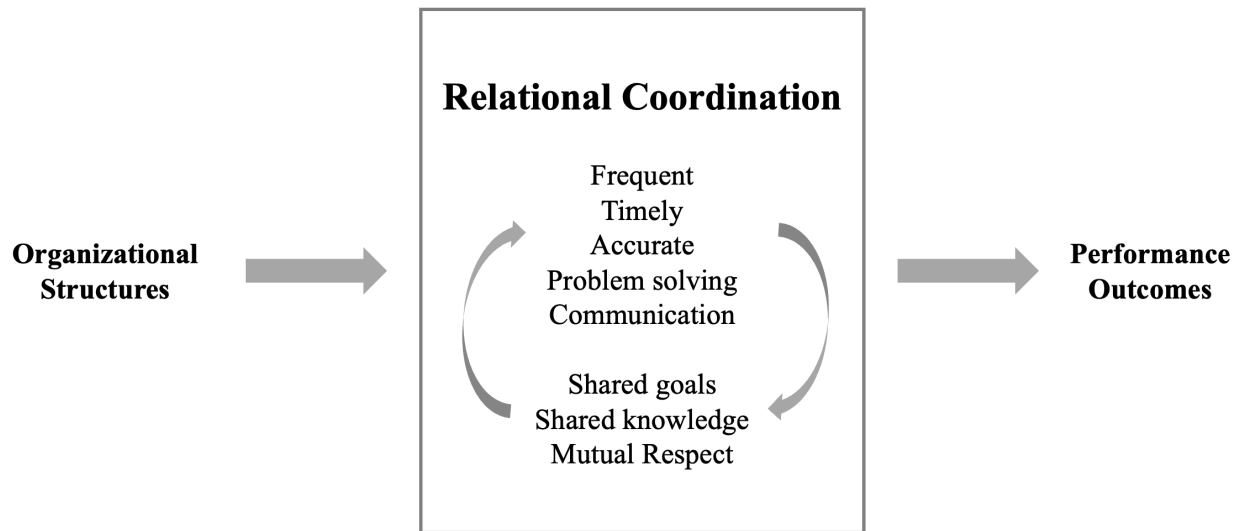
The three components relate to each other as reported in Figure 1. According to Gittell (2002), relational coordination has a ‘mediating’ effect between cross-cutting structures and performance. In this sense, RCT can be reconciled with organization design theory (Gittell, 2002).

In light of RCT, teleconsultation among doctors can be interpreted as a cross-cutting structure within the context of chronic care management. As a cross-cutting structure, teleconsultation enables the enactment of shared decision-making through the enactment of meetings and the use of a shared digital technology.

Past studies provide evidence of the impact of shared meetings on relational coordination within the healthcare domain. Schölmerich et al. (2014) examined coordination challenges within the context of midwifery and obstetrics. They found that the limited presence of interprofessional communication constituted a barrier to effective coordination. In their study on care workers in eldercare homes, Jakobsen et al. (2018) observed that “care workers found it beneficial to meet face-to-face during shift overlaps and suggested to officially provide time for these shift handovers rather than exclusively relying on written documentation” (p. 7). Abu-Rish Blakeney et al. (2019) studied interprofessional care within an advanced heart failure care team, which identified structured bedside rounds as the preferred approach to improve relational coordination. At the same time, although physical proximity

may intuitively facilitate coordination, Kuebart (2019) theorized that relational coordination is not necessarily related to spatial proximity, depending on a variety of factors, such as the nature of work.

Figure 1: Relational Coordination Theory



Source: Bolton et al., 2021

Findings on the role of digital technologies in strengthening relational coordination are mixed (Bolton et al., 2021, p. 302). However, within the healthcare domain, some evidence on a positive effect is available (Cramm & Nieboer, 2012; Romanow et al., 2018).

As our research aims to understand whether the intensity of use of teleconsultation improves relational coordination within chronic care management, we advance the following hypotheses:

H1: The frequency of use of teleconsultation between SDs and GPs is positively associated with relational coordination.

H2: The frequency of use of teleconsultation among SDs is positively associated with relational coordination.

Methodology

Data Collection and Sample

To test our hypotheses, we collected data through an online survey administered to Italian SDs between March and April 2023.

The electronic survey was distributed via email with the support of three medical associations and a health communication agency, in compliance with the European GDPR, and administered in Italian. Completion required about 10 minutes. The email was sent to about 150,000 doctors. Data on the

stratification of the population is not available to the researchers. 489 high-quality complete answers were gathered.

The average age of the sample is 54,9 years old (with a standard deviation of 10.5 years). 45% of the sample is constituted of female doctors, 55% of male doctors. 12% of the respondents work in private practices, 65% in public hospitals or LHAs, 7% in research hospitals and 16% in outpatient clinics.

Measures

To measure relational coordination we used the relational coordination survey (Gittell, 2000), which consists of 7 items (frequent communication, timely communication, accurate communication, problem-solving communication, shared knowledge, mutual respect, shared goals) and a 5-items Likert scale. With respect to the original formulation (Gittell, 2000), our survey was not ‘site-specific’, but it was submitted to a high sample of the general population of Italian doctors. Therefore, our survey contains two measures of relational coordination: one related to relational coordination between SDs (respondents to the survey) and GPs (Cronbach’s $\alpha=0.918$), and the other related to relational coordination between SDs (respondents) and other SDs (Cronbach’s $\alpha=0.897$). At the beginning of the relational coordination section, these indications were given:

In your daily practice, you likely encounter scenarios in which chronic patients are managed in different settings — such as outpatient specialty clinics and general medicine offices. The statements below aim to capture various aspects concerning your perception of interactions with your colleagues in these scenarios.

Please think of a recent, specific case where you had a shared responsibility for a patient who was treated in a multidisciplinary way in different settings (e.g., within integrated care pathways). Using that case as a reference, indicate your level of agreement with each of the following statements about coordination with General Practitioners and other specialists.

The frequency with which teleconsultation is used was self-reported by the respondents in the survey based on a 4-items Likert scale (from ‘Never’ to ‘On a daily basis’). We asked separately for this information referring to teleconsultations with GPs and with other SDs.

Measured control variables are age, gender and a dummy to indicate whether the doctor works exclusively in private practice.

Data analysis

Confirmatory Factor Analysis (CFA) was employed to validate the measurement model for relational coordination (both between SDs and GPs and among SDs). Model fit indices such as Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR) were considered to ascertain the goodness of fit of the model. The Average Variance Extracted (AVE) and Composite Reliability (CR) were

computed to ascertain the convergent validity and reliability of the measures, respectively. The CFA allowed to generate the variable “RC” as the weighted linear combination of observed variables that represent relational coordination as a latent variable.

Subsequently, two regression analyses were conducted to test the hypotheses, with relational coordination serving in both cases as the dependent variable and the frequency of use of teleconsultation as independent variable. Age, gender and private practice were considered as control variables.

Before the estimation, non-binary variables were standardized. Analyses were conducted using software STATA v14.

Results

Confirmatory Factor Analysis (CFA)

CFA was performed to validate the measurement model for relational coordination – between SDs and GPs and among SDs.

As depicted in

Table 1, all measures indicate significant positive relationships with relational coordination. AVE and CR are higher than commonly accepted thresholds (equal to 0.50 and 0.70 respectively), indicating a good validity for all constructs (Hair et al., 2010).

Table 1: CFA for Relational Coordination Construct

Construct	Measurement Model	Loading factors (standardized)	AVE	CR
Relational Coordination between SDs and GPs	Frequent communication	0.659	0.620	0.919
	Timely communication	0.804		
	Accurate communication	0.852		
	Problem-solving communication	0.879		
	Shared knowledge	0.762		
	Mutual respect	0.716		
	Shared goals	0.818		
Relational Coordination among SDs	Frequent communication	0.582	0.561	0.899
	Timely communication	0.744		
	Accurate communication	0.769		
	Problem-solving communication	0.762		
	Shared knowledge	0.804		
	Mutual respect	0.754		
	Shared goals	0.806		

Note: all p-values are <0.001

Table 2 illustrates various Goodness of Fit indexes, along with thresholds suggested by the literature (Hair et al., 2010). Both models exhibit strong fit according to most indicators, despite some limitations in RMSEA (to be considered in the context of the other fit indices which largely validate the model).

Table 2: Goodness of Fit Indexes

Fit Statistic	Suggested Threshold	Relational Coordination Construct	Value
RMSEA	<0.07	SDs*-GPs	0.153
		SDs-SDs	0.142
CFI	>0.90	SDs-GPs	0.931
		SDs-SDs	0.926
TLI	>0.90	SDs-GPs	0.897
		SDs-SDs	0.889
SRMR	< 0.08	SDs-GPs	0.041
		SDs-SDs	0.041

*Note: SD stands for Specialist Doctors

Regression Analysis

In the SDs-GPs model (Table 3), we observe a highly significant and positive coefficient (0.199) for the variable 'Frequency of use of teleconsultation' ($p < 0.001$). This lends empirical support to our hypothesis (H1) that frequent teleconsultations between SDs and GPs are positively associated with relational coordination. Among the control variables, only 'age' shows a small but still significant positive impact on relational coordination.

In the SDs-SDs regression model, we also observe a positive and significant effect of 'frequency of use of teleconsultation' (0.092; $p = 0.001$), which supports H2.

Table 3: Estimates of the regression model

Variable	SDs-GPs Coefficient	SDs-SDs Coefficient
Frequency of use of teleconsultation	0.199****	0.092***
Age	0.007**	0.002
Gender	0.010	-0.012
Private practice	0.071	-0.080
Intercept	-0.715****	-0.277*

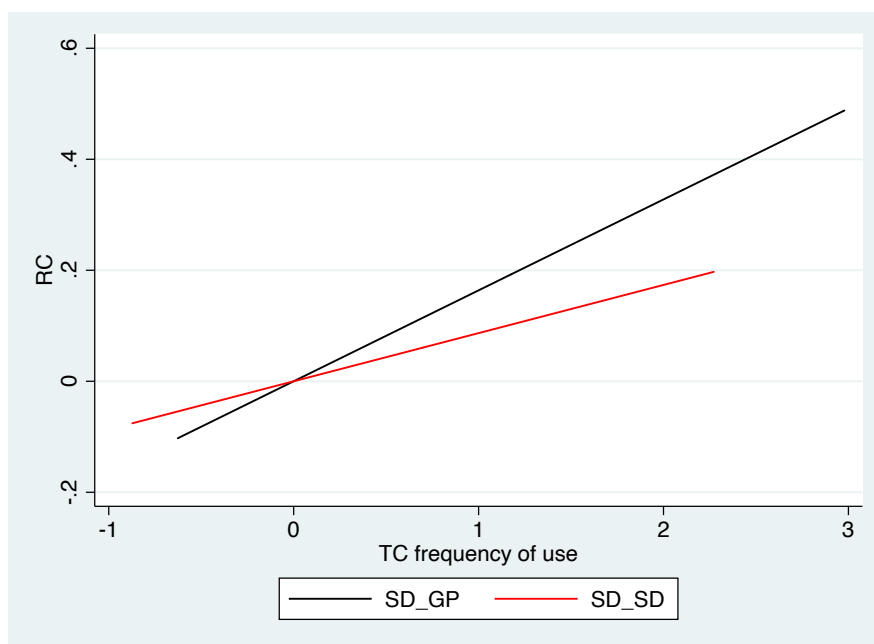
Notes: * $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .001$; measures are standardized

Although positive and significant, in this case, the coefficient is noticeably smaller at 0.092, suggesting a weaker effect on relational coordination (Figure 2). Control variables do not show any significant effect.

Interpretation

We interpret the difference in the coefficients between the two models through the lens of doctor's professional jurisdictions (Abbott, 1988): it has become increasingly clear that the primary jurisdiction of GPs involves acting as the 'coordinator' of care. As such, interactions with GPs may prove to be easier. However, this hypothesis warrants further empirical research.

Figure 2: Comparison between the relationship between relational coordination and frequency of use of teleconsultation, in the case of SDs-GPs interaction and SDs-SDs interaction



We contribute to the current debate on RCT in three ways. Firstly, we add to the previous evidence (Abu-Rish Blakeney et al., 2019; Jakobsen et al., 2018; Schölmerich et al., 2014) on the positive role of shared meetings on relational coordination, adding the case of digitally-mediated meetings, as in the case of teleconsultation. Secondly, we contribute previous evidence on the effect of shared information systems on relational coordination within the healthcare domain (Cramm & Nieboer, 2012; Romanow et al., 2018). Consequently, as a third contribution, our findings seem to confirm that spatial proximity is not necessarily beneficial for relational coordination, but it depends on the nature of the performed work (Kuebart, 2019).

In practice, although many studies show the benefits of teleconsultation, the same cannot be said about the mechanisms through which the employment of these tools improves outcomes. Our study suggests that teleconsultation affects the quality of relationships among health professionals, which – coherently with RCT – leads to a higher level of quality and efficiency. Moreover, our study also indicates that the integration of teleconsultation may be a valuable strategy in overcoming traditional barriers to effective healthcare coordination, such as jurisdictional conflicts and autonomy struggles. Finally, although it has been shown that teleconsultation improves the quality of relationships among doctors, it is also true that these tools are not quite diffused. Within our sample of respondents, not even half of the specialist doctors used teleconsultation and only a small percentage did it more than twice a week. Two ‘infrastructural’ actions are required in this sense: (i) the targeted development of enabling competencies for the use of these tools, through the embodiment of digital skills development courses within university curricula and on-the-job training; (ii) the design of appropriate incentive systems for the use of teleconsultation, including reimbursement schemes.

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