

ORIGINAL ARTICLE

# The actor–partner interdependence model in shared decision-making: an illustrative example of its application to the physician–patient dyad in primary care consultations

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## Abstract

**Objectives:** We applied the actor–partner interdependence model, a method used to evaluate the relationship process between two related persons, to patient–physician data about the effect of shared decision-making behaviors on patient and physician uncertainty. We discuss measurement and interpretation problems.

**Study Design and Setting:** The EXACKTE<sup>2</sup> project was a cross-sectional study of 263 unique patient–physician dyads in 17 primary care clinics in Canada. Participants independently completed self-administered questionnaires postconsultation to measure patients' and physicians' perceptions of shared decision-making behaviors and their uncertainty about whether the decision was the best one for the patient. We used the actor–partner interdependence model to explore the effect of shared decision-making behaviors on patient and physician uncertainty.

**Results:** Application of the actor–partner interdependence model to our data showed significant actor effects only. Our exploratory analysis suggested that an appropriate dyadic pattern for this context would be the couple-oriented model.

**Conclusion:** Each actor's perception of the physicians' shared decision-making behaviors appeared only to affect their own uncertainty (actor effects), but the questionnaire may have been inadequate for identifying partner effects. Researchers should further explore using the actor–partner interdependence model to analyze actor–partner interdependence in the physician–patient relationship, and format questions tailored precisely to the model. © 2018 Elsevier Inc. All rights reserved.

**Keywords:** Actor–partner interdependence model; Shared decision-making; Dyadic measures; Patient–physician dyad; Uncertainty; Measurement problem

Ethical considerations: Participants provided informed consent. Institutional Review Board approval for the study was obtained from the Research Ethics Board of the Centre de Santé et de Services Sociaux de la Vieille Capitale in Québec City, Canada (final approval 2008/11/25; ethics number #2008-2009-23). Physicians and patients were not compensated for their participation.

Conflict of interest statement: The authors declare that they have no conflicts of interests.

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## 1. Introduction

The delivery of high-quality health care that adds value is a major goal for health organizations. Effective physician–patient communication is an essential step in the delivery of high-quality care [1]. Some studies have demonstrated that patients' and physicians' perceptions of the communication process is not always concordant [2,3]. Disagreements may even lead to litigation.

Shared decision-making is an interdependent process in which both “actors” have to share information and consider the patient's preferences to arrive at a common understanding of what constitutes the best medical decision for the patient [4,5]. Communication processes can be modified to improve agreement between the two parties. Shared decision-making training thus involves educating physicians in communication skills and is often supported by the distribution of decision support materials [6].

### What is new?

- A common outcome variable between the two related persons appears to be essential for the actor–partner interdependence model to be meaningful. The situation shared by the physician and the patient has more impact on the patient.
- The actor–partner interdependence model was developed for long-term relationships. The physician–patient consultation is a short-lived affair.
- Difference in wording of dyad members' respective predictor variables (other perception vs. self-perception) may distort results and could explain the absence of partner effects. The creation of a “score difference” variable should be conceptually supported by measures and items tailored to the model.
- Researchers should further explore methods for measuring and analyzing the interdependence between physician and patient, including appropriate wording of items, adding measures of meta-perception to self-perception and other perception, and adding a third-party perspective.

Until recently, most research studied patients and physicians separately, using independent measures and disregarding their mutual influence [7]. However, as they are members of the same dyad and share a similar context or experience, their scores are likely to correlate. For example, uncertainty scores could correlate between patient and physician and indeed might correlate more with each succeeding visit as their relationship develops. Analysis of this correlation can capture complex communication processes more accurately, and data analysis methods that model interdependency are important when there is reason to expect dependencies in the data.

Types of perceptions in relationships have been described as self-perception, other perception, and meta-perception [8]. Self-perception represents how the individual views himself or herself [9]. Other perception represents how the individual views another person [10]. Meta-perception represents the perception that the person has of the other person's perception of himself or herself [11]. These types of perception may play a major role in measuring the interdependence process between two related persons.

Researchers in a number of domains use the actor–partner interdependence model [12–14] to analyze dyadic data [15]. It is especially useful in situations where variables vary both within and between dyads [16]. The actor–partner interdependence model simultaneously estimates the effects of one dyad member's characteristics

and the other dyad member's characteristics on an outcome variable. The actor–partner interdependence model has been used in studies on interactions between husbands and wives [17,18], parents and children [19], and romantic partners [20]. However, the method is not yet widely applied in health care to evaluate the relationship process between physician and his or her patient during a clinical encounter. The objective of this study was to provide an illustrative example of applying the actor–partner interdependence model to the EXACKTE<sup>2</sup> (Exploiting the Clinical Consultation as a Knowledge Transfer and Exchange Environment) physician/patient data.

## 2. Materials and methods

### 2.1. Study design and population

EXACKTE<sup>2</sup> was a cross-sectional study conducted in 17 primary care clinics in two Canadian cities. EXACKTE<sup>2</sup> used similar questionnaires for physicians and patients to produce dyadic data on the essential elements of shared decision-making [21]. A research assistant first recruited physicians and then patients during each physician's appointment hours in the waiting room at a randomly predetermined time. Eligible patients were at least aged 18 years, able to read French or English, willing to give informed consent, not suffering from an acute condition that required immediate medical intervention, and willing to report later on the decision they made while meeting their physician.

### 2.2. Data collection procedures

For our illustrative example, the actor–partner interdependence model was used to see if the physicians' and patients' perceptions of the physician's shared decision-making behaviors in a clinical consultation influenced their uncertainty about whether the decision was the best one for the patient. The elements of shared decision-making measured were, based on a systematic review by Makoul and Clayman (2006) as follows: definition/explanation of the problem, presentation of options, discussion of pros/cons, clarification of patient values and preferences, presentation of doctor's knowledge/recommendation, discussion of patient's ability/self-efficacy, and checking/clarifying understanding [22]. After the consultation, patients and physicians independently completed a parallel set of questions designed to measure these elements of shared decision-making and their uncertainty about whether the decision was the best one for the patient. Table 1 summarizes the subscales used to measure shared decision-making elements and uncertainty. To have positive interpretations for each shared decision-making element, scores were reversed so that a high score was positive. We assessed patients' and physicians' feelings of uncertainty about the health care option chosen with three items on the “uncertainty” subscale of the Decisional Conflict Scale

**Table 1.** Summary of the subscales and their corresponding shared decision-making elements

Subscales (number of item, questionnaire, author, year)	Shared decision-making element	Modality of the scale	Variable name (scores on the scales were reversed so that a high score is positive for each shared decision-making element)
Information giving (nine items, Medical Communication Competence Scale, Cegala, 1998)	Define/explain problem Present options Discuss pros/cons (benefits/risks/costs)	1–5 1 = very satisfied 5 = very dissatisfied	Physician's knowledge about the patient's health problem
Values clarification (three items, Decisional Conflict Scale, O'Connor, 2005)	Clarify patient's values/preferences	1–5 1 = strongly agree 5 = strongly disagree	Clarification of the patient's values
Self-efficacy (three items, Theory of Planned Behaviour, Ajzen, 1988)	Discuss patient's ability/self-efficacy	1–5 1 = extremely capable 5 = extremely incapable	Discussion of the patient's ability/self-efficacy
Information verifying (four items, Medical Communication Competence Scale, Cegala, 1998)	Check/clarify understanding	1–5 1 = very satisfied 5 = very dissatisfied	Verify the patient's understanding (MCCS)
Feeling uninformed (three items, Decisional Conflict Scale, O'Connor, 2005)	Check/clarify understanding	1–5 1 = strongly agree 5 = strongly disagree	Verify the patient's understanding (DCS)
Uncertainty (three items, Decisional Conflict Scale, O'Connor, 2005)		1–5 1 = strongly agree 5 = strongly disagree	Uncertainty

(Cronbach's alpha = 0.70) [23]. To assess defining/explaining the problem, presenting the options, and discussing benefits and harms, we used nine items on the “information giving” subscale of the Medical Communication Competence Scale (Cronbach's alpha = 0.86) [24]. We assessed exploring the patient's values and preferences with three items on the Decisional Conflict Scale “values clarification” subscale (Cronbach's alpha = 0.72) [23]. We assessed discussion of the patient's ability/self-efficacy to act upon his/her choice with three items on the “perceived behavioral control” measure in the Theory of Planned Behavior [25]. We assessed checking/clarifying the patient's understanding with four items on the Medical Communication Competence Scale “information verifying” subscale (Cronbach's alpha = 0.78) [24] and three items on the Decisional Conflict Scale “informed” subscale (Cronbach's alpha = 0.71) [23] (Appendix 1). None of the EXACKTE<sup>2</sup> questions measure meta-perceptions. Items measured both self-perceptions and other perceptions, and most parallel items were inversed, that is, the doctor's self-perception paralleled the patient's other perception (e.g., the self-perception item beginning “I provided good explanations of ...”) paralleled the patient's other perception (“The doctor provided good explanations of ...”). Patient and physician questionnaires also measured sociodemographic characteristics.

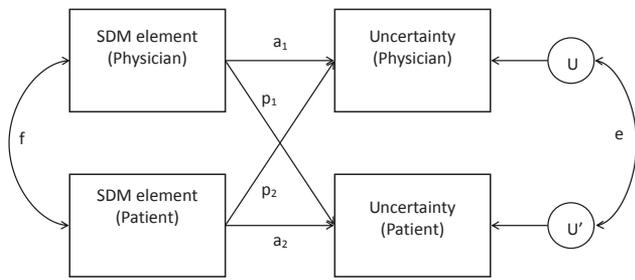
### 2.3. Data analysis

We calculated descriptive statistics such as frequency distributions, means, and standard deviations to

summarize participants' demographic and clinical characteristics. We calculated a mean from the items for each shared decision-making element. If a respondent provided answers to all except for one item, we imputed this missing value using the mean of the other items in the variable. If any more items were missed, the variable score was considered missing. Skewness and kurtosis indices were reported to determine if the score distribution was normal for each variable. Pearson correlations between shared decision-making variables and uncertainty were computed. We then assessed the actor and partner effects between physicians' and patients' uncertainty for each shared decision-making element using the actor–partner interdependence model [16] (see Fig. 1).

### 2.4. Testing the interdependence process

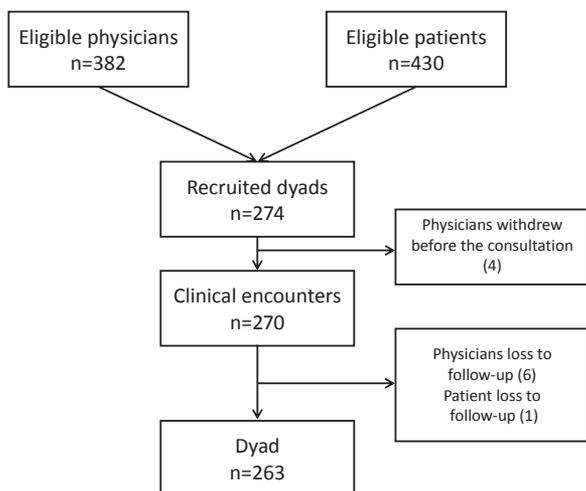
The actor–partner interdependence model analyses take into account the interdependence process by estimating the effect of a person's own variable (actor effect) and the effect of the same variable from the partner's standpoint (partner effect) on an outcome variable. Thus, in our example (Fig. 1), an actor effect (paths “a<sub>1</sub>” and “a<sub>2</sub>”) occurs when a person's score on perception of the physician's shared decision-making behavior affects that person's own score on uncertainty, whereas a partner effect (paths “p<sub>1</sub>”, “p<sub>2</sub>”) occurs when a person's own score on his/her perception of the physician's shared decision-making behavior affects his/her partner's score on uncertainty. The partner effect is thus fundamentally dyadic. The curved line f with



**Fig. 1.** The actor–partner interdependence model (APIM).  $a_1$ , Actor effect (physician);  $a_2$ , Actor effect (patient);  $p_1$ , Partner effect (physician perception of SDM element on patient perception of uncertainty);  $p_2$ , Partner effect (patient perception of SDM element on physician perception of uncertainty); U, residual (unexplained) portion of physician uncertainty score; U', residual portion of patient uncertainty score; e, residual non-independence not explained by actor and partner effects; f, correlation between the two predictor variables; SDM, Shared decision-making.

double-headed arrows represents correlation between the two predictor variables, and the curved line e with double-headed arrows represents the residual nonindependence not explained by actor and partner effects [16]. In total, the actor–partner interdependence model has 14 parameters (four regression effects, two correlations, two means, two intercepts, two variances, and two residual variances). The basic actor–partner interdependence model estimated all parameters; thus, the model is said to be saturated with a chi-square equal to zero and no degree of freedom. All these parameters are easily estimated by the use of structural equation modeling.

To interpret actor–partner interdependence model results, Kenny and Cook discuss four possible patterns for actor and partner effects (Fig. 1) [14]. In the actor-oriented model, each person’s outcome is only influenced by the predictor variables of that person, and not by their partner’s. To test this model, the two partner effects are fixed to 0. This model tested the



**Fig. 2.** Flow of the study participants.

hypothesis that the physician’s perception of the discussion about the patient’s self-efficacy, for example, was not associated with the patient’s uncertainty about his/her decision, but only with his/her own uncertainty about it, and that the patient’s feelings of self-efficacy were not associated with the physician’s uncertainty, but only with the patient’s own uncertainty. In other words, each dyad member’s thoughts about the physician’s shared decision-making behaviors influenced only their own uncertainty concerning the decision. The constraint involved in this model freed two degrees of freedom to evaluate the fit of the model. Statistical indices included chi-square and degree of freedom, the comparative fit index, and the root mean square error of approximation. A good model fit is indicated by a nonsignificant chi-square value, chi-square divided by its degree of freedom  $< 2$ , comparative fit

**Table 2.** Descriptive variables of physicians and their patients

Physician’s characteristics (n = 263)	
Female, n (%)	166 (63)
Age (y, mean ± SD), n = 260	37 ± 11
Physician professional activities (mean ± SD)	
Hours worked/week, n = 127	46 ± 13
Hours/week worked in the family practice teaching unit, n = 130	26 ± 15
Patients seen/week, n = 230	49 ± 37
Patient’s characteristics (n = 263)	
Female, n (%)	181 (69)
Age (y, mean ± SD), n = 255	49 ± 18
French speaking, n (%)	155 (59)
English speaking, n (%)	108 (41)
Marital status, n (%)	
Married/living with partner	164 (62)
Not living with partner	96 (37)
No answer	3 (1)
Responsibilities, n (%)	
Working	129 (49)
Unemployed or laid off	31 (12)
Retired	71 (27)
Other	29 (11)
No answer	3 (1)
Schooling, n (%)	
High school diploma or less	95 (36)
College or professional degree or university	162 (62)
No answer	6 (2)
Family income, n (%)	
< \$50,000	104 (39)
\$50,000–\$59,999	36 (14)
\$60,000–\$79,999	44 (17)
\$80,000–\$99,999	32 (12)
\$100,000 or more	31 (12)
No answer	16 (6)

Abbreviation: SD, standard deviation.

**Table 3.** Descriptive statistics of the SDM elements and uncertainty

Variables	Physician's perception				Patient's perception			
	<i>n</i>	Mean (SD)	Skewness	Kurtosis	<i>n</i>	Mean (SD)	Skewness	Kurtosis
Physician's knowledge about the patient's health problem (MCCS)	243	2.95 (0.51)	−0.19	0.50	241	3.51 (0.57)	−1.13	0.55
Clarification of the patient's values (DCS)	263	3.00 (0.64)	−0.70	1.56	259	3.48 (0.55)	−0.83	0.68
Discussion of the patient's ability/self-efficacy (TPB)	263	3.38 (0.63)	−1.33	3.69	259	3.58 (0.54)	−0.98	−0.13
Verify the patient's understanding (MCCS)	262	3.11 (0.56)	−0.15	0.10	260	3.76 (0.48)	−1.92	2.89
Verify the patient's understanding (DCS)	262	3.26 (0.45)	0.13	−0.30	260	3.53 (0.56)	−1.23	1.82
Uncertainty (DCS)	263	2.02 (0.75)	0.61	0.49	263	1.57 (0.59)	0.67	−0.34

*Abbreviations:* SDM, shared decision-making; SD, standard deviation; MCCS, medical communication competence scale; DCS, decisional conflict scale; TPB, theory of planned behavior.

index  $\geq 0.95$ , and root mean square error of approximation  $\leq 0.06$  [26]. The choice of the model depends on the pattern observed in the saturated model. Statistical analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC, USA), and structural equation modeling was conducted using MPLUS Version 7.4 (Muthén & Muthén, Los Angeles, CA).

### 3. Results

#### 3.1. Participants' characteristics

A total of 263 unique dyads were recruited in primary care settings (Fig. 2). The mean age of physicians was  $37 \pm 11$  years, and most were female (63%); the mean age of patients was  $49 \pm 11$  years, and most were female (69%; Table 2). Most shared decision-making behavior variables had less than 2% of missing data, except for “physician's knowledge about the patient's health problem” for which there were 7.6% and 8.4% missing data for the physician and the patient, respectively (Table 3). There were no missing data on the uncertainty variables. Scores for the physician perception of his/her shared decision-making behavior (range: 2.95–3.38) were lower than the scores for the patient perception of the physician's shared decision-making behavior (range: 3.48–3.76). Conversely, the score for the physician's uncertainty about the decision (mean:  $2.02 \pm 0.75$ ) was higher than the score for the patient's uncertainty (mean:  $1.57 \pm 0.59$ ). Each variable's score distribution was approximately normal based on the skewness and kurtosis indices.

#### 3.2. Actor–partner interdependence model

Table 4 presents the association between the patients' and physicians' perceptions of shared decision-making behaviors and their uncertainty. The more positively the physician perceived his/her own shared decision-making behaviors, the more his/her own uncertainty decreased about the decision ( $P < 0.01$ ), but no association was observed with the patient's own uncertainty ( $P > 0.10$ ). Similarly, the more

positively the patient perceived the physician's shared decision-making behaviors, the more his/her own uncertainty about the decision decreased ( $P < 0.01$ ), but no association was observed with the physician's own uncertainty ( $P > 0.10$ ). According to the baseline models (Table 5), all physician and patient actor effects for each shared decision-making behavior differed from 0 ( $P < 0.01$ ), but few partner effects differed significantly from 0. These results suggest fixing the two partner effects to 0 in the shared decision-making analysis. This result suggests an actor-only

**Table 4.** Association between variables associated with shared decision-making elements and uncertainty perceived by physician and patient

Shared decision-making elements assessed	Physician's uncertainty	Patient's uncertainty
Physician		
Physician's knowledge about the patient's health problem	−0.30 (<0.01)	−0.02 (0.75)
Clarification of the patient's values	−0.43 (<0.01)	−0.05 (0.37)
Discussion of the patient's ability/self-efficacy	−0.20 (<0.01)	0.00 (0.99)
Verify the patient's understanding (MCCS)	−0.18 (<0.01)	0.02 (0.70)
Verify the patient's understanding (DCS)	−0.23 (<0.01)	−0.10 (0.12)
Patient		
Physician's knowledge about the patient's health problem	−0.07 (0.31)	−0.46 (<0.01)
Clarification of the patient's values	−0.09 (0.14)	−0.61 (<0.01)
Discussion of the patient's ability/self-efficacy	−0.04 (0.54)	−0.42 (<0.01)
Verify the patient's understanding (MCCS)	−0.05 (0.38)	−0.35 (<0.01)
Verify the patient's understanding (DCS)	−0.12 (0.06)	−0.59 (<0.01)

**Table 5.** Actor–partner interdependence model of patient–physician dynamics for each SDM elements associated with uncertainty

SDM elements	Physician's knowledge about the patient's health problem	Clarification of the patient's values	Discussion of the patient's ability/self-efficacy	Verify the patient's understanding (MCCS)	Verify the patient's understanding (DCS)
Hypothesis about actor and partner effects					
Actor effects					
a <sub>1</sub> , estimate (P value)	−0.43 (<0.01)	−0.50 (<0.01)	−0.23 (<0.01)	−0.25 (<0.01)	−0.36 (<0.01)
a <sub>2</sub> , estimate (P value)	−0.49 (<0.01)	−0.66 (<0.01)	−0.48 (<0.01)	−0.43 (<0.01)	−0.62 (<0.01)
Partner effects					
p <sub>1</sub> , estimate (P value)	0.05 (0.47)	−0.03 (0.50)	0.08 (0.12)	0.02 (0.73)	−0.03 (0.62)
p <sub>2</sub> , estimate (P value)	−0.04 (0.59)	−0.11 (0.17)	−0.003 (0.98)	−0.09 (0.40)	−0.12 (0.16)
Hypothesis	a ≠ 0; P = 0	a ≠ 0; P = 0	a ≠ 0; P = 0	a ≠ 0; P = 0	a ≠ 0; P = 0
Dyadic pattern	Actor-only pattern	Actor-only pattern	Actor-only pattern	Actor-only pattern	Actor-only pattern
Model fit					
df	2	2	2	2	2
χ <sup>2</sup>	0.700	2.522	1.980	0.975	2.493
RMSEA	0.000	0.032	0.000	0.000	0.031
CFI	1.000	0.997	1.000	1.000	0.996

Abbreviations: a<sub>1</sub>, actor effect (physician); a<sub>2</sub>, actor effect (patient); p<sub>1</sub>, partner effect (physician perception of SDM elements on patient perception of uncertainty); p<sub>2</sub>, partner effect (patient perception of SDM elements on physician perception of uncertainty).

pattern (Table 5). All statistical indices for these models indicated good model fit (root mean square error of approximation: 0.000–0.032; comparative fit index: 0.996–1.000).

#### 4. Discussion

Our illustrative example sought to use the actor–partner interdependence model to measure whether patients' and physicians' perceptions of the physician's shared decision-making behaviors influence their own and/or the other's uncertainty about the decision. Our findings suggested that (1) the good adjustment of the actor-only pattern model showed that the perception of each member of the dyad about the physician's shared decision-making behaviors influenced only their own personal uncertainty about the decision; (2) patients perceived more shared decision-making behaviors on the part of the physicians than the physicians perceived themselves. These observations lead us to draw three main conclusions about research on shared decision-making using the actor–partner interdependence model.

First, the outcome targeted in our illustrative example was a patient-centered outcome. The actor–partner interdependence model was developed for ongoing personal relationships such as marriages [17,18], in which husband and wife each self-perceives an experience (predictor variable) that affects their marital satisfaction (common outcome variable). In the context of a patient–physician consultation,

patient uncertainty about the decision is central. The pattern that would best fit this focus, if effective shared decision-making was occurring, would be the couple-oriented model. In this model, the patient's uncertainty is affected not only by his/her own perception of the physician's shared decision-making behaviors but also by the physician's perception of his/her own behavior. Partner effects suggest that something truly relational has occurred. However, our illustrative example failed to demonstrate a partner effect. This could suggest that even when physicians perform shared decision-making behaviors to their own satisfaction, they may be failing to communicate effectively, which requires active concern for and awareness of the patient's responses to their behaviors, that is, an interaction in which an “exchange and synthesis of meaning” takes place in the clinical encounter [27]. Otherwise, the physician–patient consultation is a short-lived affair in which the two solitudes are not breached. The actor–partner interdependence model was developed for long relationships such as marriages [17,18]. However, it would be interesting to see if partner or couple effects occur as the relationship develops: with continuity of care, there may be increased mutual awareness and influence. A recent study using other data in a similar context observed two positive actor effects with personal uncertainty (unclear values,  $P < 0.0001$ ; ineffective decision,  $P < 0.0001$ ) [28]. A partner effect was also observed in this study (regression weight:  $-0.18$ ,  $P = 0.03$ ), but the effect was very small.

Second, the observed effects in the actor–partner interdependence model in our illustrative example may be the result of how the questions to measure the perception of each actor were worded. Variation between other perceptions and self-perceptions between dyad members' predictor variables in our data may have distorted results and could explain the absence of partner effects. We argue that the ultimate goal of the analysis is to create a “couple measure,” but our results revealed that before creating this variable, the wording of items (i.e., perception type) has to be adequate to obtain an accurate interpretation. In fact, we suggest that parallel questions for each dyad member may have to solicit the same perception type (i.e., self-perception/self-perception and other perception/other perception). Hooker et al. also failed to find partner effects when parallel items were inversely worded [29]. Schaffhuser et al. too showed that actor and partner effects are influenced by the wording of items. They also show that to better capture the complexity of the communication process in a clinical encounter, items seeking all three types of perception (i.e., self-, other-, and meta-perception) may be necessary [30]. Indeed, they report that a higher percentage of variance was explained in multilevel analyses when they used all three perspectives. Each type of perception seems to offer a specific type of information not captured by the others [30]. In our context, for example, a meta-perception question in the “information giving” category could be, for the patient, “Does the doctor think she/he explained my medical problem to my satisfaction?” Our results also highlight that including a third-party assessment of the communication behaviors as outcomes for actor and partner variables may be relevant, as suggested by Legaré et al. [31]. In addition, to fully assess the nature of the communication processes and better understand how to measure the dyad in primary care, it is important to qualitatively measure the nature of the clinical encounter, such as with focus groups of physicians and patients [32]. In the context of the medical encounter, our results suggest that dyadic questionnaires need further development to take full advantage of the sophisticated capabilities of the actor–partner interdependence model in the dyadic context of the medical encounter.

Third, in our illustrative example, scores for the patient's perception of the physician's shared decision-making behavior were higher than scores for the physician's perception of his/her own shared decision-making behavior. Patients may have evaluated the physician's shared decision-making behaviors more positively than did the physician him/herself perhaps because of social desirability bias or the difference between the types of perception measured.

Our illustrative example has several strengths. First, we obtained our results from a sample of 263 unique physician–patient dyads in primary care consultations. This is, to our knowledge, the first dyadic dataset to offer such extensive data for exploring the effect of different variables on physician's and patient's perceptions of personal uncertainty. Second, by recruiting unique dyads, we avoided producing a learning effect in physicians: they only

completed the questionnaire once. Third, our results suggest ways that both data collection and data analysis can be improved for studying the effects of interdependence of physicians and patients in both short- and long-term primary care relationships.

Our illustrative example also had limitations. First, the cross-sectional study design did not control for potential confounding factors, and in the context of primary care, the wide variety of medical problems results in inherently heterogeneous consultations. Second, in the study protocol, we planned to use a theoretical model/framework to assess the effect of essential components of shared decision-making on personal uncertainty in both patients and their physicians, and then use the actor–partner interdependence model to evaluate our theoretical model by assessing the interpersonal relationship established between the two members of the dyad [21]. However, the doctor's knowledge/recommendations component was lacking. Finally, taking the physician's behavior (shared decision-making elements) as the predictor variable and a patient-weighted outcome (decision affects patient more than doctor) as an outcome variable may have camouflaged partner effects.

## 5. Conclusion

The results of our illustrative example could mean that each actor's perception of the physicians' shared decision-making behaviors affected their own uncertainty, but not the uncertainty of the other. However, the difference in the nature of dyad members' respective perceptions (other perception vs. self-perception) of the same behavior may have distorted results. Parallel questions for dyad members in which self-perceptions and other perceptions matched, or else questions generating meta-perceptions may have captured the interdependence of patient/physician uncertainty in a more meaningful way. Future studies should also add a third-party observer and perform qualitative interviews with the two principal actors.

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## Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jclinepi.2018.11.027>.

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