

NURSE-PHYSICIAN COLLABORATION SCALE: A CONTRIBUTION TO THE ITALIAN VALIDATION

LUCA CARICATI
TIZIANA MANCINI
UNIVERSITY OF PARMA

ALFONSO SOLLAMI
AZIENDA OSPEDALIERO-UNIVERSITARIA OF PARMA

CINZIA GUIDI
AZIENDA OSPEDALIERO-UNIVERSITARIA OF FERRARA

CARMEN PRANDI
AZIENDA OSPEDALIERA SANTA MARIA NUOVA OF REGGIO EMILIA

MONICA BIANCONCINI
AUSL OF BOLOGNA

ROSA SILVANO
CHIARA TAFFURELLI
GIOVANNA ARTIOLI
AZIENDA OSPEDALIERO-UNIVERSITARIA OF PARMA

This study aimed at providing an Italian validation of the Nurse-Physician Collaboration Scale (NPCS), an instrument recently developed in Japan and then in USA to measure the perception of collaborative practice between nurses and physicians. The Italian version, translated and adapted from the original version, was composed by 20 items on a 5-point Likert scale and was administered to 498 professionals (360 nurses and 138 physicians) working in several hospitals of the North Italy. Confirmatory factor analysis and Rasch analysis showed a mono-dimensional factor structure and proved that the scale was able to measure adequately the underlined construct for both professionals. Differential analysis showed that physicians perceived collaborative practice more than nurses did, and that collaborative practice was perceived to a lesser extent in contexts in which there was higher proceduralization and technologization of the work such as critical care units.

Key words: Collaborative practice; Nurse-physician collaboration; Measure of collaboration; Inter-professional collaboration; Inter-professional care.

Correspondence concerning this article should be addressed to Luca Caricati, Dipartimento di Economia, Università di Parma, Via Kennedy 6, 43100 Parma (PR), Italy. Email: luca.caricati@unipr.it

INTRODUCTION

Given that one profession alone cannot give complete assistance to patients, the multidisciplinary approach is becoming an indispensable strategy for healthcare management. Accordingly, collaborative practice, in particular between nurses and physicians, is a target to be pursued in order to achieve efficacious care. Indeed, meta-analytical evidence shows that the limited involvement of nurses in decision-making processes and disagreement between physicians and other professionals are among the principal factors hindering efficacious care (Espinosa, Young, & Walsh, 2008). Several studies have confirmed the positive effect of inter-professional collaboration on the quality of care and health outcomes (Baggs et al., 1999; Curley, McEachern, & Speroff, 1998; Gittell et al., 2000; Hamric & Blackhall, 2007; Knaus, Draper, Wagner, & Zimmerman, 1986; Martin, Ummenhofer, Manser, & Spirig, 2010; Shortell et al., 1994; Zwarenstein & Bryant, 2000). Others have demonstrated that communication errors between nurses and physicians were the cause of 20% of near misses in UK surgical wards (Williams, 2007) and of between 13% and 19% of deaths between 20 weeks of gestation and one year of life. A lack of collaboration could lead to negative outcomes for both patients and caregivers (Azoulay & Sprung, 2004; Levy, 2001).

The nurse-physician relationship, despite its importance, is still a critical aspect of all health organizations, albeit interprofessional difficulties depend on the existing model of collaboration. When a complementary model of inter-professional collaboration is encouraged from primary education onward and enhanced in everyday practice, attitudes toward collaboration and collaboration itself are more positive (Brolis, Postal, & Povoli, 2006; D'amour & Oandasan, 2005). When, instead, a hierarchical model prevails, there is a greater focus on power differences and stereotypical roles (Hojat et al., 2003) which hinder collaborative practice. Even in nations in which nurse-physician collaboration was initiated several decades ago (e.g., the USA and UK), inter-professional collaboration still appears to be problematic and unstable. Nurse-physician conflict has been identified as a stress factor for nurses (Caricati et al., in press; Greenfield, 1999). Conflicts are rooted in several aspects such as power differentials, lack of knowledge of other professions, and a lack of shared training for nurses and physicians (Chase, 1995; Coombs, 2003; Fagin, 1992). As Garman, Leach, and Spector (2006) and Hoff, Pohl, and Bartfield (2006) point out, nurses and physicians are usually educated separately and start to work together only when they enter the hospital. Moreover, physicians tend to show a more negative attitude toward collaboration with nurses, and define collaboration as good when nurses observe physicians' orders (Thomas, Sexton, & Helmreich, 2003). In contrast, nurses tend to have a more positive attitude toward inter-professional collaboration, and define collaboration as good when physicians respect their autonomy and professionalism (Hojat et al., 1999; Thomas et al., 2003). This difference in how collaborative practice is defined means that physicians are more likely to perceive satisfactory inter-professional collaboration than nurses (e.g., Hamric & Blackhall, 2007; Krogstad, Hofoss, & Hjortdahl, 2004).

Defining and Measuring Collaborative Practice

Collaboration may be defined as a shared decision-making process between independent roles from which a collective responsibility for the outcome is derived (Disch, Beilman, & Ingbar, 2001). Some authors have highlighted several dimensions constituting collaboration: interdepend-

ence, trust, mutual respect, open communication, and shared responsibilities and power (Bleakley, 2006; D'Amour & Oandasan, 2005). More precisely, collaborative practice has been defined as the nurse-physician interaction, which favors mutual recognition of professional competences (Taylor, 1996) and permits both professionals to influence a patient's care (Weiss & Davis, 1985).

Based on these definitions, Dougherty and Larson's (2005) review highlights the existence of five scales widely used for measuring nurse-physician collaborative practice: the Collaborative Practice Scale (CPS; Weiss & Davis, 1985), Collaboration and Satisfaction about Care Decisions (Baggs, 1994), the Nurses' Opinion Questionnaire (Adams, Bond, & Arber, 1995), the Jefferson Scale of Attitudes toward Physician-Nurse Collaboration (Hojat et al., 1999) and the ICU MD/RN Questionnaire (Shortell, Rousseau, Gillies, Devers, & Simons, 1991). These scales, in accordance with the previously illustrated definition of collaborative practice, take into account communication, cooperation, sharing patient information and decision-making processes as dimensions of collaborative practice (see Dougherty & Larson, 2005). Although these scales are widely used, they were developed and validated more than ten years ago. Recently, Ushiro (2009) proposed a new scale, named the Nurse-Physician Collaboration Scale (NPCS), composed of 27 items on a 5-point Likert scale asking respondents to indicate the extent to which (from *never* to *always*) certain collaborative behaviors occur in the Care Unit (CU). The definition proposed by Ushiro describes collaborative practice as "actions related to sharing information about patients, participating in decision-making concerning patient care, and providing comprehensive care to patients from a patient-centred perspective" (p. 1499). Accordingly, the NPCS measures three dimensions, reflecting most of the definitions of collaborative practice existing in the literature: 1) joint participation in the cure/care decision-making process, 2) sharing of patient information, and 3) cooperativeness. The NPCS has been validated with a broad sample of hospital nurses and physicians from 27 hospitals in a large town in Japan (1,584 nurses and 843 physicians). At present, the only study to have used the NPCS elsewhere is Nair, Fitzpatrick, McNulty, Click, and Glembocki's (2012) work undertaken with U.S. nurses and physicians; in this study, however, the factor structure of the scale was not assessed.

Given that there is a lack of scales measuring nurse-physician collaborative practice in everyday activities in Italy, the main goal of the present research was to supply a first Italian adaptation of the NPCS.

Aim and Expectations

In Italy, nurse-physician collaborative practice is an ongoing process of social and organizational change which started in 1994 (D.M. 739/1994) and is primarily linked to the professional growth of nurses. Italian nurses and physicians are still experiencing a transition process characterized by the difficulty of acquiring a coherent social image, a solid professional identity, and a new equilibrium in their inter-professional relationships. This makes it important for organizations and management professionals to be able to measure and evaluate existing collaborative practice.

Given that, in Italy, the hierarchical model of inter-professional collaboration seems to prevail and that health organizations have only recently paid close attention to collaborative practice (Brolis et al., 2006), describing precise expectations about the factor structure of the scale is not easy. We could expect to find the three factors delineated by Ushiro (2009). However, given the high cor-

relation between factors reported by Ushiro (mean correlation, $r = .68$), we decided also to test a single-factor solution (it is worth noting that Ushiro also tested a single-factor solution, but found a slightly poorer fit). According to Ushiro's findings, another expectation is the invariance of the scale across nurses and physicians. Finally, given that several works indicate that physicians are more likely to perceive satisfactory inter-professional collaboration than nurses (Hamric & Blackhall, 2007; Krogstad et al., 2004), we expect that physicians would score higher than nurses on the NPCCS.

METHOD

Participants

Nurses and physicians working in the same care unit (CU), randomly selected from all CUs (25%), in four hospitals, in the Emilia-Romagna region, were enrolled in this study. The final sample was composed of 498 professionals of whom 360 (72.3%) were nurses. Albeit this sample is disproportionate, the percentages roughly approximate the percentages of nurses and physicians in Italian hospitals. Table 1 shows descriptive statistics for the gender and age of nurses and physicians. In the whole sample, 164 participants (33.3%) were men while 329 (66.7%) were women (nine participants did not report their gender). While men were equally distributed between professions, nurses were more likely to be women, $\chi^2(1) = 55.83, p < .001$. These percentages reflect the existing gender difference between nurses and physicians. Finally, the mean age of the whole sample was 40.71 years ($SD = 8.73$, range: 23-64), with physicians being older than nurses, $F(1, 459) = 62.12, p < .001$.

TABLE 1
 Gender distribution and mean age by professions

	Men		Women		Mean age (years)
	<i>N</i>	% inside profession	<i>N</i>	% inside profession	
Nurses	83	50.61	272	82.67	38.82
Physicians	81	49.39	57	13.32	45.52
Total	164	33.33	329	66.67	40.71

The Scale

In order to translate the items, we adopted a team-based iterative approach (Douglas & Craig, 2007; Harkness, Van de Vijver, & Mohler, 2003). First, the NPCCS items were translated by three independent researchers (i.e., parallel translation) who were nurses and expert in the field of the nurse-physician relationship. In the committee meeting, the translations were then compared and disagreements were solved through group discussion. Seven items were omitted as not applicable in the Italian context. The remaining items were pretested by asking 15 professionals (both

nurses and physicians) to complete the questionnaire. In this phase, respondents filled out the questionnaire with one researcher and verbalized their understanding of each item, expressing problems and misunderstandings. Based on the problems and misunderstandings that emerged in the pretest, the items were changed accordingly and reanalyzed by the team until an adjudication of the translation was reached. The resulting scale (NPCS-Iv) then comprised 20 items describing behaviors (e.g., “The nurses and the physicians exchange opinions to resolve problems related to patient cure/care,” “The nurses and the physicians together consider their proposals about the future direction of patient care”). Participants were asked to indicate the extent to which each behavior described by items (see Table 3) occurred in their CU (1 = *never*, 5 = *always*).

Procedure

Paper-and-pencil questionnaires were distributed inside each CU and returned three weeks later; the researchers collected the questionnaires from each CU. Participation was voluntary and the return of the questionnaire was assumed to express the professional’s agreement to participate.

RESULTS

Factor Structure of the NPCS-Iv

We used confirmatory factor analysis (CFA) in order to test the expected three-factor structure of the scale. CFA was implemented with Mplus software (Muthén & Muthén, 2006) and maximum likelihood estimation with robust standard error was used in order to adjust for distributional problems and adopt a relatively conservative approach. According to Ushiro’s (2009) results, three correlated latent factors were expected. The results, however, indicated that the model was not estimable because the high correlation among factors prevented a correct estimation of parameters. In other words, the three factors had poor discriminant validity making it impossible to estimate the parameters correctly.

This led us to test a model in which only one latent factor was expected. This unifactorial model showed good fit indexes, $\chi^2(153) = 382.96, p < .001$; CFI = .943, TLI = .929, RMSEA = .055, CI = .048-.062, $p = .12$; SRMR = .04, and good factor determinacy (.971). Moreover, all items had parameter estimation higher than .30 (all $ps < .001$). These results thus indicate that the NPCS-Iv has a unifactorial structure.

Scale invariance between nurses and physicians was then checked. Table 2 reports the index of fit for several invariant models. The first model refers to configural invariance (e.g., no constraint was imposed between nurses and physicians). In the second model (metric invariance), factor loadings were constrained between samples. In the third model (scalar invariance), besides factor loadings, intercepts were also constrained. Finally, in the fourth model (residual invariance), factor loadings, intercepts and error variances were constrained to be equal across nurses and physicians. As one can see, the first and the second model were essentially equal and better than the other models. These results suggest that the unidimensional structure of the NPCS-Iv has configural and metric invariance between nurses and physicians.

TABLE 2
 Model fit statistics for the Nurse-Physician Collaboration Scale Iv

Model	χ^2	<i>p</i>	CFI	TLI	RMSEA	AIC
Structural invariance (no constraints)	558.905	< .001	.936	.921	.058	25173.16
Metric invariance	594.761	< .001	.932	.920	.058	25170.62
Scalar invariance	717.076	< .001	.906	.896	.066	25268.65
Residual invariance	742.020	< .001	.905	.900	.065	25257.10

Note. CFI = Comparative fit index; TLI = Tucker-Lewis index; RMSEA = Root mean square error of approximation; AIC = Akaike's information criterion.

Rasch Analysis

Given that previous analysis demonstrated the unidimensional structure of the NPCCS, we decided to analyze the scale further using Rasch models which are known to be suitable when the scale is unidimensional. This approach permits assessment of whether items are suitable for measuring the underlined construct and whether the scale is adequate to the sample. We will not discuss the Rasch models here, but we would like to specify some features linked to the approach proposed by Linacre and Wright (see Linacre, 2002, 2004; Wright & Master, 1982) and implemented using the Winsteps 5.1.26 software for Windows (Linacre, 2006). Rasch models estimate both the “ability” of a person (i.e., the extent to which that person possesses the underlined construct) and the “difficulty” of an item (i.e., the extent to which that item measures the underlined construct) on the same unit of measure (logit), assuming that logits for both persons and items increase in a continuous way. It is worth noting that Rasch models permit estimation of both person and item characteristics independently because item characteristics do not depend on person characteristics and vice versa (separability theorem; Rasch, 1960). The model we used was for the Likert scale assuming that thresholds between the points of the Likert scale are ordered in a continuous way and are the same for all items (Rating Scale Model; Andrich, 1978, 1982). For items, an important statistic is the mean square (MNSQ) fit statistic representing the contribution of each item to the measurement of the construct. High values for MNSQ indicate a lack of homogeneity among items, while low values indicate redundancy (Linacre & Wright, 1998). Usually, MNSQ values between 0.5 and 1.5 are considered sufficiently informative while values between 1.5 and 2, or lower than 0.5, are considered not particularly informative, but not deleterious for measurement (Bond & Fox, 2001; Linacre, 2002). Infit and Outfit are the two indexes linked to the MNSQ; Infit represents unexpected answers to items that are not extreme (i.e., items which are neither too easy nor too hard), while Outfit represents unexpected answers given to extreme items.

Another important statistic is the root mean square error (RMSE), which represents an estimation of the mean error of the scale, with a value of 0 indicating a perfect fit between expected and measured scores. The reliability of measurement is assessed by the separation index (ISR; Wright & Masters, 1982) computed for both items (item separation reliability) and persons (person separation reliability). These indexes are very different from those usually employed to assess reliability (e.g., Cronbach's alpha) because they are calculated by separating the contribution of items and persons. However, they can be interpreted in the same way as Cronbach's alpha with

1 indicating perfect reliability (usually, values greater than .80 are considered acceptable; Fox & Jones, 1998).

Finally, it is possible to assess whether items function differently across different groups through differential item functioning (DIF). This function, which is based on t distribution, permits assessment of whether items supply the same measurement across samples. However, as suggested by Smith (2004) and Lang, Chew, Crownover, and Wilkerson (2011), DIF represents a problem for measurement only when a significant t value is associated with a DIF greater than 1.

Item characteristics. Initially, we checked thresholds of items, finding a corrected order (-1.80, -0.76, 0.61, 1.95 logit). Thus, a 5-point Likert scale seemed able to discriminate participants' responses. As shown in Figure 1, the curve of measured thresholds nearly overlays the expected one (conventionally, the mean score is fixed at 0 logit).

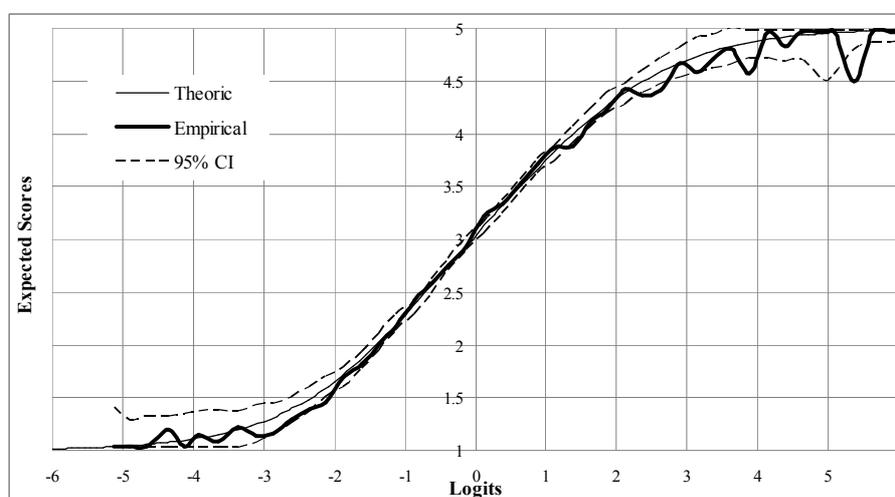


FIGURE 1
Item characteristic curve of the NPCS-Iv with 20 items (answers form 1 to 5).

Item 11 showed Infit and Outfit greater than 1.5 (1.63 and 1.76), as did item 18 (1.52 and 1.53). Although these values were beyond the cutoff of 1.50, several authors have shown that MNSQ values smaller than 2 can be acceptable because whilst they are not particularly informative, they are not seriously detrimental to measurement (Bond & Fox, 2001; Fisher, 2007; Linacre, 2002). Thus, we decided to retain items 11 and 18. Other items had fit indexes between 0.69 and 1.50 showing good adequacy for measurement. Moreover, the item-total correlation (point biserial correlation) was good for all items (Table 3).

We then assessed whether items had different functioning depending on profession (nurses vs. physicians) through DIF. The results indicated that no items had a DIF value greater than 1 and at the same time a significant value of t (mean DIF = 0.22 logit, SD = 0.20, range: 0.02-0.77), confirming that the items functioned the same for both nurses and physicians.

Scale characteristics. The 20-item scale showed a very good reliability for both items (item separation reliability = .99) and persons (person separation reliability = .92) and a good RMSE value (.06). Furthermore, the scale had an Infit of 1 (SD = 0.25) and an Outfit of 1 (SD = 0.27).

TABLE 3
Items, logits, fit indexes (Infit and Outfit MNSQ) and item-total point-biserial correlations of the NPCCS-Iv

	Logit	Infit MNSQ	Outfit MNSQ	Point - biserial correlation
9 In the event of a disagreement about the future direction of a patient's care, the nurses and the physicians hold discussions to resolve differences of opinion	0.85	1.00	0.97	.69
15 In the event of a change in treatment plan, the nurses and the physicians have a mutual understanding of the reasons for the change	0.72	0.69	0.69	.76
14 When a patient is to be discharged from the hospital, the nurses and the physicians discuss where the patient will continue to be treated and the lifestyle regimen the patient needs to follow	0.62	1.37	1.35	.65
6 The nurses and the physicians together consider their proposals about the future direction of patient care	0.59	0.69	0.68	.76
20 The future direction of a patient's care is based on a mutual exchange of opinions between the nurses and the physicians	0.44	0.95	0.95	.70
8 The nurses and the physicians take into account each other's schedule when making plans to treat a patient together	0.43	0.92	0.90	.72
13 The nurses and the physicians discuss how to prevent medical care accidents	0.32	0.98	0.98	.68
3 The nurses and the physicians all know what has been explained to a patient about his/her condition or treatment	0.21	1.08	1.06	.63
10 The nurses and the physicians share information to verify the effects of treatment	0.09	0.80	0.79	.72
12 The nurses and the physicians discuss whether to continue a certain treatment when that treatment is not having the expected effect	0.09	0.85	0.84	.71
5 The nurses and the physicians help each other	0.04	0.85	0.85	.70
4 When confronted by a difficult patient, the nurses and the physicians discuss how to handle the situation	-0.02	0.92	0.95	.72
16 The nurses and the physicians can freely exchange information or opinions about matters related to work	-0.05	0.89	0.90	.68
7 The nurses and the physicians share information about a patient's level of independence in regard to activities of daily living	-0.11	0.84	0.83	.70
2 The nurses and the physicians seek agreement on the interpretation of signs and symptoms that a patient has	-0.17	0.91	0.90	.62
1 The nurses and the physicians exchange opinions to resolve problems related to patient cure/care	-0.27	0.94	0.95	.65
19 In the event a patient develops unexpected side effects or complications, the nurses and the physicians discuss countermeasures	-0.29	0.93	0.92	.68
18 The nurses and the physicians can easily talk about topics other than topics related to work	-0.76	1.52	1.53	.42
17 The nurses and the physicians check with each other concerning whether a patient has any signs of side effects or complications	-1.02	1.24	1.26	.53
11 The nurses and the physicians greet each other every day	-1.71	1.63	1.76	.46

Note. Items are ordered according to their logit score. The first column indicates the presentation order of items.

Finally, the unidimensional solution explained 64% of the total variance.

In order to verify whether the scale was able to assess the latent construct for all participants, we checked the logit distribution of items and persons. This is displayed in Figure 2, in which the median value is reported for items (i.e., the value at which each item has a 50% chance of receiving a value higher or lower than its median). In Figure 2, the # column represents the distribution of person scores while numbers show item scores. As can be seen, the NPCCS-Iv correctly measured all participants (only five participants were above the range of the scale). Overall, the scale seems to be adequate to measure the construct of collaborative practice between nurses and physicians.

Considering the position of the items, it appears that “The nurses and the physicians greet each other every day” (item 11) was rated as the behavior most likely to occur in the CUs (i.e., this item had the highest mean), followed by item 17 (“The nurses and the physicians check with each other concerning whether a patient has any signs of side effects or complications”), and 18 (“The nurses and the physicians can easily talk about topics other than topics related to work”). This seems to indicate that cooperative interpersonal behaviors between nurses and physicians are likely to occur. Figure 2 also shows that “In the event of a disagreement about the future direction of a patient’s care, the nurses and the physicians hold discussions to resolve differences of opinion” (item 9) was rated as less frequent behavior. Following item 9, items 14 (“When a patient is to be discharged from the hospital, the nurses and the physicians discuss where the patient will continue to be treated and the lifestyle regimen the patient needs to follow”), 15 (“In the event of a change in treatment plan, the nurses and the physicians have a mutual understanding of the reasons for the change”), and 6 (“The nurses and the physicians together consider their proposals about the future direction of patient care”) were those which were rated as less frequent by professionals. Given the content of these items, it appears that communication about patients’ future treatment and care is a weak aspect of nurse-physician collaboration.

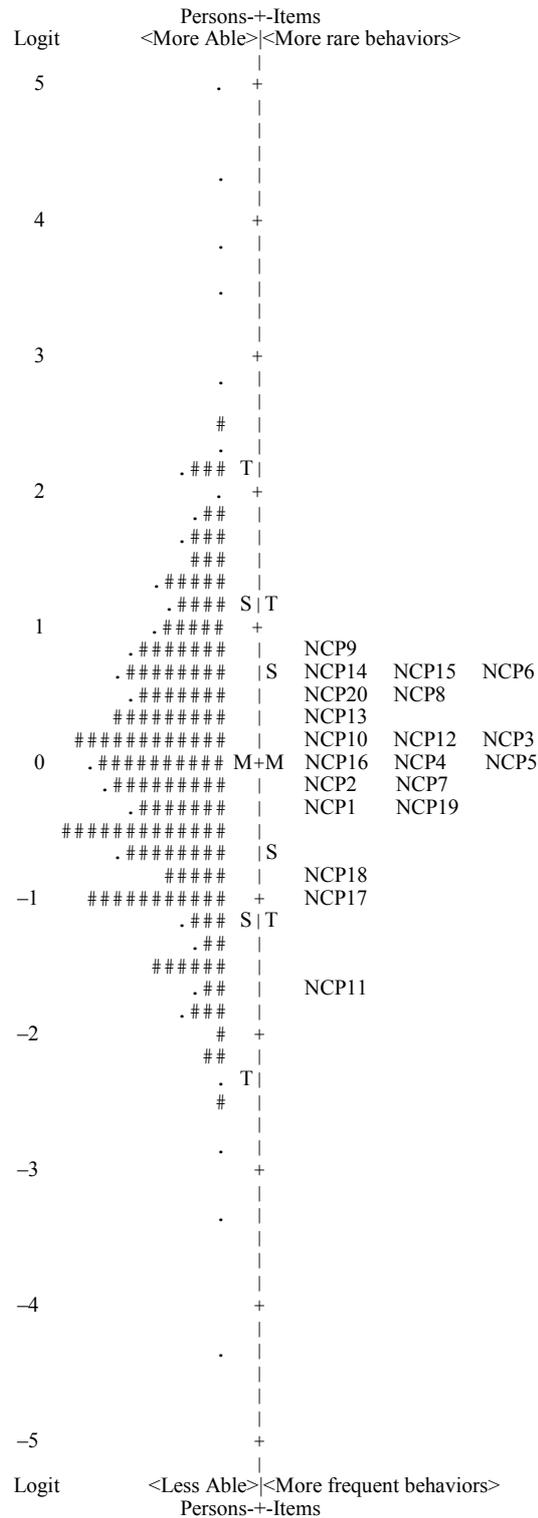
Discriminant Validity

Finally, in order to assess the discriminant validity of the NPCCS-Iv, the difference (in logit) between profession, gender and units of work was assessed. For units of work, CUs were grouped according to the type of care they supplied: critical care (i.e., operating theater), ordinary care (i.e., rheumatology), and long-term care (i.e., hospice).

ANOVA showed two significant differences. The first indicated that, as expected, physicians scored higher ($M = 0.502$, $SD = 0.924$) than nurses ($M = -0.168$, $SD = 1.235$) on perception of collaborative practice, $F(1, 472) = 18.41$, $p < .001$, $\eta^2 = 0.04$. The second difference concerned the unit of work, $F(2, 472) = 19.17$, $p < .001$, $\eta^2 = 0.07$, indicating that, unexpectedly, collaboration was higher in long-term care ($M = 1.045$, $SD = 1.185$) than in both ordinary care ($M = -0.012$, $SD = 1.048$) and critical care ($M = -0.306$, $SD = 1.209$, post-hoc, $p < .001$). Neither gender difference nor interaction effects were significant.

DISCUSSION

Although in political and organizational spheres the importance of the nurse-physician



Note. Every '#' represents three persons; every '.' represents one person. M = mean; S = one standard deviation; T = two standard deviations. Scores are in logits.

FIGURE 2
 Items and participants maps (logit).

collaboration is now recognized and promoted in Italy, as elsewhere, instruments to measure and assess effective collaboration are still scarce. The present work aimed to address this lack, supplying a first adaptation of the Nurse-Physician Collaboration Scale (Ushiro, 2009). The original version of this scale, which measures perceptions of collaborative practice between nurses and physicians, is composed of three correlated factors. The results of this study, however, based on confirmatory factor analysis, reveal that the Italian version has a unidimensional structure. This evidence is not surprising given that collaborative practice is a complex behavior in which several aspects (e.g., communication and sharing patient information) tend to be correlated with each other. Linked to this aspect, the unidimensionality of the NPCS-Iv can also be explained by the fact that the focus on collaborative practice is relatively recent in Italy. Furthermore, professionals may not be able to discriminate the different aspects of collaboration clearly; these are also frequently confused in the conceptualization of the construct (D'Amour & Oandasan, 2005). Nevertheless, Rasch analysis showed that the scale was able to measure the latent construct and to discriminate professional behaviors adequately. Indeed, the results indicate that the NPCS-Iv supplies a good measurement of the construct, detecting almost all scores of nurses and physicians. The version of the scale used in this work seems to be a promising instrument to measure perceptions of collaborative practice. Moreover, both the Rasch analysis and confirmatory factor analysis show that the structure of the scale and the functioning of items are invariant for nurses and physicians.

Considering the content of items and their positions on the measured continuum, the results indicate that items 9, 15, 14, 6, 20 and 8 (see Table 3) received lower scores, that is, they were the items which professionals rated as less likely to occur in their CU. The content of these items principally refers to the scheduling of and decisions concerning patients' care programs, indicating that the principal difficulty in collaboration between nurses and physicians relates to decisions about the future care/cure of the patients. At the other end of the continuum, items 11, 17 and 18 received higher scores, suggesting behaviors that are easier to engage in. Items 11 and 18 refer to interpersonal behaviors (i.e., greeting each other and talking about topics unrelated to work) indicating that interpersonal relationships between professionals are perceived as fairly good. Other items occupied intermediate positions ranging from more frequent to less frequent. These items mainly refer to shared information and decisions about patients' treatment in the here and now (i.e., discussing how to manage a difficult patient or discussing the continuation of a treatment). They progressively receive lower scores (i.e., they are described as less likely to occur) the more they refer to future care/cure. Overall, this evidence seems to indicate that nurse-physician collaborative practice is particularly problematic in activities and behaviors that imply new nursing competences, that is, nursing diagnoses and nurses' opinions about care/cure decisions.

The results also indicate that the scale has discriminant validity. Indeed, the findings reveal that physicians have higher scores than nurses, confirming that physicians are more likely than nurses to perceive that collaboration is in place in the CU (Chase, 1995; Coombs, 2003; Hamric & Blackhall, 2007; Hojat et al., 1999; Miller, 2001; Thomas et al., 2003). This could be due to the presence and persistence of the hierarchical model of inter-professional relationships in Italian hospitals, in which physicians are more interested in the maintenance of the status quo; they are also more likely to perceive "soft forms" of collaboration as effective.

Moreover, the results show differences in scores depending on the type of work. More precisely, perceptions of collaborative practice were higher in long-term CUs than in critical and

ordinary CUs. This seems contrary to the idea that more procedural work activities favor better collaboration between professionals, raising instead the question of the depersonalization of professionals whose work mainly depends on technology (see e.g., Knorr Cetina, 1999).

The present study represents the first step toward the Italian validation of the NPCS. Thus, a certain amount of caution is necessary in evaluating the robustness and generalizability of results and further research is needed to investigate the psychometric properties of the NPCS-Iv in greater depth. For example, the scale could benefit from adding some “more difficult” items investigating aspects related to nurses’ new roles and competences (e.g., the use of nursing records). Moreover, further studies should take into account nurse-physician collaborative practice outside the hospital context, such as in community health services. Despite these shortcomings, our results confirm the validity of the NPCS-Iv as a promising measure of nurse-physician collaborative practice.

However, they highlight the need to improve and encourage nurse-physician collaboration in Italian health care organizations. The fact that professionals are not able to discern clearly the different dimensions of collaborative practice and the difference in mean scores between nurses and physicians suggest, both a lack of knowledge in terms of what collaboration should be, and that nurses and physicians have different concepts of collaboration. In this regard, a useful strategy to improve collaboration could be to enhance training and provide educational programs in which nurses and physicians would learn to work together and recognize the autonomy and competence of each profession before entering hospitals (Garman et al., 2006; Hoff et al., 2006).

REFERENCES

- Adams, A., Bond, S., & Arber, S. (1995). Development and validation of scales to measure organizational features of acute hospital wards. *International Journal of Nursing Studies*, 32(6), 612-627. doi:10.1016/0020-7489(95)00041-1
- Andrich, D. (1978). A rating formulation for ordered response categories. *Psychometrika*, 43, 561-573. doi:10.1007/BF02293814
- Andrich, D. (1982). Using latent trait measurement models to analyze attitudinal data: A synthesis of viewpoints. In D. Spearritt (Ed.), *Proceedings of the 1980 invitation conference for the improvement of testing* (pp. 89-126). Melbourne, Victoria, Australia: Australian Council for Educational Research.
- Azoulay, E., & Sprung, C. I. (2004). Family-physician interactions in the intensive care unit. *Critical Care Medicine*, 32, 2323-2328. doi:10.1097/01.CCM.0000145950.57614.04
- Baggs, J. G. (1994). Development of an instrument to measure collaboration and satisfaction about care decisions. *Journal of Advanced Nursing*, 20(1), 176-182. doi:10.1097/01.CCM.0000145950.57614.04
- Baggs, J. G., Schmitt, M. H., Mushlin, A. I., Mitchell, P. H., Eldredge, D. H., Oakes, D., Hutson, A. D. (1999). The association between nurse-physician collaboration and patient outcomes in three intensive care units. *Critical Care Medicine*, 27, 1991-1998. doi:10.1097/00003246-199909000-00045
- Bleakley, A. (2006). Broadening conceptions of learning in medical education: The message from team-working. *Medical Education*, 40(2), 150-157. doi:10.1111/j.1365-2929.2005.02371.x
- Bond, T. G., & Fox, C. M. (2001). *Applying the Rasch model. Fundamental measurement in the human sciences*. Mahwah, NJ: Erlbaum.
- Brolis, R., Postal, N., & Povoli, R. (2006). How to work in group: Doctors-nurses collaboration. *Assistenza Infermieristica e Ricerca*, 25(2), 84-87. doi:10.1702/143.1586
- Caricati, L., La Sala, R., Marletta, G., Pelosi, G., Ampollini, M., Fabbri, A., ... Mancini, T. (in press). Work climate, work values and professional commitment as predictors of job satisfaction in nurses. *Journal of Nursing Management*.
- Chase, S. (1995). The social context of critical care clinical judgment. *Heart and Lung*, 24(2), 154-162.
- Coombs, M. (2003). Power and conflict in intensive care clinical decision making. *Intensive and Critical Care Nursing*, 19, 125-135. doi:10.1016/S0964-3397(03)00040-5

- Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: An intervention designed using continuous quality improvement. *Medical Care*, *36*, AS4-AS12. doi:10.1097/00005650-199808001-00002
- D'Amour, D., & Oandasan, I. (2005). Interprofessionality as the field of interprofessional practice and inter-professional education: An emerging concept. *Journal of Interprofessional Care*, *1*, 8-20. doi:10.1080/13561820500081604
- Disch, J., Beilman, G., & Ingbar, D. (2001). Medical directors as partners in creating healthy work environments. *AACN Clinical Issues*, *12*, 366-377. doi:10.1097/00044067-200108000-00005
- D.M. 739 (1994, September 14). Regolamento concernente l'individuazione della figura e del relativo profilo professionale dell'infermiere [Regulations concerning the definition of the nurse and its professional profile]. *Gazzetta Ufficiale*, *6*, January 9, 1995.
- Dougherty, M., & Larson, E. (2005). A review of instruments measuring nurse-physician collaboration. *Journal of Nursing Administration*, *35*(5), 244-253. doi:10.1097/00005110-200505000-00008
- Douglas, S. P., & Craig, C. S. (2007). Collaborative and iterative translation: An alternative approach to back translation. *Journal of International Marketing*, *15*(1), 30-43. doi:10.1509/jimk.15.1.030
- Espinosa, L., Young, A., & Walsh, T. (2008). Barriers to intensive care nurses providing terminal care: An integrated literature review. *Critical Care Nursing Quarterly*, *31*, 83-89. doi:10.1097/01.CNQ.0000306402.55518.da
- Fagin, C. M. (1992). Collaboration between nurses and physicians: No longer a choice. *Academic Medicine*, *67*, 295-303. doi:10.1097/00001888-199205000-00002
- Fisher, W. P. Jr. (2007). Rating Scale Instrument Quality Criteria. *Rasch Measurement Transactions*, *21*(1), 1095.
- Fox, C. M., & Jones, J. A. (1998). Uses of Rasch modeling in counseling psychology research. *Journal of Counseling Psychology*, *45*(1), 30-45. doi:10.1037/0022-0167.45.1.30
- Garman, A. N., Leach, D. C., & Spector, N. (2006). Worldviews in collision: Conflict and collaboration across professional lines. *Journal of Organizational Behaviour*, *27*, 829-849. doi:10.1002/job.394
- Gittell, J. H., Fairfield, K. M., Bierbaum, B., Head W., Jackson, R., Kelly, M., ... Zuckerman, J. (2000). Impact of relational coordination on quality of care, postoperative pain and functioning, and length of stay: A nine-hospital study of surgical patients. *Medical Care*, *38*(8), 807-819. doi:10.1097/00005650-200008000-00005
- Greenfield, L. J. (1999). Doctor and nurses: A troubled partnership. *Annals of Surgery*, *230*(3), 279-288. doi:10.1097/00000658-199909000-00001
- Hamric, A. B., & Blackhall, L. J. (2007). Nurse-physician perspectives on the care of dying patients in intensive care units: Collaboration, moral distress, and ethical climate. *Critical Care Medicine*, *35*(2), 422-429. doi:10.1097/01.CCM.0000254722.50608.2D
- Harkness, J. A., Van de Vijver, F. J. R., & Mohler, P. P. (2003). *Cross-cultural survey methods*. Hoboken, NY: John Wiley.
- Hoff, T. J., Pohl, H., & Bartfield, J. (2006). Teaching but not learning: How medical residency programs handle errors. *Journal of Organizational Behavior*, *27*, 869-896. doi:10.1002/job.395
- Hojat, M., Fields, S. K., Veloski, J. J., Griffiths, M., Cohen, M. J., & Plumb, J. D. (1999). Psychometric properties of an attitude scale measuring physician-nurse collaboration. *Evaluation & The Health Professions*, *22*(2), 208-220. doi:10.1177/01632789922034275
- Hojat, M., Gonnella, J. S., Nasca, T. J., Fields, S. K., Cicchetti, A., Lo Scalzo, A., ... Torres-Ruiz, A. (2003). Comparisons of American, Israeli, Italian and Mexican physicians and nurses on the total and factor scores of the Jefferson scale of attitudes toward physician-nurse collaborative relationships. *International Journal of Nursing Studies*, *40*, 427-435. doi:10.1016/S0020-7489(02)00108-6
- Knaus, W. A., Draper, E. A., Wagner, D. P., & Zimmerman, J. E. (1986). An evaluation of outcome from intensive care in major medical centers. *Annals of Internal Medicine*, *104*(3), 410-418. doi:10.7326/0003-4819-104-3-410
- Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Cambridge, MA: Harvard University Press.
- Krogstad, U., Hofoss, D., & Hjortdahl, P. (2004). Doctor and nurse perception of inter-professional cooperation in hospitals. *International Journal for Quality in Health Care*, *16*, 491-497. doi:10.1093/intqhc/mzh082
- Lang, W. S., Chew, A. L., Crownover, C., & Wilkerson, J. R. (2011). Using the Rasch model to determine form equivalence in the trilingual Lollipop Readiness Test. *The International Journal of Educational and Psychological Assessment*, *8*(1), 23-44.
- Levy, M. M. (2001). End of life in the intensive care unit: Can we do better? *Critical Care Medicine*, *29*(Suppl.), N56-N61. doi:10.1097/00003246-200102001-00011
- Linacre, J. M. (2002). Optimizing rating scale category effectiveness. *Journal of Applied Measurement*, *3*, 85-106.
- Linacre, J. M. (2004). Optimizing rating scale category effectiveness. In E. V. J. Smith & R. M. Smith (Eds.), *Introduction to Rasch measurement: Theory, models and applications* (pp. 258-278). Maple Grove, MN: JAM Press.

- Linacre, J. M. (2006). *WINSTEPS Rasch measurement computer program* (Version 3.61). Chicago: Winsteps.com.
- Linacre, J. M., & Wright, B. D. (1998). *A user's guide to WINSTEPS*. Chicago: MESA press.
- Martin, J. S., Ummerhofer, W., Manser, T., & Spirig, R. (2010). Interprofessional collaboration among nurses and physicians: Making a difference in patient outcome. *Swiss Medical Weekly, 1*, 140:w13062. doi:10.4414/sm.w.2010.13062
- Miller, P. A. (2001). Nurse-physician collaboration in an intensive care unit. *American Journal of Critical Care, 10*, 341-350.
- Muthén, L. K., & Muthén, B. O. (2006). *Mplus user's guide* (4th ed.) [Computer software and manual]. Los Angeles: Muthén & Muthén.
- Nair, D. M., Fitzpatrick, J. J., McNulty, R., Click, E. R., & Glembocki, M. M. (2012). Frequency of nurse-physician collaborative behaviors in an acute care hospital. *Journal of Interprofessional Care, 26*(2), 115-120. doi:10.3109/13561820.2011.637647
- Rasch, G. (1960). *Probabilistic models for some intelligence and attainment tests*. Copenhagen, Denmark: Danmarks Paedagogiske Institut.
- Shortell, S. M., Rousseau, D. M., Gillies, R. R., Devers, K. J., & Simons, T. L. (1991). Organizational assessment in intensive care units (ICUs): Construct development, reliability, and validity of the ICU nurse-physician questionnaire. *Medical Care, 29*(8), 709-726. doi:10.1097/00005650-199108000-00004
- Shortell, S. M., Zimmerman J. E., Rousseau, D. M., Gillies R. R., Wagner D. P., Draper E. A., ... Duffy, J. (1994). The performance of intensive care units: Does good management make a difference? *Medical Care, 32*(5), 508-525. doi:10.1097/00005650-199405000-00009
- Smith, E. (2004). Evidence for the reliability of measures and validity of measure interpretation: A Rasch measurement perspective. In E. Smith & R. Smith (Eds.), *Introduction to Rasch measurement* (pp. 93-122). Maple Grove, MN: JAM Press.
- Taylor, J. S. (1996). Collaborative practice within the intensive care unit: A deconstruction. *Intensive and Critical Care Nursing, 12*, 64-70.
- Thomas, E. J., Sexton, J. B., & Helmreich, R. L. (2003). Discrepant attitudes about teamwork among critical care nurses and physicians. *Critical Care Medicine, 31*(3), 956-959. doi:10.1097/01.CCM.0000056183.89175.76
- Ushiro, R. (2009). Nurse-Physician Collaboration Scale: Development and psychometric testing. *Journal of Advanced Nursing, 65*(7), 1497-1508. doi:10.1111/j.1365-2648.2009.05011.x
- Weiss, S. J., & Davis, H. P. (1985). Validity and reliability of the collaborative practice scales. *Nursing Research, 34*(5), 299-305. doi:10.1097/00006199-198509000-00010
- Williams, D. J. P. (2007). Medication errors. *Journal of the Royal College of Physicians Edinburgh, 37*, 343-346.
- Wright, B. D., & Master, G. N. (1982). *Rating scale analysis*. Chicago: MESA press.
- Zwarenstein, M., & Bryant, W. (2000). Interventions to promote collaboration between nurses and doctors. *The Cochrane Database of Systematic Reviews, 2*, CD000072. doi:10.1002/14651858.CD000072