Acta Biomed 2021; Vol. 92, Supplement 2: e2021331 DOI: 10.23750/abm.v92iS2.11773

Further evidence of validity of the Nursing Decision Making Instrument: an Italian validation study

Beatrice Albanesi[1], Rosario Caruso[2], Cristina Arrigoni[3], Anna De Benedictis[4], Irene Baroni[2], Giulia Villa[4], Federica Della Fiore[2]

[1]Research Unit Nursing Science, Campus Bio – Medico, University Hospital of Rome, Italy; [2]Health Professions Research and Development Unit, IRCCS Policlinico San Donato, Milan, Italy; [3]Department of Public Health, Experimental and Forensic Medicine, Section of Hygiene, University of Pavia, Pavia, Italy; [4]Clinical Direction, Campus Bio – Medico University Hospital of Rome, Italy; [5]Health Professions Research and Development Unit, IRCCS San Raffaele Scientific Institute, Milan, Italy

Abstract. *Background and aim of the work:* Nurses face many decisions in their daily practice. Indeed, the decision-making process is an integral part of nursing practice. This study aimed to provide the Italian version of the Nursing Decision Making Instrument (NDMI) and establish its content and face validity, construct validity, and reliability among Italian nurses. *Methods*: A three phases validation, methodological and cross-sectional study was realized. Phase one referred to the cultural-linguistic translation of the NDMI into Italian (i.e., I- NDMI). Phase two aimed to obtain a good level of content and face validity (cut-off <0.70). Phase three involved a cross-section data collection amongst Italian nurses in assessing the construct validity and reliability of the I-NDMI. *Results*: A total of five hundred thirty-two (532) participants were enrolled in three Italian hospitals. The 65.6% were female (n=349), with a mean age of 40.81 (SD±9.91) years. The majority of participants were clinical nurses working by shifts (n=390; 73.3%) with a mean working experience of 16.21 (SD±10.43) years. I-NDMI showed adequate content validity. Confirmatory factor analysis models supported the four-factorial structure of the I-NDMI (i.e., Intuition; Prevision; Assessment; Planning) in explaining data obtained from nurses. Moreover, the scale and each domain showed adequate internal consistency. *Conclusions*: This study constituted an advancement in the psychometric testing of the NDMI. Future research should identify specific decision-making processes and their determinants to allow theoretically grounded interventions to improve decision-making among nurses.

Key words: Nursing; Decision-making; Critical Thinking; Analytical Thinking; Intuitive Thinking; Instrument, Validation, Italian

Background

Research on decision-making has emerged from a variety of fields including economics, nursing and medicine (Johansen & O'Brien, 2015). Nursing research further explored elements important to nurse decision-making that include experience and intuition, context of the decision-making situation, knowing the patient, interpretation and reflection (Johansen & O'Brien, 2015; Tanner, 2006).

The complexity of decision-making for nurses continues to increase with increases in patient acuity and technological advances (Simmons, Lanuza, Fonteyn, Hicks, & Holm, 2003). In addition, nurse decision-making can vary significantly based on nurse practice setting (Tummers, van Merode, & Landeweerd,

2002). An understanding of nurse decision-making in the medical–surgical environment is essential for enhancing patient outcomes. A review of the literature was conducted with the goal of summarising the factors and processes identified in research on nurse patient care decisions in the medical–surgical setting Research on decision-making has emerged from a variety of fields including economics, nursing and medicine (Johansen & O'Brien, 2015). Nursing research further explored elements important to nurse decision-making that include experience and intuition, context of the decision-making situation, knowing the patient, interpretation and reflection (Johansen & O'Brien, 2015; Tanner, 2006).

The complexity of decision-making for nurses continues to increase with increases in patient acuity and technological advances (Simmons, Lanuza, Fonteyn, Hicks, & Holm, 2003). In addition, nurse decision-making can vary significantly based on nurse practice setting (Tummers, van Merode, & Landeweerd, 2002). An understanding of nurse decision-making in the medical–surgical environment is essential for enhancing patient outcomes. A review of the literature was conducted with the goal of summarising the factors and processes identified in research on nurse patient care decisions in the
medical–surgical setting

Nurses face many decisions in their daily practice that often are ethical, political, practical and clinical, challenges (1). Indeed, the decision-making process is an integral part of nursing practice and involves a series of complex decisions resulting from patients' observation and evaluation (2,3).

The decision-making process covers a strategic relevance in the nursing setting leading nurses to identify the necessary interventions to be implemented in care (4). Indeed, nurses are guided by the decision-making process in evaluating, assimilating, and/or discarding information to make judgments in clinical situations (2,6) and to meet the needs of patients and their families (4). Accordingly, decision-making allows nurses to play an active role as team members, ensuring continuity of care and patient safety (5,7). Additionally, the situations characterized by high clinical complexity and frequent use of technological solutions could increase nursing decision-making complexity (8,9).

The nursing decision-making process is generally based on analytical or intuitive thinking (5,8). Both analytical and intuitive thinking are core elements of decision-making theories (2,4). The theories based on analytical thinking (7,8) and information processing theories (7,8) have influenced nursing decision-making processes for decades. In particular, the theories based on analytical thinking proceed by a specific systematic process (i.e., cognitive continuum theory) and can be achieved through a situation analysis (i.e., Dreyfus and Dreyfus (2,18). While in the theory of information processing, the focus is the human problem solving and relies on the previous knowledge acquired by an individual on the problems and areas concerned.

To date, nursing decision-making and its theoretical perspectives are deepened by several studies (2,6,7,10-16), but few are the validated tools that measure nursing decision-making (12). Some tools concerned the issue of shared decision-making (13,15), a minority of tools assess nurses' coping strategies in decision-making (13), while most tools assess clinical decision-making skills (2,10).

However, even if some tools exist, few of them have referred to a specific theory or framework in evaluating nursing decision-making, underlining only the problem-solving ability that nurses have of this process (16).

In order to fill this gap, Lauri and Salanterä (2) had developed and validated the Nursing Decision Making Instrument, starting from the elaboration of the theories of the cognitive continuum and the theory of change of cognition by Dreyfus and Dreyfus (18). In particular, the Nursing Decision Making Instrument aimed to highlight the elements that allow the elaboration of decision-making and problem-solving in nursing practice (2).

Lauri and Salanterä developed and validated the first version of the Nursing Decision Making Instrument in 2002 (2), using 54 items to assess four decision-making stages (14 items for each stage): analytical, analytical-intuitive, intuitive-analytical, and intuitive (2). At the end of the validation process, this instrument showed good psychometric characteristics, and it was translated into English, German, Norwegian and Swedish for international data collection (2). Afterward, a shortened version of the instrument was created, comprised of 24 items and four subscales, each

with six items corresponding to the four stages of the decision-making process. For the shortened version of the instrument, cut-off points in the scores relating to the four decision-making models were defined based on normative quartiles: 25% of the responses were intuitive-interpretive, 25% were analytical-systematic, and 50% in the two middle quartiles were analytical-intuitive or intuitive-analytical, that is, quasi-rational (2).

In Italy, although the decision-making process is widely recognized to be essential in nursing care, it has received little attention, where most of the empirical evidence was principally referred to nursing students (19) or to specific clinical contexts, as oncology (20).

Developing and standardizing instruments able to grasp the elements of nursing decision-making might significantly contribute to implementing care decisions and the progression of their skills (2). Moreover, data collected by validated tools provide objective feedback on defined and advanced decisional nursing skills.

Aims

This study has two main objectives to (a) cross-culturally adapt the Nursing Decision Making Instrument in the Italian setting and (b) assess its psychometric properties.

Methods

Design

According to the recommendations of Rattray and Jones (21), a multicenter, cross-sectional, three-phase design was performed. Specifically, phase one included the validation and adaptation process. Phase two included face and content validity, while phase three was referred to assess the construct validity and psychometric testing. The study also reported in accordance with the "Enhancing the QUAlity and Transparency Of health Research" (EQUATOR) guidelines, using the "Strengthening the Reporting of OBservational studies in Epidemiology" (STROBE). Data were collected from September 2020 to January 2021.

Instrument

The Nursing Decision Making Instrument consists of 24 items questionnaire developed by Lauri and Salanterä (2) in collaboration with Bjørk and Hamilton (16). The instrument is a structured self-report questionnaire, composed in accordance with the four stages of the decision-making process, having four subscales, each composed of six items. Specifically, half of the items (odd-numbered items) were designed to measure analytical-systematic decision-making describing the nurse's capacity to seek or handle infor-

Table 1. Content validity of I-DM-scale (CVR, I-CVIs and S-CVIs) (phase 2)

	CVR	Interpretation	I-CVIs	Interpretation	S-ICVs
item 1	1.00	Relevant	1	Adequate	
item 2	1.00	Relevant	1	Adequate	
item 3	0.88	Relevant	1	Adequate	
item 4	1.00	Relevant	0.76	Adequate	
item 5	0.88	Relevant	0.76	Adequate	
item 6	0.88	Relevant	0.76	Adequate	
item 7	0.76	Relevant	1	Adequate	
item 8	0.88	Relevant	1	Adequate	
item 9	1.00	Relevant	1	Adequate	
item 10	0.88	Relevant	0.93	Adequate	
item 11	0.76	Relevant	0.93	Adequate	
item 12	0.88	Relevant	1	Adequate	
item 13	0.76	Relevant	1	Adequate	0.96
item 14	1.00	Relevant	1	Adequate	
item 15	1.00	Relevant	1	Adequate	
item 16	1.00	Relevant	0.88	Adequate	
item 17	0.88	Relevant	1	Adequate	
item 18	1.00	Relevant	1	Adequate	
item 19	1.00	Relevant	1	Adequate	
item 20	0.88	Relevant	1	Adequate	
item 21	0.88	Relevant	0.88	Adequate	
item 22	1.00	Relevant	1	Adequate	
item 23	1.00	Relevant	1	Adequate	
item 24	1.00	Relevant	1	Adequate	

Note. CVR = Content Validity Ratio; I-CVIs = Content validity Index to the items' level; S-CVI = Content validity Index to the scale level. The S-CVI was computed excluding inadequate ICVIs

mation or plan actions. On the contrary, the other half items (even-numbered items) reflected the intuitive decision-making process, generally used in situations when there is a short time to decide. The scale ranges from: "almost never," "rarely "sometimes," "often," and "almost always", using a 5-point Likert scale. Following the scoring procedure, each score has to be summed, and a low total score determines an analytic approach to decision-making, while an elevated score indicates an intuitive approach to decisions. According to Lauri and Salanterä (2) instructions, a score of 24 – 67 indicates analytical-systematic decision making, a score of 68 – 77 indicates quasi-rational decision making, and a score of 78 – 120 indicates intuitive-interpretive decision making.

Phase One: Translation and cultural adaptation

The first phase of the study aimed to realize the Italian cultural-linguistic adaptation, strictly using the methodology of Brislin's classic translation model (22) and according to other Italian cultural-linguistic validations (23). a group of certified translators, fluent in Italian and in English languages, was involved to guarantee an appropriate translation and back-translation of the instrument. Specifically, the translation process started by involving a project manager to supervise the process. Two translators separately prepared two preliminary Italian versions of instruments which have been re-back translated in English by two other bilingual translators. Lastly, the experts made a debate to ensure better cultural equivalence, identifying the possible differences between the Italian and English versions. The project manager assessed the degree of consensus using the Fleiss' Kappa' inter-rater agreement index. Then, the experts were asked to rate each item of the Italian version of the Nursing Decision Making Instrument with a Likert scale from one to five (1 = completely not agree; 5 = completely agree) and from one to four scale (1 = minimum consensus; 4 = maximum consensus) to evaluate their level of agreement. The agreement among raters higher than 0.80 indicated an adequate consensus (22,23). At the end of the discussion, the project manager endorsed the first version of the Nursing Decision Making Instrument, named I-NDMI.

Phase Two-Face and content validity

The endorsement of I-NDMI derived from phase one has been subjected to phase two to obtain its content (i.e., quantitative) and face (i.e., qualitative) validity. According to the methodology developed in the 1970s by Lawshe (24), a panel of 20 nurses experts rated each item for defining its pertinence and relevance based on the purpose of its measurement. Pertinence and relevance were assessed using a 4-point Likert scale (1 = not pertinent/not relevant; 4 = completely pertinent/relevant) to compute the content validity ratio (CVR) and content validity index (CVI). CVI was computed both for the items level (I-CVIs) and for the scale-level (S-CVI). CVR could vary between +1 and -1. A higher score shows further agreement among raters on maintaining the evaluated item on the scale. Precisely, their scores were calculated to set the content validity ratio (CVR), based on the formula "CVR = (Ne-N/2)/(N/2)", where "Ne" is the number of panelists indicating indispensable, while "N" is the total number of participants. CVR varies between +1 and -1. Hence, the content validity index (CVI) was evaluated at both items level (I-CVIs) and scale-level (S-CVI). The number of panelists judging the item as relevant (i.e., ratings ≥ 3) was divided by the total number of panelists to obtain the relevancy of each item (I-CVIs). If the items did not reach the threshold of .80 in CVR or I-CVIs indices, the items might be discharged (24,25).

To obtain face validity (qualitative validity), the authors asked the same experts to reply to three open-ended questions, which were verbatim transcribed. The questions pointed to explore the difficulty level of the wording of the translated items, the theoretical relationship between items, and the questionnaire's main purpose, and eventually debate ambivalence and misunderstandings of items. Narrative analysis on the replies to the three open questions of face validity (qualitative validity) was carried out through specific techniques of detection and analysis of the "themes" that synthesize and represent the answers (textual content analysis) (25). Any proposals for clarifications of the items were considered for improving the wording of the translation.

Phase Three-Construct validity and reliability

Once phase two was performed, a cross-sectional data collection was realized from November to De-

cember 2018, involving a nurse sample from two university hospitals in northern Italy (Pavia and Milan) and one general hospital of middle Italy (Rome), using a consecutive and convenience sampling approach. According to Beckett et al. (27) indications, the adequacy of sample size was established considering the item/-participants Hair's ratio of 1:10. As inclusion criteria, nurses had to work in adult medical, surgical, critical, and pediatric wards, providing direct patient care, and they had to be full-time employed.

Data Analysis for Construct Validity and reliability

The construct validity of the I-NDMI (phase 3) was analyzed using the framework of confirmatory factor analysis (CFA). When appropriate, the socio-demographic characteristics of responders were evaluated using descriptive statistics, using mean, standard deviation (SD), and frequencies. Based on the original theoretical dimensions (2, 6), a CFA was performed using a four-factor structure and through a multifaceted approach (30). The diagonally weighted least squares (WLSMV) estimator was employed to perform the analysis by considering the frequency distributions given by the items that showed, in some cases, a skewness higher than |1|. The WLSMV required no distributional assumptions about the observed variables, while a normal latent distribution underlying each observed categorical variable is assumed; for this reason, the WLSMV was selected for estimating the unknown parameters of the models. The following criteria were used to evaluate the model fit to the sample statistics: (a) chi-square; (b) Comparative Fit Index (CFI) (31) and Tucker and Lewis (32) incremental index: values ≥.90 or, better to .95, support a good fit; (c) Root Mean Square Error of Approximation (RMSEA) (33). Structural: values <.06 at the bottom limit of the 90% confidence interval represent a good fit, and Standardized Root Mean Square Residual (SRMSR) (34) values <.08 show a good fit. The first CFA model was unspecified (uncorrelated residuals); however, considering that some similar items could be theoretically intercorrelated, the assessment of modification indices in the first model was employed to specify a residual covariance for items 7 and 8, 1 and 10, 10 and 14; after, re-evaluating the modification indices, a third model was performed adding the specification of the residual covariance for items 2 and 22. The change in the model fit to data was evaluated for assessing the most suitable CFA solution to explain the sample statistics; the models were then compared using likelihood-ratio chi-squared tests. The internal consistency reliability for each domain and the overall scale were evaluated by the Cronbach's alpha and model-based internal consistency index (33,34).

Once confirmed the dimensionality of the scale, we synthesized the sample statistics by domains (means and SD) and presented the frequencies for each possible decision-making style: analytical for scores between 24 – 67, quasi-rational for scores between 68 – 77, rationale for scores between 78 – 120. A type I error = 0.05 was employed for all the analyses, except for CFI, RMSEA, and SRMR. IBM SPSS® Statistics for Windows version 22 (35) and Mplus 7.1 (36) software were used for the analyses.

Ethical considerations

The study was approved by the Research Review Board of each hospital involved, and it was performed following the European legal and ethical requirements for non-interventional research studies and with the International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH) guidelines. The participants were voluntarily involved, and they were fully informed about the study's purpose; written informed consent was required to participate in the study. The authors of the original instrument granted permission to proceed with the validation of the I-NDMI.

Results

Phase One-Translation and Cultural Adaptation

The process of translation and cultural adaptation did not reveal any problematic items or terms for translation purposes. Four bilingual experts had a consensus discussion to ensure the best linguistic and cultural Italian version of the scale (which lasted about 120 minutes). The agreement among raters was evaluated with an inter-rater agreement index (Fleiss' Kappa) of 0.90 (cut-off > 0.80).

Regarding translation, no differences were found between the original and the Italian translated versions. In fact, translation, back-translation, and forward translation (i.e., English and Italian) showed no significant differences between the versions. The inter-rater agreement index between nurses was 0.95.

Phase Two—Face and Content Validity

A panel of 20 experts participated in phase two to ascertain the translated scale's face and content validity. Most involved experts were females (70%, n = 14), reporting a median age of 40 years

(IRQ = 34-56). Most nurses were coordinators (n = 6), three nursing managers, and five research nurses about job titles. The following indices have been calculated from the answers expressed on the Likert scales on pertinence and relevance: Content Validity Ratio (CVR) measuring pertinence, Content Validity Index, measuring the relevance, at the level of individual items (I-CVI) and the whole instrument (S-CVI). During the first content validity round, assessed by CVR, I-CVIs, and S-CVIs emerged that item 7, item 11, and item 13 did not achieve adequate content validity (i.e., CVR I-CVIs lower than 0.70). The analysis of face validity confirmed the little comprehensibility of those items with low CVR and I-CVI. The second round of face and content validity achieved satisfactory indices (all CVRs, I-CVIs, S-CVI had scores higher than 0.75) previous modification of the Italian linguistic form of item 7, item 11, and item 13 (Table 2). Two main themes emerged from the narrative analysis to the second round of consultation on the answers from the experts: "usefulness" and "immediacy of comprehension".

Phase Three—Construct validity and reliability

Five hundred thirty-two (532) participants were enrolled in phase 3, including 190 nurses from Milan hospital, 199 nurses from Pavia hospital, and 143 nurses from Rome. Overall sample's socio-demographic characteristics and the stratification by sub-samples shows in Table 3. The study sample was 65.6% female (n = 349), whit a mean age of 40.81 (SD ± 9.91) years. The majority of the participants were clinical nurses working by shifts (n = 390; 73.3%) with a mean working experience of 16.21 (SD ± 10.43) years. Most of them had a bachelor's degree (n = 415; 78%) and working in a medical setting (n = 160;30%). As Table 4. shows, the initial unspecified CFA model (model 1) showed poor fit to the data: $\chi^2_{(246)}$ = 1593.725, p<0.001; RMSEA=0.101; 90% CI [0.097-0.106]; CFI = 0.754; TLI = 0.724; SRMR = 0.078. The modification indices were analyzed to support a strategy for the specifications, given that residuals of items could be intercorrelated as many items covered shared aspects considering the original wording. Thus, model 2 specified the residual covariance for items 7 and 8, 1 and 10, 10 and 14, showing an improved fit to the data: $\chi^2_{(235)}$ = 810.102, p<0.001; RMSEA = 0.068; 90% CI [0.063-0.073]; CFI = 0.867; TLI = 0.843; SRMR = 0.061. Finally, after another check of the modification indices, a third model added residual covariance specification for items 2 and 22, showing satisfactory fit to the data: $\chi^2_{(224)}$ = 602.551, p<0.001; RMSEA = 0.56; 90% CI [0.051-0.062]; CFI = 0.912; TLI = 0.892; SRMR = 0.055.

We found that the models explained the data differently, comparing the models by the Satorra-Bentler scaled chi-square difference test by considering the differences in degrees of freedom. For this reason, the most suitable solution was given by model 3, and standardized factor loadings of this model were reported in Table 5, as well as internal consistency reliability for domain and scale levels. These results support the use of factor scores and the total score in Italian versions of the NDMI. Table 6 shows the level of decision-making among Italian nurses. As emerged from the total sample, most of the nurses expressed intuitive thinking in decisions (n = 421; 85.9%) particularly expressed in the prevision factor (n = 438; 83.9%), while the 8.6% (n = 46) demonstrated quasi-rational thinking with a high percentage in the assessment (n = 64; 12.6%). The remaining 4.7% (n = 23) shows analytical decision-making. The individual samples per region also show this same trend of the data. Milan and Pavia present a nursing sample with an analytical decision-making (n = 171; 90%) and a higher percentage (n = 171; 90%) in the intuition and prevision factors (n = 171; 90%). Differently, the sample from Rome, although it shows a higher result in intuitive decision-making, obtains higher results in prevision (n = 106; 76.8%) and assessment (n = 94; 69.6%).

Table 2. Sociodemographic characteristics of the overall sample and split into three hospitals (N = 532)

	Overall sample (N = 532)		**Milan Hospital (n = 190)**		**Pavia Hospital (n = 199)**		**Rome Hospital (n = 143)**	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Sex								
Male	177	33.3	67	35.3	50	25.1	60	42.0
Female	349	65.6	123	64.7	149	74.9	77	53.8
Missing	6	1.1	0	0	0	0	6	4.2
Marital status								
Unmarried	196	36.8	78	41.1	72	36.2	46	32.2
Married	312	58.6	112	58.9	124	62.3	76	53.1
Missing	24	4.5	0	0	3	1.5	21	14.7
Educational level								
Base	415	78.0	163	85.8	161	80.9	91	63.6
Post-base	109	20.5	26	13.7	38	19.1	45	31.5
Missing	8	1.5	1	0.5	0	0	7	4.9
Professional role								
Manager	10	1.9	7	3.7	0	0	3	2.1
Head nurse	29	5.5	8	4.2	8	4.0	13	9.1
Shift nurse	390	73.3	156	82.1	140	70.4	94	65.7
Out of shift	94	17.7	19	10.0	51	25.6	24	16.8
Missing	9	1.7	0	0	0	0	9	6.3
Work environment								
Medical setting	160	30.0	63	33.1	58	29.1	39	27.3
Surgical setting	126	23.7	42	22.1	50	25.1	34	23.8
Critical care setting	134	25.2	60	31.6	50	25.1	24	16.8
Outpatients	51	9.6	6	3.2	24	12.1	21	14.7
Other	60	11.2	18	9.5	16	8.0	15	10.5
Missing	11	2.1	0	0	1	0.5	10	7.0
	Means	**SD**	**Means**	**SD**	**Means**	**SD**	**Means**	**SD**
Age (years)	40.81	9.91	39.26	9.39	42.08	10.32	41.13	9.75
Working experience (years)	16.21	10.43	14.40	9.61	18.31	11.72	15.65	8.84

Discussion

The primary aim of this study was to cross-culturally adapt the Nursing Decision Making Instrument in the Italian setting. In this regard, the assessment of Italian nurses' decision-making is undermined by the unavailability of validated measurements until now in the Italian context (37). Accordingly, this study described the Nursing Decision Making Instrument validation process amongst Italian nurses, testing its psychometric properties. The cross-cultural adaptation provided a good cultural and semantic equivalence. Concerning the face and content validity, the items resulted as appropriate. The CFA emerged a 4-factor model with good fit indices and high factor loadings, identifying an underpinning structure for Italian nurses' decision-making. This factor structure is in line with the different proposed theories and models of the decision-making process (2,6), for which the intuitive-interpretative approach is more in use during patients' data elaboration. In contrast, the analytic-systematic are generally used for nurses' planning of care

Table 3. The goodness of fit statistics of the three CFA models (N = 532)

	Chi-square	df	ratio chi²/df	CFI	TLI	SRMR	RMSEA
Model 1	1593.725	246	6,4	0.754	0.724	0.078	0.101
Model 2	810.102	235	3,4	0.867	0.843	0.061	0.068
Model 3	602.551	224	2,7	0.912	0.892	0.055	0.056

	Satorra-Bentler scaled chi-square difference (TRd)	Δdf	p-value
Mod1 vs. mod 2	7833.62	11	<0.001
Mod1 vs. mod 3	991.174	22	<0.001
Mod2 vs. mod3	207.551	11	<0.001

Note: Model 1 is unspecified; model 2 specified the residual covariance for items 7 and 8, 1 and 10, 10 and 14; model 3 added residual covariance specification for items 2 and 22. The comparisons between models were based on the Satorra-Bentler scaled chi-square difference test (TRd) by considering the differences in degrees of freedom (**Δ**df). All the models explained sample statistics differently (all comparisons showed p<0,001). For this reason, model 3 seemed to be the most suitable model to explain the collected, observed data.

Table 4. I-NDM scale Confirmative Factor Analysis (Phase 3) (N = 532)

	Mean	SD	Intuition	Prevision	Assessment	Planning
item1	4.08	0.91			0.437	
item2	3.30	1.05	0.301			
item3	3.52	0.98				0.497
item4	3.87	0.91	0.541			
item5	3.90	0.88	-0.562			
item6	3.75	0.82	0.494			
item7	3.60	0.91			0.505	
item8	3.81	0.81	0.484			
item9	3.71	0.89				0.488
item10	3.12	0.99			-0.378	
item11	3.83	0.78		0.500		
item12	3.69	0.75	0.498			
item13	3.79	0.86				0.598
item14	3.27	1.07			-0.425	
item15	3.80	0.95				0.616
item16	3.75	0.90		-0.587		
item17	3.82	0.87				0.634
item18	3.80	0.80		-0.539		
item19	3.76	0.87				0.636
item20	3.57	0.84		-0.469		
item21	3.83	0.80		-0.494		
item22	4.08	0.83			-0.600	
item23	3.85	0.83			-0.584	
item24	3.77	0.77		-0.534		
Cronbach's Alfa	Overall = 0.922		0.748	0.821	0.847	0.828

Table 5. Description of the level of DM, for I-DM scale and subscales, in the overall sample and three specific settings (N = 532)

				Analitical thinking		Quasi Rational thinking		Intuitive thinking	
		mean	**DS**	**n**	**%**	**n**	**%**	**n**	**%**
Overall Sample	Intuition	20.32	3.12	41	7.9	61	11.7	419	80.4
	Prevision	21.60	2.83	33	6.3	51	9.8	438	83.9
	Assessment	20.38	2.73	41	8.1	64	12.6	402	79.3
	Planning	20.70	3.11	49	9.4	62	11.9	411	78.7
	DM_tot	83.01	10.20	23	4.7	46	8.6	421	85.9
Milan Hospital	Intuition	23.70	3.23	7	3.7	12	6.3	171	90
	Prevision	23.43	3.81	11	5.8	8	4.2	171	90
	Assessment	23.13	3.41	10	5.3	13	6.8	167	87.9
	Planning	23.49	3.89	13	6.8	11	5.8	166	87.4
	DM_tot	93.76	12.87	7	3.7	6	3.2	177	93.2
Pavia Hospital	Intuition	22.43	3.21	12	6.3	24	12.5	156	81.3
	Prevision	22.30	3.54	15	7.7	18	9.3	161	83.0
	Assessment	22.12	3.31	15	8.2	26	14.3	141	77.5
	Planning	22.61	4.11	21	10.9	20	10.4	152	78.8
	DM_tot	89.42	12.11	10	5.7	16	9.2	148	85.1
Rome Hospital	Intuition	20.32	3.12	22	15.8	25	18.0	92	66.2
	Prevision	21.60	2.83	7	5.1	25	18.1	106	76.8
	Assessment	20.38	2.73	16	11.9	25	18.5	94	69.6
	Planning	20.70	3.11	15	10.8	31	22.3	93	66.9
	DM_tot	83.00	10.19	6	4.8	24	19.0	96	76.2

(16). Based on the scale dimensions, it showed that the majority of the Italian nurses expressed intuitive decision-making. This result is not in line with previous studies (6) for which nurses present quasi-rational thinking. One possible reason for this result could be linked to the scale dimensionality, which presents a few items for the analytic-systematic section then the intuitive-interpretative one (38,39). Another possible reason could probably depend on nurses' working experience. Benner et al. (38) affirmed that the clinical experience is an important predictor of intuitive-interpretative decision-making. This aspect is also in line with the results of Lauri and colleagues (6), for which the decision-making process is deeply influenced by the working experience of nurses and the development of critical thinking. In particular, the context of work modulates nurses' work experience and determine their actions (40, 41). Spiegare meglio, in che senso e in che modo c'è l'influenza del contest

Overall, decision-making is one of the most important nurse practice activities, in which the professional competencies and values mingle with personal characteristics (39). Despite the literature on the decision-making process, to date, the complete awareness of nurses' decision-making process and how it is employed in practice remains an area of lively debate (10). The combined use of intuition and evidence-based practices is the best strategy to deliver tailored nursing care, deserving a privileged place in the clinical decision-making process (10, 42).

In the Italian setting, many clinical settings still lack advanced practice and care planning (38). Nurses' perception and action of their decisions are associated with their field of practice, promoting a particular type of decision-making (39). Non chiaro il contenuto della frase.

Moreover, work organization and hierarchies are preponderant for nurses' decisions (44,45). As

emerged from the study of Nibbelink et al. (4), nurses still lack a preponderant role in decisions, particularly for their perception of this role (43,46). However, in the last years, nurses' decision-making emerged as a fundamental clinical practice component for patients' and families' outcomes (48). Moreover, situation-specific nurses' decision-making is essential in delivering safe and effective nursing care (47), such as in emergencies (49). For instance, nurses are often the decision-making activators for specific clinical situations, such as meeting patients' nutritional needs in end-of-life care (50). I-NDMI should be considered a useful tool when DM has to be assessed for educational or research purposes. Specifically, I-NDMI could help investigate the relationships between the decision-making process, professional behaviors, nursing outcomes, and competencies.

Conclusions

The Decision-making process remains one of the major challenges in nursing care, as it guides the nurses' practice and the delivery of care. This study constituted a notable advancement in the psychometric testing of the Italian Version of Nursing Decision Making Instrument. To our knowledge, this is the first study to test the theoretical dimensions and construct validity of this instrument. This research is also the first study to validate a scale on nurses' decision-making in the Italian context. Moreover, the I-NDM proved to be a valid and reliable measure of nurses' level and type of decision-making. Additionally, I-NDM proved to be applicable in clinical practice, making nurses' role in decisions more evident. This study has some limitations to declare. Although numerically adequate, the sample is a convenience one. This possibly hinders the generalizability of the results to other contexts. Given the cultural sensitivity that characterizes the decision-making, the instrument may need further analysis for other nursing cultural contexts.

Further studies are needed to define nurses' decision-making based on their level of education and competencies. Italian Nursing Decision Making Instrument should be considered a useful instrument when Decision Making has to be assessed for educational or research purposes. Specifically, the Italian instrument could help investigate the relationships between the decision-making process, professional behaviors, nursing outcomes, and competencies. Future research should identify specific decision-making processes and their determinants to allow theoretically grounded interventions to improve decision-making among nurses.

Acknowledgements: This study was funded by local research funds of the IRCCS Policlinico San Donato, a Clinical Research Hospital partially funded by the Italian Ministry of Health.

Conflict of Interest statements: All the authors declare no conflict of interest.
Funding: This study received no funding.

References

1. Johansen ML, O'Brien JL. Decision Making in Nursing Practice: A Concept Analysis. Nurs Forum. 2016;51(1):40-48.
2. Lauri S, Salanterä S. Developing an instrument to measure and describe clinical decision making in different nursing fields. J Prof Nurs. 2002;18(2):93-100.
3. Simmons B. Clinical reasoning: concept analysis. J Adv Nurs. 2010;66(5):1151-1158.
4. Nibbelink CW, Brewer BB. Decision-making in nursing practice: An integrative literature review. J Clin Nurs. 2018;27(5-6):917-928.
5. Stinson KJ. Benner's Framework and Clinical Decision-Making in the Critical Care Environment. Nurs Sci Q. 2017;30(1):52-57.
6. Lauri S, Salanterä S, Chalmers K, et al. An exploratory study of clinical decision-making in five countries. J Nurs Scholarsh. 2001;33(1):83-90.
7. Banning M. A review of clinical decision making: models and current research. J Clin Nurs. 2008;17(2):187-195.
8. Tanner CA. Thinking like a nurse: a research-based model of clinical judgment in nursing. J Nurs Educ. 2006;45(6):204-211.
9. Hardy D, Smith B. Decision Making in Clinical Practice. Br. J. Anaesth. 2008;9(1), 19-21.
10. Thompson C, Aitken L, Doran D, Dowding D. An agenda for clinical decision making and judgement in nursing research and education. Int J Nurs Stud. 2013;50(12):1720-1726.
11. Tiffen J, Corbridge SJ, Slimmer L. Enhancing clinical decision making: development of a contiguous definition and conceptual framework. J Prof Nurs. 2014;30(5):399-405.
12. Ahmad M, Abu Tabar N, Othman EH, Abdelrahim Z. Shared Decision-Making Measures: A Systematic Review. Qual Manag Health Care. 2020;29(2):54-66.

13. Isaksson U, HajdarevićS, Jutterström L, Hörnsten Å. Validity and reliability testing of the Swedish version of Melbourne Decision Making Questionnaire. Scand J Caring Sci. 2014;28(2):405-412.
14. Miller EM, Hill PD. Intuition in Clinical Decision Making: Differences Among Practicing Nurses. J Holist Nurs. 2018;36(4):318-329.
15. Bottacini A, Scalia P, Goss C. Shared decision making in Italy: An updated revision of the current situation. Z Evid Fortbild Qual Gesundhwes. 2017;123-124:61-65.
16. Bjørk IT, Hamilton GA. Clinical decision making of nurses working in hospital settings. Nurs Res Pract. 2011.
17. Harbison J. Clinical decision making in nursing: theoretical perspectives and their relevance to practice. J Adv Nurs. 2001;35(1):126-137.
18. Dreyfus HL, Dreyfus SE, Athanasiou T. Mind over machine: The power of human intuition and expertise in the era of the computer. New York: Free Press;1986
19. Canova C, Brogiato G, Roveron G, Zanotti R. Changes in decision-making among Italian nurses and nursing students over the last 15 years. J Clin Nurs. 2016;25(5-6):811-818.
20. Valcarenghi D, Bagnasco A, Aleo G, et al. Exploring the Interaction Between Nursing Decision Making and Patient Outcomes in 2 European Cancer Centers: A Qualitative Study. Cancer Nurs. 2018;41(5):E40-E49.
21. Rattray J, Jones MC. Essential elements of questionnaire design and development. J Clin Nurs. 2007;16(2):234-243.
22. Brislin RW. Back-Translation for Cross-Cultural Research. J Cross-Cult Psychol. 1970;1(3):185-216.
23. Caruso R, Arrigoni C, Groppelli K, et al. Italian version of Dyspnoea-12: cultural-linguistic validation, quantitative and qualitative content validity study. Acta Biomed. 2018;88(4):426-434.
24. Lawshe CH. Quantitative Approach to Content Validity. Pers. Psychol. 1975; 28:563- 575.
25. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. Res Nurs Health. 2007;30(4):459-467.
26. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. Nurs Health Sci. 2013;15(3):398-405.
27. Beckett C, Eriksson L, Johansson E, Wikström C. Multivariate Data Analysis (MVDA). Quality by Design. 2018;201-225.
28. Dellafiore F, Rosa D, Udugampolage NS, Villa G, Albanesi B. Professional values and nursing self-efficacy in the Italian context. Correlational descriptive study. Scand J Caring Sci [published online ahead of print, 2021 Mar 10].
29. Dellafiore F, Pittella F, Arrigoni C, et al. A multi-phase study for the development of a self-efficacy measuring scale for ostomy care nursing management. J Adv Nurs. 2020;76(1):409-419.
30. Hoyle RH. Structural equation modeling: Concepts, issues, and applications. Sage Publications, Inc; 1995.
31. Bentler PM. Comparative fit indexes in structural models. Psychol Bull. 1990;107(2):238-246.
32. Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38(1), 1–10.
33. Steiger JH. Structural Model Evaluation and Modification: An Interval Estimation Approach. Multivariate Behav Res. 1990;25(2):173-180.
34. Pavlov G, Maydeu-Olivares A, Shi D. Using the Standardized Root Mean Squared Residual (SRMR) to Assess Exact Fit in Structural Equation Models. Educ Psychol Meas. 2021;81(1):110-130.
35. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
36. Muthén LK, Muthén BO. Mplus User's Guide. Sixth Edition. Los Angeles, CA: Muthén & Muthén. (1998-2011).
37. Weber S. A qualitative analysis of how advanced practice nurses use clinical decision support systems. J Am Acad Nurse Pract. 2007;19(12):652-667.
38. Benner P, Hughes RG, Sutphen M. Clinical Reasoning, Decision making, and Action: Thinking Critically and Clinically. In: Hughes RG, ed. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); April 2008.
39. Melin-Johansson C, Palmqvist R, Rönnberg L. Clinical intuition in the nursing process and decision-making-A mixed-studies review. J Clin Nurs. 2017;26(23-24):3936-3949.
40. de Casterlé BD, Goethals S, Gastmans C. Contextual influences on nurses' decision-making in cases of physical restraint. Nursing ethics. 2015;22(6), 642–651.
41. Hagbaghery MA, Salsali M, Ahmadi F. The factors facilitating and inhibiting effective clinical decision-making in nursing: a qualitative study. BMC Nurs. 2004;3(2).
42. Pearson H. Science and intuition: do both have a place in clinical decision making? Br J Nurs. 2013;22(4):212-215.
43. Rocco G, Affonso DD, Mayberry LJ, Stievano A, Alvaro R, Sabatino L. The Evolution of Professional Nursing Culture in Italy: Metaphors and Paradoxes. Glob Qual Nurs Res. 2014 Oct 8;1:2333393614549372.
44. Hoffman K, Donoghue J, Duffield C. Decision-making in clinical nursing: investigating contributing factors. J Adv Nurs. 2004;45(1):53-62.
45. Laschinger HK, Finegan J, Shamian J. The impact of workplace empowerment, organizational trust on staff nurses' work satisfaction and organizational commitment. Health Care Manage Rev. 2001;26(3):7-23.
46. Caruso R, Pittella F, Zaghini F, Fida R, Sili A. Development and validation of the Nursing Profession Self-Efficacy Scale. Int Nurs Rev. 2016;63(3):455-464.
47. Dellafiore F, Caruso R, Arrigoni C, et al. The development of a self-efficacy scale for nurses to assess the nutritional care of older adults: A multi-phase study. Clin Nutr. 2021;40(3):1260-1267.
48. Goethals S, Dierckx de Casterlé B, Gastmans C. Nurses' decision-making in cases of physical restraint: a synthesis of qualitative evidence. J Adv Nurs. 2012;68(6):1198-1210.

49. Van den Bulcke B, Piers R, Jensen HI, et al. Ethical decision-making climate in the ICU: theoretical framework and validation of a self-assessment tool. BMJ Qual Saf. 2018;27(10):781-789.
50. Albanesi B, Marchetti A, D'Angelo D, et al. Exploring Nurses' Involvement in Artificial Nutrition and Hydration at the End of Life: A Scoping Review. JPEN. 2020;44(7):1220-1233.

Correspondence:
Received: 30 May 2021
Accepted: 30 November 2021
Correspondence:
Rosario Caruso, PhD, RN
Head of Health Professions Research and Development Unit,
IRCCS Policlinico San Donato,
Via Agadir, 20-24, 20097
San Donato Milanese, Italy.
Phone:+39 0252774940
Email: rosario.caruso@grupposandonato.it