

**ORIGINAL RESEARCH:
EMPIRICAL RESEARCH—QUANTITATIVE**

Nurses' beliefs about nursing diagnosis: A study with cluster analysis

Fabio D'Agostino¹  | Luca Pancani² | José Manuel Romero-Sánchez³  |
Iris Lumillo-Gutierrez⁴ | Olga Paloma-Castro³  | Ercole Vellone¹ | Rosaria Alvaro¹

¹Department of Biomedicine and Prevention, University of Rome Tor Vergata, Rome, Italy

²Department of Psychology, University of Milan Bicocca, Milan, Italy

³Research Group under the Andalusian Research, Development and Innovation Scheme, University of Cádiz, Cádiz, Spain

⁴Institut Català de la Salut, Primary Care Center CAP Pare Claret, Barcelona, Spain

Correspondence

Fabio D'Agostino, Department of Biomedicine and Prevention, University of Rome Tor Vergata, Rome, Italy.
Email: fabio.d.agostino@uniroma2.it

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Abstract**Aims:**

1. To identify clusters of nurses in relation to their beliefs about nursing diagnosis among two populations (Italian and Spanish);
2. to investigate differences among clusters of nurses in each population considering the nurses' socio-demographic data, attitudes towards nursing diagnosis, intentions to make nursing diagnosis and actual behaviours in making nursing diagnosis.

Background: Nurses' beliefs concerning nursing diagnosis can influence its use in practice but this is still unclear.

Design: A cross-sectional design.

Methods: A convenience sample of nurses in Italy and Spain was enrolled. Data were collected between 2014-2015 using tools, that is, a socio-demographic questionnaire and behavioural, normative and control beliefs, attitudes, intentions and behaviours scales.

Results: The sample included 499 nurses (272 Italians & 227 Spanish). Of these, 66.5% of the Italian and 90.7% of the Spanish sample were female. The mean age was 36.5 and 45.2 years old in the Italian and Spanish sample respectively. Six clusters of nurses were identified in Spain and four in Italy. Three clusters were similar among the two populations. Similar significant associations between age, years of work, attitudes towards nursing diagnosis, intentions to make nursing diagnosis and behaviours in making nursing diagnosis and cluster membership in each population were identified.

Conclusion: Belief profiles identified unique subsets of nurses that have distinct characteristics. Categorizing nurses by belief patterns may help administrators and educators to tailor interventions aimed at improving nursing diagnosis use in practice.

KEYWORDS

Beliefs, cluster analysis, nurses, nursing diagnosis, psychometrics, theory of planned behaviour

1 | INTRODUCTION

A nursing diagnosis (ND) is the clinical judgement that nurses make about individual, family, or community responses to health conditions or life processes that provides the basis for selection of nursing interventions to achieve outcomes for which the nurse is held accountable (Herdman, 2014). The implementation of NDs, as a part of the nursing process, has multiple benefits, such as, the improvement of critical thinking in nurses' clinical practice (Muller-Staub, 2009) and a greater professional identity (Axelsson, Bjorvell, Mattiasson, & Randers, 2006) and autonomy (Elizalde & Almeida Mde, 2006). Moreover, the use of NDs leads nurses to a better planning of care with an improvement of the quality of interventions and patient outcomes (Sanson, Vellone, Kangasniemi, Alvaro, & D'Agostino, 2017). Some of these outcomes are better clinical management and therapeutic adherence in chronic patients (Azzolin et al., 2013; Cardenas-Valladolid et al., 2012; Rojas-Sanchez et al., 2009) and decreased drug-related costs (Perez Rivas et al., 2016). It was also shown that NDs are associated with hospital outcomes such as patient mortality and length of hospital stay (Castellan, Sluga, Spina, & Sanson, 2016; D'Agostino et al., 2017). Despite these benefits, nurses' behaviours towards the use of ND are still unclear, thus, the use of ND is not systematic and difficulties still exist in its use (Paans, Nieweg, van der Schans, & Sermeus, 2011; Thoroddsen, Ehrenberg, Sermeus, & Saranto, 2012).

1.1 | Background

The theory of planned behaviour (TPB) is used to explain and predict human behaviours. The TPB posits that an individual's behaviour (e.g. the use of ND) is determined by the intention to perform that behaviour (e.g. the intention to use ND). In turn, the intention to perform that behaviour is determined by the individual's attitude towards that behaviour (e.g. attitude towards ND), the subjective norm (e.g. perception of social pressure to use ND) and perceived behavioural control (e.g. perception of ease or difficulty in using ND). Attitudes towards that behaviour, subjective norms and perceived behavioural controls are, respectively, determined by behavioural beliefs (e.g. beliefs about the likely consequences of using ND), normative beliefs (e.g. beliefs about the normative expectations of important other people in using ND) and control beliefs (e.g. beliefs about the presence of factors that may further or hinder the use of ND) (Ajzen, 1991).

According to a systematic review the TPB has helped the health sciences to explain and predict several healthcare provider behaviours (Godin, Belanger-Gravel, Eccles, & Grimshaw, 2008) and clearly offers the investigators a theoretically sound framework for these purposes. Regarding the nursing profession, the TPB gives a good explanation of some nurses' behaviours, such as the correct measurement of blood pressure (Nelson, Cook, & Ingram, 2014), the reporting of suspected child abuse (Bergman, Nurmi, & Alexander, 2012) and the reporting of adverse drug reactions (Angelis et al., 2017). Prior studies have already found that attitudes towards the

Why is this research needed?

- Nursing diagnoses represent the clinical judgement of nurses and are useful to a better planning of care with an improvement of the quality of nursing interventions and patient outcomes.
- Nurses' behaviour concerning the use of nursing diagnosis in practice remains unclear and practices are not systematic.
- Identifying nurses by clusters of beliefs about nursing diagnosis may be useful to provide tailored interventions.

What are the key findings?

- Six clusters of nurses were identified in Spain and four were identified in Italy. Three clusters were similar among the two populations.
- Similar significant associations between age, years of work, attitudes towards nursing diagnosis, intentions to make nursing diagnosis, behaviours in making nursing diagnosis and cluster membership in each population were identified.

How should the findings be used to influence policy/practice/research/education?

- Categorizing nurses by belief patterns may help administrators and educators to tailor interventions to improve the use of nursing diagnosis in clinical practice.
- Studies should investigate whether tailored interventions aimed at changing nurses' beliefs are useful to boost nursing diagnosis use in clinical practice.

use of ND influences ND use in clinical practice (D'Agostino et al., 2016; de Souza Guedes et al., 2013; Romero-Sanchez et al., 2013), however, it is noted that none of these studies considered behavioural, normative and control beliefs about ND use. Because behavioural, normative and control beliefs are the first and most important antecedents of individual's behaviours, they play a key role in determining individual behaviours.

Literature from the human science disciplines has shown that beliefs about human behaviours present themselves in clusters, which can be identified with cluster analysis (Brier et al., 2011; Santiago-Rivas, Schnur, & Jandorf, 2016). Cluster analysis creates a classification of entities that maximizes the between-group variation and minimizes in-group variation (Everitt, Landau, Leese, & Stahl, 2011). In cluster analysis, individuals belonging to the same cluster are the most homogeneous in terms of patterns of beliefs and the most inhomogeneous from the other identified clusters. In our case, a cluster analysis of nurses' beliefs about ND use would allow the identification of nurses whose different patterns of beliefs may generate different behaviours in using ND. Once clusters of beliefs in

nurses are identified, nurses belonging to the same cluster would share very similar characteristics that may help to identify target groups of nurses who need a different approach in case an intervention is needed.

To our knowledge, only one study has been conducted to identify typologies of nurses using cluster analysis, however, this study focused on identifying clusters of nurses' attitudes towards ND (Romero-Sanchez et al., 2014) without considering their underlying beliefs about it. To date, although studies of attitudes and behaviours towards ND have been conducted in Spain and Italy (D'Agostino et al., 2016; Romero-Sanchez et al., 2013), no study has identified patterns of nurses' beliefs about ND and no study has compared these patterns considering nurses' socio-demographic variables (i.e. age, gender, years of work, education in ND) and the dependent variables of the TPB (i.e. attitude towards ND, intention to make ND, actual behaviour in making ND). Finally, no study of this subject has compared these different populations.

2 | THE STUDY

2.1 | Aims

The aims of this study were: (1) to identify clusters of nurses in relation to beliefs about ND between two populations (Italian and Spanish); and (2) to investigate differences among clusters of nurses in each population, considering nurses' socio-demographic data, attitude towards ND, intention to make ND and actual behaviour in making ND.

3 | METHODS

3.1 | Design

A cross-sectional study.

3.2 | Sample/participants and setting

A convenience sample of nurses from two countries (Italy and Spain) was used. Italian nurses were recruited from two hospitals (a University and a general hospital) and from two long-term facilities in central Italy. All clinical nurses were included in the Italian sample. In Spain, nurses were recruited from 302 primary-care centres in Catalonia (Northeast Spain) and among the 900 members of a local primary-care scientific association. Most nurses of the Spanish sample held clinical positions (91.5%) while the rest occupied management, research or teaching positions.

3.3 | Data collection

Data were collected from May 2014 - September 2014 in Italy and from June to September 2015 in Spain. For the Italian sample, researchers recruited nurses by asking them to complete instruments at the end of their work shift to avoid work-related pressures or

time constraints. The Spanish data were collected using an electronic online format of the survey. The regional offices for primary-care management and a local primary-care scientific association sent emails to potential participants containing an information letter, a link to the survey and an invitation to participate voluntarily. Each nurse took 10–15 minutes to complete the research instruments.

3.4 | Instruments

3.4.1 | Socio-demographic questionnaire

It was designed by the research team to collect socio-demographic and professional variables of nurses such as age, gender and years worked in nursing. It also asked about education related to ND that could be expressed as: (1) highly focused on ND; (2) included ND; or (3) did not include ND.

For this study, six scales, presented below, were developed based on the TPB. The six scales were translated into Spanish and then back-translated, in accordance with the methodology of Beaton, Bombardier, Guillemin, and Ferraz (2000). All six scales underwent factorial validity and internal consistency reliability testing in this study.

3.4.2 | Behavioural beliefs scale

It was a 5-item scale to measure the nurses' behavioural beliefs about ND use. Items asked how important the respondent considered the use of ND to be for: (1) improving the quality of care; (2) facilitating the choice of appropriate interventions; (3) promoting nursing autonomy; (4) facilitating communication among nurses; and (5) not losing the human element through categorizing the patient by diagnostic labels. Participants could respond to these items using a 5-point Likert scale ranging from 1 (not important) - 5 (very important). Each participant's score was obtained by summing the response to each item. Higher scores indicated better behavioural beliefs about ND use.

3.4.3 | Normative beliefs scale

It was a 4-item scale to measure the nurses' normative beliefs about ND use. Items asked how important it was to the respondent that the following people approved the use of ND: (1) patients; (2) nurses; (3) physicians; and (4) nurse directors. The Normative Beliefs Scale used a 5-point Likert response scale ranging from 1 (not important) - 5 (very important). Each participant's score was obtained by summing the response to each item. Higher scores indicated better normative beliefs about ND use.

3.4.4 | Control beliefs scale

It was a 4-item scale to measure the nurses' control beliefs about ND use. Items asked how important the following situations were in facilitating the use of ND in practice: (1) receiving specific education

on ND; (2) using electronic nursing documentation with a clinical decision support system; (3) having awards; and (4) having institutional support. The Control Beliefs Scale used a 5-point Likert response scale, from 1 (not important) - 5 (very important). Each participant's score was obtained by summing the response to each item. Higher scores indicated better control beliefs about ND use.

3.4.5 | Attitudes scale

It was a semantic differential scale consisting of six bipolar adjective pairs (e.g. important/unimportant, useful/useless) to measure the nurses' attitudes towards ND use. A score from 1-5 was assigned to each item, where 1 represented the most negative attitude and 5 the most positive. Each participant's score was obtained by summing the response to each item. Higher scores indicated better attitudes towards ND use.

3.4.6 | Intention scale

It contained a single item to measure the nurses' intention to use ND in clinical practice. This item asked: "What is your intention to use ND in clinical practice?" The score ranged from 0 (not at all my intention to use) - 10 (very much my intention to use).

3.4.7 | Behaviour scale

It contained a single item to measure the nurses' behaviour in recording ND in their clinical practice. The item asked: "How often do you record ND in your practice?" The score ranged from 1 (never) - 5 (always).

3.5 | Ethical considerations

Before data collection, approval for the study was obtained from each site's Institutional Review Board. Participants were informed about the study's aim and signed the informed consent form. Their participation was voluntary, and data were analysed and reported in an aggregate form only.

3.6 | Data analysis

The statistical analysis was performed in four steps. First, descriptive statistics (frequency, mean and standard deviation [SD]) were used to describe the socio-demographic characteristics of the Italian and Spanish samples. Individual scores on each scale were computed as the mean of the items included in each scale.

Second, a series of preliminary confirmatory factor analyses (CFA) was conducted to investigate the factorial validity of the scales that measured behavioural beliefs, control beliefs, normative beliefs and attitudes concerning ND. The CFA evaluated the goodness of fit using the chi-square statistic (χ^2), the comparative fit index (CFI) and the root mean squared error of approximation (RMSEA). The fit of the models is considered acceptable if the chi-square is associated with a

non-significant probability value, the CFI is higher than .90 and the RMSEA is lower than .08. A CFI higher than .95 and a RMSEA lower than .05 indicate an excellent fit (Brown, 2015; Kline, 2015). Once the factorial validity was assessed, Cronbach's alphas were calculated to measure each scale's internal consistency reliability.

Third, a cluster analysis was performed using individuals' standardized scores for the behavioural, normative and control beliefs scales. This analysis was conducted separately for the Italian and Spanish samples. As suggested by Asendorpf, Borkeu, Ostendorf, and Van Aken (2001), an initial Ward's hierarchical method (Ward, 1963) allowed choice of a range of possible solutions based on the error sum of squares (ESS). Let us consider n as the number of clusters extracted in a particular solution. A strong increase in ESS between n and $n - 1$ solutions suggests that $n - 1$ cluster is too few to adequately explain population variability. Conversely, closely similar increases in ESS for n and $n + 1$ solutions suggest that $n + 1$ clusters are too many and do not add anything to the identification of typologies, making the solution less parsimonious. A K-means non-hierarchical method was then applied to each of the chosen solutions to further increase the explained ESS, moving individuals to better fitting clusters. The optimal solution was selected based on clusters interpretability and on four internal criteria: a lower value of the C-index (Hubert & Levin, 1976) and of G (+) (Rohlf, 1974), a higher value of the Gamma index (Baker & Hubert, 1975) and point-biserial correlation (Milligan, 1981) indicated a better fitting solution. The two optimal solutions (one for Italians and one for Spanish) were then compared to find out whether clusters were similar across the populations. Similarity was mathematically computed through the average squared Euclidean distance between clusters centroids (ASEDC). The literature provides no cut-offs for this index, but Bergman et al. (2012) suggested that an ASEDC lower than 0.25 indicates an acceptable degree of similarity between two clusters. The clustering techniques employed in this study are strongly affected by the presence of multivariate outliers and can be conducted only on complete data. Thus, 71 individuals (12.4%, comprising 37 Italians & 34 Spanish) were excluded from the analyses due to incomplete data or because they were detected as multivariate outliers, reducing the initial sample from 570-499 nurses.

Fourth, clusters belonging to the Italian and Spanish sample were compared to characterize each cluster in terms of age, gender, years of work, education in ND, attitude towards ND, intention to make NDs and actual behaviour in making diagnoses. Differences among the identified clusters were investigated using a one-way analysis of variance (ANOVA) with cluster membership as the independent variable. Omega squared (ω^2) was used as a measure of effect size. Post-hoc tests were conducted to highlight differences between all the possible pairs of clusters. Hochberg's GT2 was chosen as posthoc test because, compared to other tests, it has greater power with a high number of comparisons and groups with different sample sizes (Field, 2013). The characterization of clusters for categorical variables (participants' gender and education in ND) was performed with a chi-square test. Data were analysed using Sleipner 2.1 (Bergman & El-Khoury, 2002), Mplus version 7 (Muthén & Muthén, 1998-2012) and spss version 22 (IBM, 2015).

4 | RESULTS

4.1 | Participants' characteristics

The sample included 499 nurses. The main characteristics of nurses are described in Table 1. The Italian sample was composed of 272 individuals (66.5% women), with a mean age of 36.5 (*SD* 8.6). The Spanish sample comprised 227 individuals (90.7% women), with a mean age of 45.2 (*SD* 10.2). Italian nurses had a mean of 11.4 years (*SD* 9.1) worked in nursing, while Spanish nurses had a mean of 22.1 years (*SD* 10.3). The proportion of individuals who had received an education highly focused on ND was similar in the two populations (23.2% of the Italian and 23.3% of the Spanish sample), but more Italians (21.3%) than Spanish (10.6%) had received no education in ND.

4.2 | Validity and reliability testing

At CFA, factorial validity of the new developed scales (behavioural, normative and control beliefs and attitudes towards ND) resulted in an acceptable to excellent fit to the data. All scales resulted mono-dimensional with good factor loadings and supportive internal consistency reliability (Table 2).

4.3 | Cluster analysis

The initial Ward's hierarchical method yielded similar results in both populations, suggesting that the optimal number of clusters was between 4-6. In fact, as can be seen in Figure 1, solutions with three clusters or less were associated with strong increases in ESS, indicating substantial losses in explained variance; while solutions with seven clusters or more showed regular increases of ESS, indicating that the identification of further cluster was unnecessary and probably redundant.

Table 3 displays the internal criteria computed after K-means was applied to the selected solutions in both samples. Based on

TABLE 2 The fit indices of the confirmatory factor analyses performed on the beliefs and attitudes scales

Scale	χ^2	df	P-value	RMSEA	CFI	λ range	α
Behavioural beliefs	6.03	5	.304	.020	.999	.60-.91	.903
Control beliefs	5.17	2	.075	.056	.991	.46-.89	.738
Normative beliefs	3.68	2	.159	.073	.992	.57-.97	.804
Attitudes	22.21	7	.002	.066	.984	.62-.87	.893

Standardized loadings range (λ range) and Cronbach's alphas are reported in the last two columns.

RMSEA, root mean squared error of approximation; CFI, comparative fit index.

clusters interpretability and driven by the principle of parsimony, the four-cluster solution was chosen as optimal for the Italian sample. Three of the four criteria clearly suggested the six-cluster solution as optimal for the Spanish sample.

The two solutions are displayed in Figure 2. Three cluster pairs were similar across the populations, namely S5-I3 (ASEDC < 0.01), S6-I4 (ASEDC = 0.02) and S3-I2 (ASEDC = 0.17). S5 and I3 showed behavioural and control beliefs just above the average and normative beliefs just below it; this cluster pair was named "average positive beliefs." S6 and I4 showed high values in all the scales, especially in normative beliefs and was named "high positive beliefs." If the clusters in these two pairs were almost identical, the pair S3-I2 presented some differences. On one hand, behavioural and normative beliefs were just above (S3) and below (I2) the average, but their distances from it was negligible (lower than |0.25|) in both the samples, hence they were interpreted as average levels. On the other hand, both clusters showed low control beliefs, but the level of this was much lower in the Spanish sample; this cluster pair was named "average negative beliefs." Besides these three, no other pairs were found to be similar across the two populations from the ASEDC

TABLE 1 Nurses' socio-demographic and professional characteristics (*N* = 499)

	Italian sample <i>N</i> = 272		Spanish sample <i>N</i> = 227	
	Mean (<i>SD</i>); Range	<i>N</i> (%)	Mean (<i>SD</i>); Range	<i>N</i> (%)
Age (years)	36.5 (8.6); 22-60		45.2 (10.2); 23-64	
Gender				
Female		181 (66.5)		206 (90.7)
Male		91 (33.5)		21 (9.3)
Work experience as nurse (years)	11.4 (9.1); 1-40		22.1 (10.3); 0-44	
Education related to ND				
Education was highly focused on ND		63 (23.2)		53 (23.3)
Education included ND		151 (55.5)		150 (66.1)
Education did not include ND		58 (21.3)		24 (10.6)

ND, nursing diagnosis.

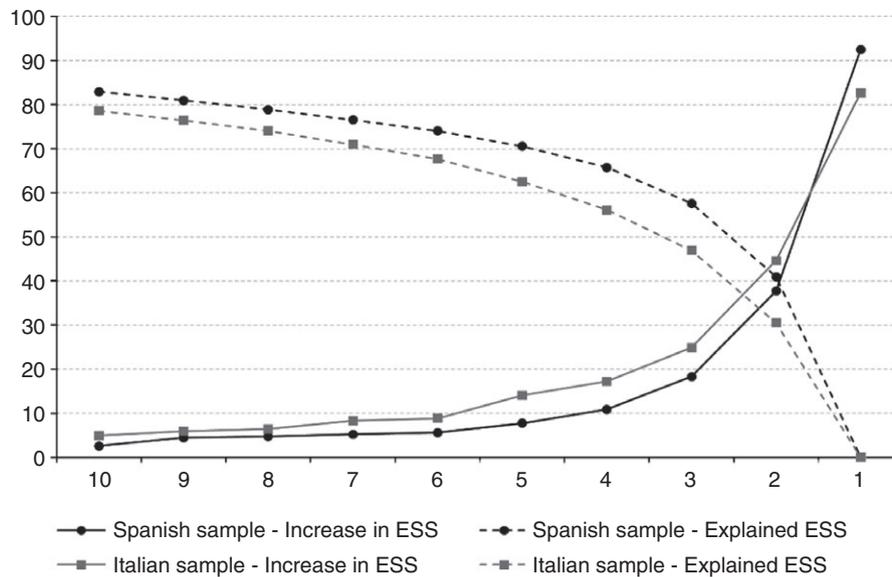


FIGURE 1 Graphical representation of the explained error sum of squares (ESS) and its increase for cluster solutions on the two population samples after the Ward's method was applied. ESS value is reported on the Y axis, the number of extracted clusters in the X axis

TABLE 3 Internal criteria and final explained ESS of the cluster solutions of the populations

	Spanish sample			Italian sample		
	Six clusters	Five clusters	Four clusters	Six clusters	Five clusters	Four clusters
C-index	.096 ^a	.114	.116	.147	.120	.104 ^a
G (+)	.026 ^a	.036	.047	.038 ^a	.048	.059
Gamma	.845 ^a	.804	.790	.767 ^a	.745	.704
Point-biserial corr.	.386	.393	.458 ^a	.382	.407 ^a	.407 ^a
Explained ESS	76.37	73.18	67.54	70.15	66.67	60.07

ESS, error sum of squares.

^aBest solution for the specific criterion in the population.

perspective. However, at a glance, clusters S1 and I1 seemed to be very similar. Both had low values for all the beliefs with the lowest values being found in the Spanish sample; this cluster pair was named "high negative beliefs." No counterparts were found for the two remaining Spanish clusters, S2 and S4.

4.4 | Cluster differences

Differences among clusters in each population were investigated. These differences concerned attitude towards ND, intention to make NDs, actual behaviour in making diagnoses, age and years of work. Results are reported in Figure 3.

In the Italian sample, ANOVAs indicated significant differences between clusters in attitudes ($F [3.268] = 33.28, p < .001, \omega^2 = .26$), intention ($F [3.268] = 26.67, p < .001, \omega^2 = .22$), behaviour ($F [3.268] = 4.56, p = .004, \omega^2 = .04$) and age ($F [3.268] = 2.86, p = .037, \omega^2 = .02$), but not in years of work ($F [3.268] = 2.42, p = .066, \omega^2 = .02$). The posthoc tests revealed that levels of attitude, intention and behaviour were generally higher for clusters with higher levels of beliefs. Similarly, age was generally lower for clusters

with higher levels of beliefs. Differences were clear, especially concerning attitude for which three distinct levels could be identified: a positive attitude level for I3 and I4, a still positive but lower level for I2 and a moderate negative attitude for I1. Italian clusters showed significant associations with both gender ($\chi^2[3] = 10.01, p = .019$) and education in ND ($\chi^2[6] = 13.18, p = .040$). Relative to gender, hypergeometric probabilities indicated that men were overrepresented (1.73 times more than expected, $p = .018$) and women underrepresented (1.58 times less than expected, $p = .045$) in cluster I1. No significant hypergeometric probabilities regarding education in ND were detected, but the majority (44.4%) of nurses with an education highly focused on ND was members of cluster I4. By contrast, members of cluster I1 were the most equally distributed among education categories: 32.3% had not received any education in ND, 38.7% had received ND education and 29.0% had received an education highly focused on ND.

Clusters of the Spanish sample were significantly different in attitudes ($F [5.221] = 30.22, p < .001, \omega^2 = .39$), intention ($F [5.221] = 27.85, p < .001, \omega^2 = .37$), behaviour ($F [5.221] = 3.86, p = .002, \omega^2 = .06$), age ($F [5.221] = 2.75, p = .020, \omega^2 = .04$) and

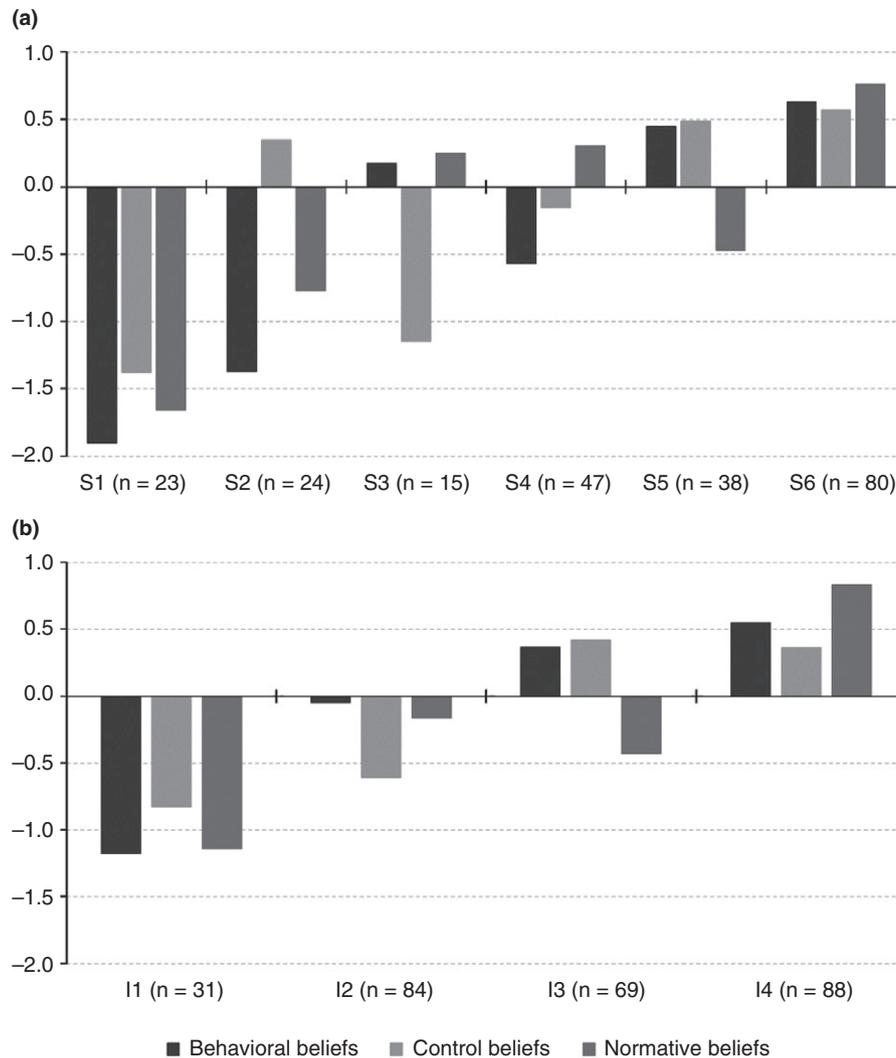


FIGURE 2 Optimal cluster solutions for the Spanish (a) and the Italian (b) samples: standardized scores of the beliefs scales are displayed for each cluster. Clusters are reported on X axis with their sample size

years of work ($F [5.221] = 2.99, p = .012, \omega^2 = .04$). Regularities comparable to those observed in the Italian sample were found among Spanish participants: attitude, intention and behaviour levels were generally higher for clusters with more positive beliefs, whereas the opposite occurred for age and years of work. Except for behaviour, every dependent variable showed the same two clusters associated with extreme values; the cluster with the most positive beliefs (S6) and the cluster with the most negative beliefs (S1). Beside these regularities, attitude towards ND and intention to make ND were the most discriminated variables by cluster membership. Cluster S5 showed an attitude level that was lower only than S6 and higher than all the other clusters; the same occurred for S4 in relation to the intention level. Moreover, a further cluster clearly stood out in terms of intention: S2 showed an intention level higher than S1 but lower than the level of all other clusters. In contrast to the Italian clusters, the Spanish clusters showed no significant differences in terms of gender [$\chi^2(5) = 3.33, p = .650$] and education in ND ($\chi^2(10) = 17.69, p = .060$).

5 | DISCUSSION

The main finding of this study was the identification of different clusters of nurses in the Italian and Spanish sample in relation to their beliefs about ND. Also, all the identified clusters showed specific characteristics that may help educators and administrators in Italy and Spain to improve the use of ND in clinical practice.

Using cluster analysis based on behavioural, normative and control beliefs, we identified four clusters in the Italian sample and six clusters in the Spanish sample. This finding suggests that in the Italian and Spanish populations there are different patterns of beliefs about ND. Different nursing education approaches, foundations of practice, fields of care and practice environments may affect the degree to which behavioural, normative and control beliefs are present in the studied individuals. Despite that, most of the sample ($N = 329$) was classified in three cluster pairs (S5-I3, S6-I4, S3-I2) that were similar across the populations.

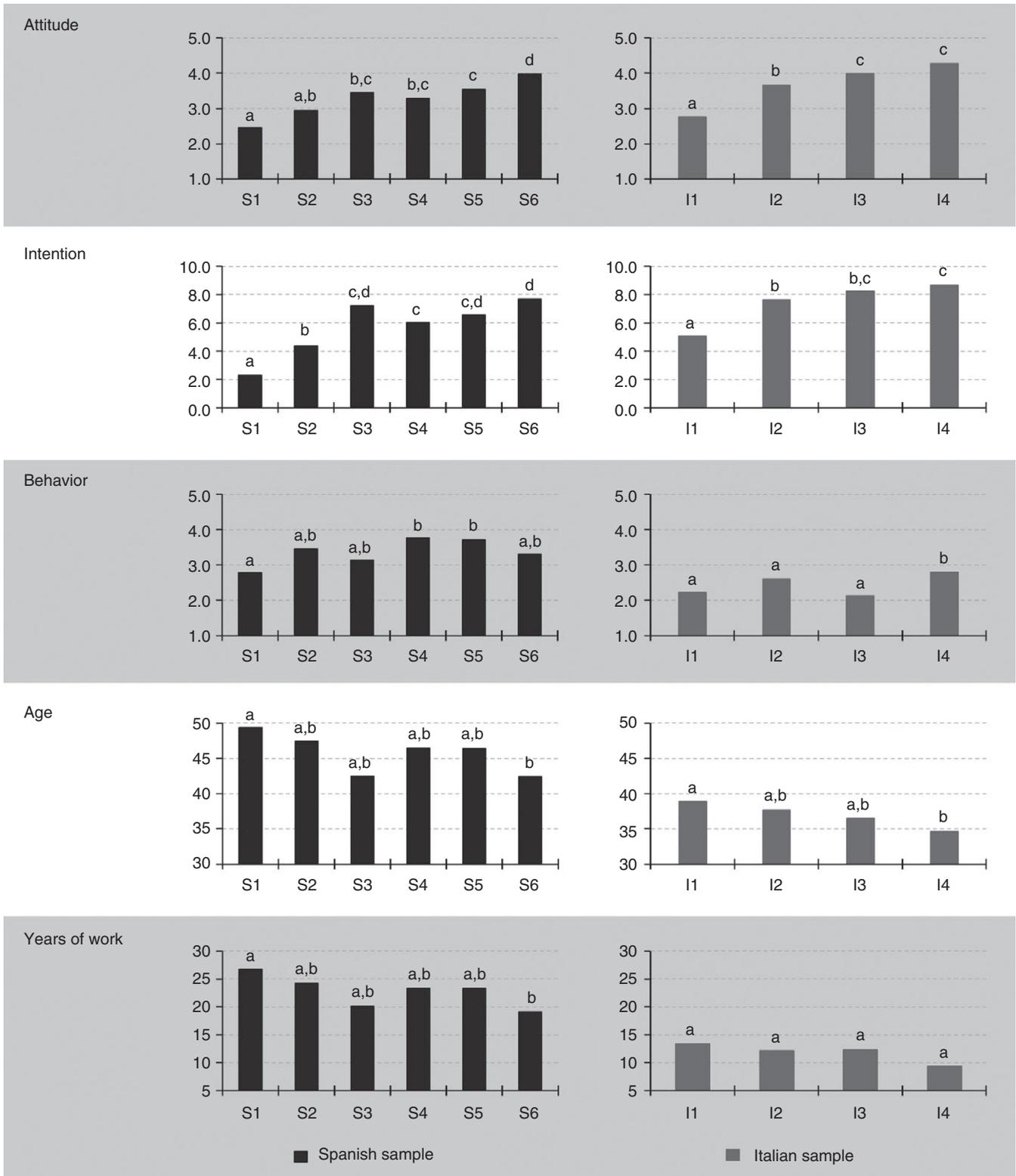


FIGURE 3 Clusters differences in the two populations: post hoc tests results. In each sample, same letters indicate non-significantly different means ($p > .05$). For example, regarding intention to make nursing diagnoses, S6 was the most positive cluster and was significantly different from S4, S2 and S1 clusters in the Spanish sample while for the Italian sample I4 was the most positive cluster and was significantly different from I2 and I1 clusters

These cluster pairs were characterized by three similar “ways” of beliefs about ND. The cluster pairs S5-I3 and S6-I4 were almost identical. The cluster pair S5-I3, which was labelled “average positive

beliefs,” had the three beliefs around the average; with positive behavioural and control just above the average and negative normative beliefs just below the average. In these clusters, nurses in

neither sample expressed a clear point of view regarding their beliefs about ND; they were mainly in a “middle” positive position. The cluster pair S6-I4, which was labelled “high positive beliefs,” was the only cluster with positive and highest belief values in all scales. It was also the pair with the highest number of nurses for each country sample. In this pair, nurses recognized as important: some advantages of using ND (e.g. improvement of the quality of care and communication among nurses), ND approval by referent individuals (e.g. patients, nurses and physicians) and that specific factors (e.g. education and electronic documentation with clinical decision support system) facilitate ND use.

The cluster pair S3-I2, which was labelled “average negative beliefs,” although similar, presented some differences that overall were not significant. In the Italian sample, all three beliefs were negative, whereas in the Spanish sample behavioural and normative beliefs were positive. However, behavioural and normative beliefs values in both samples were interpreted as average because their distance from the average was insignificant. In this pair of cluster, “middle” negative beliefs, nurses did not believe that specific factors (i.e. control beliefs) could facilitate the use of ND in practice.

Another cluster pair (S1-I1), which was labelled “high negative beliefs,” seemed very similar, although the ASEDC did not reveal this. Indeed, although the belief levels were considerably lower in the Spanish sample, the ratio among the beliefs in each cluster was very similar: behavioural beliefs were the lowest, followed by normative and then control beliefs. This was the only cluster pair with negative values for all the beliefs. These nurses consistently believed as not important: some advantages in using ND (i.e. behavioural beliefs), that specific factors facilitate ND use (i.e. control beliefs) and the approval of ND use by referent individuals (i.e. normative beliefs). In the Italian sample, this cluster had the lowest number of nurses.

The two remaining Spanish clusters (S2 and S4) had no similar clusters in the Italian sample. All four Italian clusters found their counterparts in the Spanish sample, although the ASEDC did not reveal this for the I1 cluster. This is an interesting result, showing that similar cluster beliefs exist about NDs in two different populations.

In this study, we compared the clusters identified in each population for the dependent variables of the TPB (attitude towards ND, intention to make ND, actual behaviour in making diagnosis) and nurses' socio-demographic characteristics (nurses' age, gender, years of work and education in ND). These variables might help to identify cluster membership that, according to our analysis, showed different levels of beliefs. Cluster membership may also help to identify some characteristics in each cluster that could be modified with interventions.

An interesting result was found regarding differences in the dependent variables of the TPB and nurses' socio-demographic characteristics between clusters in both populations. Different belief clusters were associated with different nurses' attitudes, intentions, behaviours, age and years of work. With the exception of actual behaviour in making NDs in the Italian sample, the findings showed a linear trend for all the dependent variables of the TPB in both populations, with lower levels of these variables in the clusters with lower beliefs and higher levels in the clusters with higher beliefs.

This trend was similar for the socio-demographic characteristics but with higher levels (i.e. older nurses, more years of work) in the cluster with lower beliefs and lower levels (i.e. younger nurses, fewer years of work) in the cluster with higher beliefs. Nurses' gender and education in ND were associated with the clusters in the Italian sample but not in the Spanish sample.

Findings of this study improve our understanding of the patterns of nurses' beliefs about NDs and the variables that characterize membership in each cluster. Previous studies were focused only on attitudes and intention towards ND and other variables such as education in ND (D'Agostino et al., 2016; da Cruz Dde, Hayashi, Oliva, & Correa, 2006; Romero-Sanchez et al., 2013). Although these variables are potential determinants of the behaviour towards ND (i.e. use of ND in practice) (Romero-Sanchez & Paloma-Castro, 2014), other variables influencing the final behaviour should be assessed according to the TPB. It was shown that educational interventions improved nurses' attitudes towards ND, but the use of ND was still perceived by nurses as difficult and demanding to perform (Leoni-Scheiber, Gothe, & Muller-Staub, 2016). Since beliefs are distal predictors of intention and actual behaviour, tailored interventions could be made to change beliefs about ND on the basis of different clusters. For example, in the Italian sample, older and male nurses, who have a lower intention and attitude, may fall into cluster I1; nurses in this cluster might need interventions to change beliefs to improve the use of ND because they showed low behaviours in making ND. Conversely, younger nurses, with higher education in ND and who have a better intention and attitude (cluster I4), might need less intensive interventions regarding beliefs because they showed high behaviours in making ND.

Interestingly, education in ND was not significant in the Spanish sample. A possible explanation of this could be that in previous studies (Romero-Sanchez et al., 2013, 2014) this variable was associated only with attitudes and not with beliefs about NDs. It seems that beliefs were not affected by education in ND and thus different educational strategies may be needed. Education should be focused not only on specific methods to improve the accuracy of NDs (e.g. clinical reasoning) (Muller-Staub, Needham, Odenbreit, Lavin, & van Achterberg, 2008) but also on showing the importance and the results of using ND both for patients and nurses through successful practical experiences. Behaviour changes in adults are affected by several factors, such as the final advantage that comes from an effort or the improvement of professional status (Pennini et al., 2016).

5.1 | Limitations

Some limitations concerning this study must be considered. First, the participants were opportunistically selected from healthcare institutions in a single region of each country. This places limitations on the ability to generalize the results. In addition, the use of a convenience sample could create bias because people not interested in participating were not represented.

Second, 12% of individuals were excluded from the analyses because of incomplete data or multivariate outliers. This reduction in

the initial sample may have affected the results and generalization of our data.

Finally, the cross-sectional nature of the study only allowed for the identification of an association rather than a clear cause and effect relationship among the behavioural, normative and control beliefs and the intention and behaviour.

6 | CONCLUSION

This study identified four clusters of nurses in the Italian and six in the Spanish population based on beliefs about ND. Similarities were present between the pairs of clusters among the two populations. The clusters showed different beliefs and significant differences in socio-demographic and TPB dependent variables.

This study showed that higher levels of beliefs were associated with generally higher levels of attitude, intention and behaviour in making ND, suggesting that the TPB is suitable for a better understanding of the factors influencing the ND use. Administrators and educators should consider beliefs about ND in the design of tailored interventions to promote the use of ND when, for example, electronic health records that use a nursing standard terminology such as ND are introduced. Further studies should investigate if tailored interventions both in clinical reasoning and in changing beliefs are useful to increase ND use in practice. Further studies in other nurse populations are also needed to see if the clusters identified in this study are similar to clusters identified in other countries. Moreover, studies should investigate the relationship among beliefs, attitude, intention and behaviour in making ND, for example, with structural equation modelling techniques, which allow to test if the variables of the TPB fit our population of interest.

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE*):

- substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content. *<http://www.icmje.org/recommendations/>

ORCID

Fabio D'Agostino  <http://orcid.org/0000-0002-4641-604X>

José Manuel Romero-Sánchez  <http://orcid.org/0000-0001-8227-9161>

Olga Paloma-Castro  <http://orcid.org/0000-0002-4225-9307>

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