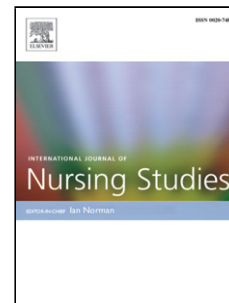# Accepted Manuscript

Title: Development and psychometric testing of the clinical learning environment, supervision and nurse teacher evaluation scale (cles+t): the spanish version

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DEVELOPMENT AND PSYCHOMETRIC TESTING OF THE CLINICAL LEARNING
ENVIRONMENT, SUPERVISION AND NURSE TEACHER EVALUATION SCALE
(CLES+T): THE SPANISH VERSION.

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DEVELOPMENT AND PSYCHOMETRIC TESTING OF THE CLINICAL LEARNING ENVIRONMENT, SUPERVISION AND NURSE TEACHER EVALUATION SCALE (CLES+T): THE SPANISH VERSION.

Abstract

Background: The Clinical Learning Environment, Supervision and Nurse Teacher Scale (CLES+T) is a reliable and valid instrument to evaluate the quality of the clinical learning process in international nursing education contexts.

Objectives: This paper reports the development and psychometric testing of the Spanish version of the CLES+T scale.

Design: Cross-sectional validation study of the scale.

Setting: 10 public and private hospitals in the Alicante area, and the Faculty of Health Sciences (University of Alicante, Spain).

Participants: 370 student nurses on clinical placement (January 2011-March 2012).

Methods: The CLES+T scale was translated using the modified direct translation method. Statistical analyses were performed using PASW Statistics 18 and AMOS 18.0.0 software. A multivariate analysis was conducted in order to assess construct validity. Cronbach's alpha coefficient was used to evaluate instrument reliability.

Results: An exploratory factorial analysis identified the five dimensions from the original version, and explained 66·4% of the variance. Confirmatory factor analysis supported the factor structure of the Spanish version of the instrument. Cronbach´s alpha coefficient for the scale was ·95, ranging from ·80 to ·97 for the subscales.

Conclusion: This version of the CLES+T instrument showed acceptable psychometric properties for use as an assessment scale in Spanish-speaking countries.

1. Introduction

Nursing is in essence a practice-based profession; consequently, clinical practice placements in health institutions form an essential component of the European undergraduate curriculum (Kajander-Unkuri et al., 2013; Salminen et al., 2010; Suhonen et al., 2009; Vizcaya-Moreno et al., 2005; Vizcaya-Moreno, 2005). European countries signatory to the Bologna Declaration are committed to restructuring their educational systems so that these become more transparent and similar, and to promoting the mobility of students, teaching and administrative in Europe. Previous research suggests that it is necessary to work cooperatively on the project of a European nursing education curriculum (De Witte et al., 2011; Johansson et al., 2010; Salminen et al., 2010; Suhonen et al., 2009). However, the concerning curricula evidence published in the scientific literature following the Bologna Declaration is limited and of little relevance in the context of nursing studies (Kajander-Unkuri 2013; Dante et al., 2013; Suhonen et al., 2009).

In accordance with the Bologna Declaration and the guidelines published by the Spanish Government in 2005 (Real Decreto 55/2005), and following a period of intense work by various institutions, the structure of nursing degree programmes has been changed (Zabalegui and Cabrera, 2009) and now consists of 240 ECTS (European Credit Transfer System) studied over the course of 4 academic years (Real Decreto 1393/2007). In compliance with

the European Directive, the clinical training component of a nursing degree in Spain now accounts for a minimum of 90 ECTS. Clinical placements are distributed throughout the degree course, although more are undertaken during the third and fourth academic years (Zabalegui and Cabrera, 2009). As a result of these recent changes, no in-depth studies of the characteristics of the clinical environment and their impact on the learning process have yet been conducted in Spain.

Historically, the Erasmus programme has enabled student nurses to undertake some of their clinical training at different universities around Europe, but it has recently been argued that there is a need to define areas of competence in the context of European nursing education (Kajander-Unkuri et al., 2013). We believe that the development of a common classification of the levels of competence required of student nurses will constitute an important step for student mobility and for clinical training and learning environment quality and research. Many instruments for evaluating the clinical learning environment have been developed in recent years, but only a few of them have been the subject of further research. Such is the case of the Clinical Learning Environment, Supervision and Nurse Teacher Evaluation Scale (CLES+T) (Saarikoski et al., 2008), which has been translated into several different languages, and used in different countries. For example, the first time in Finland (Saarikoski et al., 2008), and then in New Zealand (Watson et al., 2014), Germany (Bergjan and Hertel, 2013), Norway (Bos et al., 2012, Henriksen et al., 2012; Skaalvik et al., 2011), Holland (De Witte et al., 2011), Sweden (Johansson et al., 2010), Greece (Papastavrou et al., 2010) and Italy (Tomietto et al., 2009). Thus, the development of powerful, multilingual instruments for evaluating the quality of the clinical learning process around the world is essential. The purpose of this study was to develop a Spanish version of the CLES +T instrument and to test its psychometric properties.

2. Method

2.1. Participants

Participants were all students enrolled in the 3rd year of the nursing degree programme at the University of Alicante on clinical placement between January 2011 and March 2012 in 10 public and private hospitals in the Alicante area. Our rationale for selecting only third year students was to meet homogeneity criteria and minimize the effects of external factors, such as different level students and clinical placement planning.

Previous studies (Gaskin and Happell, 2013; Schreiber et al., 2006), have compiled guidelines for establishing the required sample size. The most important rules are: 1) minimum sample size of 100 participants; and 2) a minimum participant to variable ratio of 10:1. In order to obtain an acceptable sample size in our study for factor analysis (EFA and CFA) of the CLES+T instrument, a minimum of 340 students was required.

2.2. Instrument

The CLES+T scale consists of 34 items classified into 5 sub-dimensions: 1) pedagogical atmosphere on the ward; 2) supervisory relationship; 3) leadership style of the ward manager; 4) premises of nursing on the ward; and 5) role of the nurse teacher in clinical practice (Saarikoski et al., 2008). Items were scored using a 5-point Likert-type scale.

We also collected demographic data (gender, age) and learning-teaching data (hospital type, ward type, length of clinical placement, number of meetings with the nurse teacher, motivational level on clinical placement, level of satisfaction with the clinical placement and use of e-contact with the nurse teacher during clinical placement).

2.3. Translation of the scale

The English version was translated into Spanish following the recommendations of Behling and Law (2000), using the modified direct translation method. An expert panel of three nurse teachers translated the original instrument individually and then discussed their work

together, analyzing the different proposals until reaching consensus. Subsequently, a

translation and interpreting professional translated the Spanish version back into English.

Lastly, the authors of this paper verified the cross-cultural equivalence of the final Spanish

version; two of them had participated in the previous expert panel. This version of the scale

was then pilot tested in 2008, administering the instrument to 75 student nurses using the

same items and data collection process as employed in the present study. No modifications

were required or problems detected.

2.4. Data collection

Data were collected using the University of Alicante Virtual Campus online tool. At the end

of the first clinical placement, students were sent an email containing a web link to an

electronic version of the CLES+T scale (Spanish version), and an electronic notice was

posted on the Virtual Campus tool two weeks before the end of the data collection period. A

text explaining that data would be processed anonymously, avoiding any coercion and

implying informed consent, was included in the email invitation and in the questionnaire.

2.5. Data analysis

Descriptive statistics (frequencies and percentages) were used for the demographic and

learning process data. The reliability of the instrument was estimated with Cronbach's alpha

coefficients (α) that examine the internal consistency of the Spanish version of the instrument

and each sub-dimension. Cronbach's alpha reliability coefficient normally ranges between 0

and 1. However, α-level should be $\geq \cdot 80$ to be considered reasonably reliable (Maxim, 1999).

We performed the Kaiser-Mayer-Olkin (KMO) test and Bartlett's test of sphericity to confirm

sample and items adequacy. KMO measure should be greater than $\cdot 5$ and the significance

level (p) for Bartlett's test $< \cdot 05$ for a satisfactory factor analysis to proceed (Maxim, 1999).

In accordance with CLES+T scale validation guidelines (Saarikoski et al., 2008), EFA was

firstly used. The model was found to be different from the original version model (Saarikoski

et al., 2008), but to be the same to the model of the Swedish version (Johansson et al., 2010).

Thereby CFA was conducted to compare the two models in terms of fitness of the current

study data and to assess factorial association of our model. Using maximum likelihood

estimates, we tested both models: Model 1 according to our previous EFA results and Model

2 according to the conceptual structure of the original version of the CLES+T (Saarikoski et

al., 2008). We followed these criteria for evaluating the goodness-of-fit indexes of the

CLES+T scale: the models were assessed using the absolute fit chi-square (χ^2/DF $\leq$ 2 or 3);

the incremental fit index (IFI), the comparative fit index (CFI) and the goodness-of-fit index

(GFI) with values $>\cdot 9$ indicating acceptable fit, and $>\cdot 95$ indicating good fit (Schreiber et al.,

2006). The root mean squared error of approximation (RMSEA) with value between $<\cdot 06$ to

$\cdot 08$ (Schreiber et al., 2006).

Statistical analyses were performed using PASW Statistics 18.0.0® and AMOS 18.0.0®

software.

3. Results

3.1. Sample

Study subjects comprised a convenience sample of 370 student nurses on clinical placement

between January 2011 and March 2012 in 10 public and private hospitals in the Alicante area.

Response rate was 89·6%. All respondents were third-year students, of whom 306 (82·7%)

were female and 64 (17·3%) were male, aged between 20 to 43 years old with a mean age of

22·38 years. Half of the students were on placement in university hospitals (56·4%). Clinical

placement was undertaken on different wards (emergency 26·6%, intensive care 22·8%,

oncology 13·9%, psychiatric 10·1%, internal medicine 9·2%, surgical 8·9%, hemodialysis

6·3% and other 2·2%) for a period of 20 days (160 h) per clinical setting.

The majority (61%) of the students met with their nurse teacher about once a week during the

clinical placement; 60·8% reported being very motivated on the clinical placement and

65·1% said they were very satisfied with the clinical placement. The majority employed e-communication with the nurse teacher 1-3 times during clinical placement (63·1%), but 27·9% reported never having used it.

3.2. Internal consistency and inter-item correlations

In this study, Cronbach's alpha coefficient for the total scale was ·95, where a satisfactory score ranges from ·80 to ·97 (Table 1). Cronbach's alpha coefficient for the CLES+T categories ranged from ·77 to ·96 (Saarikoski et al., 2008). The item means varied between 3·14 and 4·37 (on a scale of 1 to 5). For factors 1-5, the corrected item-total correlation ranged from ·36 to ·92 (Table 1).

3.3. Factor analysis

Sample adequacy was confirmed by means of the KMO test (·94) and Bartlett's test of sphericity (χ^2 = 9866·96, DF = 561, p < ·001) indicating that correlations between items were large enough.

Previously an EFA identified the five dimensions from the original version and explained 66·4% of the variance. Factor 1 accounted for 20% of response variance, Factor 2 for 19·9%, Factor 3 for 12·9%, Factor 4 for 8·1%, and Factor 5 for 5·5%. Nevertheless EFA showed seven of the items loaded on different factors in the Spanish student sample compared with the Finnish student sample (Saarikoski et al., 2008). However, our results are consistent with those obtained by Johansson (2010) (Table 2).

These differences were studied through the two proposed models. Items included in Model 1 were: supervisory relationship (factor 1: items 1-8), pedagogical atmosphere on the ward (factor 2: items 9-21, 31), role of nurse teacher (factor 3: items 22-27), leadership style of the ward manager (factor 4: items 28-30) and premises of nursing on the ward (factor 5: items 32-34). Model 2 retained the structure obtained by Saarikoski et al. (2008). CFA fit indexes

of the two models are shown in Table 3; values in Model 1 indicated a good fit with the observed data.

Standardized parameter estimates are given in Figure 1. The CFA analysis revealed a strong-moderate association for item-factor relationships ($\cdot 94 \geq \lambda \geq \cdot 50$), except for item 21 which showed a weak association ($\lambda = \cdot 32$). This indicates that the latent variables can be measured by the items. According to the relationship between latent variables, the role of nurse teacher (factor 3) and the premises of nursing on the ward (factor 5) showed a moderate correlation ($\phi = \cdot 66$). The pedagogical atmosphere on the ward (factor 2) correlated moderately with the supervisory relationship (factor 1) ($\phi = \cdot 65$), the leadership style of the ward manager (factor 4) ($\phi = \cdot 55$) and the premises of nursing on the ward (factor 5) ($\phi = \cdot 52$). The correlation between the supervisory relationship (factor 1) and the role of nurse teacher (factor 3) was also moderate ($\phi = \cdot 52$). In other cases, associations among the latent variables were weak.

4. Discussion

The aim of this study was to develop and test the Spanish version of the CLES+T scale. An analysis of the data related to the Spanish student nurses' clinical placements, indicates that most of the students met with their nurse teacher about once a week and used e-communication 1-3 times during the clinical placement. They reported being very motivated and very satisfied with the clinical placement.

Focusing on this new instrument, mention that the items obtained appropriate values for internal consistency and inter-item correlations. In addition, their alpha values were comparable with those obtained for the German version (from $\cdot 82$ to $\cdot 96$) (Bergjan and Hertel, 2013), the Norwegian version (from $\cdot 85$ to $\cdot 96$) (Henriksen et al., 2012), the Dutch version (from $\cdot 80$ to $\cdot 95$) (De Witte et al., 2011), the Swedish version (from $\cdot 75$ to $\cdot 96$) (Johansson et al., 2010), the Greek version (from $\cdot 81$ to $\cdot 95$) (Papastavrou et al., 2010) and the Italian version (from $\cdot 78$ to $\cdot 95$) (Tomietto et al., 2009).

As in previous studies (Bergjan and Hertel, 2013; Henriksen et al., 2012; De Witte et al., 2011; Johansson et al., 2010; Papastavrou et al., 2010; Tomietto et al., 2009), our data confirmed the five -factor structure of the CLES+T scale (Saarikoski et al., 2008). However, Watson et al. (2014) achieved a four -factor model for their data, which combined the components of factors 1 and 2.

In the present study, the "supervisory relationship" was identified as the most significant factor in the clinical learning environment, consistent with similar results obtained in previous research on this instrument (Bergjan and Hertel, 2013; Henriksen et al., 2012; Johansson et al., 2010; Papastavrou et al., 2010; Saarikoski et al., 2008). "Pedagogical atmosphere on the ward" was the second most important factor, in agreement with the findings reported by Bergjan and Hertel (2013), Henriksen et al. (2012), Johansson et al. (2010) and Saarikoski et al. (2008).

Although our methodology adhered to the steps defined by Saarikoski et al. (2008) for the EFA, a few differences emerged that merit comment. Spanish EFA showed differences in the factors loaded compared with the Finnish sample (Saarikoski et al., 2008), and the nurse teacher factor was split into two different factors (numbers 3 and 5) in the Spanish and Swedish samples (Table 2). According to Johansson et al. (2010), the reason for this may have been that "the teacher was not employed by the clinical department and was not perceived by students as one of the staff". In this regard, we currently utilize a team supervision design (Vizcaya-Moreno, 2005), and the University employs the nurse teacher in a part- or full-time capacity (Saarikoski et al., 2013). Occasionally therefore, the role of the nurse teacher is not clearly perceived by these students (Vizcaya-Moreno, 2005). In our EFA, 3 items from factor 5 (premises of nursing on the ward) and 1 item from factor 4 (leadership style of the ward manager) loaded on factor 2 (pedagogical atmosphere on the ward). Johansson et al., (2010) obtained similar results, and Henriksen et al., (2012) have suggested

that one possible cause could be differences between theoretical dimensions. On this

occasion, we think this result could be explained by our team supervision design, but further

research would be required to confirm this possibility.

We attempted to find an explanation for these differences in factor loadings, by conducting a

CFA analysis. This indicated a suitable model fit for Model 1. Values of χ^2/DF, IFI, CFI and

RMSEA suggested an adequate fit to the data, with the exception of GFI (Schreiber et al.,

2006). On the other hand, our data did not fit Model 2, which reproduces the conceptual

structure of the original version of the CLES+T (Saarikoski et al., 2008). However, Bos et al.

(2011) validated the original instrument using CFA in primary healthcare settings and

employing the structure defined by Saarikoski et al. (2008), without reporting any problems.

4.1. Limitations of this study

In this study, we replicated the method for EFA described by Saarikoski et al. (2008); thus,

we can compare the results of both studies, despite the suggestions made by Gaskin and

Happell (2013).

Test-retest reliability is an important property for development of a scale, but it was not

assessed in this study. In addition, other validity assessments (such as convergent and

discriminant validity) should be undertaken in future research.

Lastly, since this study was conducted with third-year nursing degree students at just one

educational institution, it will be necessary to test the instrument in different settings.

Furthermore, confirmation of the instrument's generalization to, and external validity in,

other Spanish speaking countries is required.

5. Conclusion

The results of this study indicate that the Spanish version of the CLES +T scale showed

acceptable psychometric properties for evaluating student nurses' clinical placements. Further

research should be undertaken to explore the factor structure differences found in the

different CLES+T versions, in order to obtain a powerful, multilingual instrument. Therefore, cross-cultural research will be necessary to evaluate the clinical learning environment in international nursing education contexts.

Conflict of interest: The authors declared no conflicts of interest.

Ethical approval: This study was approved by the Ethics Committee of the University of Alicante (Spain). Permission to translate and test the CLES+T was granted by the copyright holder.

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Table 1 Statistics and Cronbach's alpha coefficients for Factors 1-5 of the Spanish version of the CLES+T (n=370)

	Mean Spanish CLES+T	SD (±)	Corrected item-total correlation	Cronbach's α if item deleted
Factor 1. Supervisory relationship (α= ·97)	3·87	·95	-	-
1. The supervisory relationship was characterised by a sense of trust	3·86	1·01	·88	·96
2. My supervisor showed a positive attitude towards supervision	3·96	1·06	·88	·96
3. There was a mutual interaction in the supervisory relationship	3·84	1·05	·92	·96
4. I continuously received feedback from my supervisor	3·69	1·09	·89	·96
5. The supervision was based on a relationship of equality and promoted my learning	3·94	·99	·89	·96
6. I felt that I received individual supervision	3·67	1·16	·88	·96
7. Mutual respect and approval prevailed in the supervisory relationship	4·09	·92	·80	·97
8. Overall I am satisfied with the supervision I received	3·89	1·05	·88	·96
Factor 2. Pedagogical atmosphere on the ward (α= ·92)	4·15	·63	-	-
9. The ward can be regarded as a good learning environment	4·26	·92	·78	·91
10. I felt comfortable going to the ward at the start of my shift	4·17	·97	·75	·91
11. The staff were generally interested in student supervision	3·90	1·04	·77	·91
12. The staff were easy to approach	4·29	·89	·71	·91
13. There was a positive atmosphere on the ward	4·20	·81	·72	·91
14. The staff learned to know the student by their personal name	4·21	·94	·68	·92
15. During staff meetings (e.g. before shifts) I felt comfortable taking part in the discussions	3·77	1·01	·71	·91
16. There were no problems in the information flow related to patients' care	4·05	·87	·66	·92
17. There were sufficient meaningful learning situations on the ward	4·37	·82	·62	·92
18. The ward nursing philosophy was clearly defined	4·21	·78	·63	·92
19. Patients received individual nursing care	4·24	·85	·53	·92
20. The learning situations were multi-dimensional in terms of content	4·23	·81	·55	·92
21. Documentation of nursing (e.g. nursing plans, daily recording of nursing procedures...) was clear	4·32	·76	·36	·93
31. The effort of individual employees was appreciated	3·85	·92	·60	·92
Factor 3. Role of nurse teacher (α= ·87)	3·88	·73	-	-
22. In my opinion, the NT was capable of integrating theoretical knowledge and everyday practice of nursing	4·12	·87	·72	·84
23. The NT was capable of operationalising the learning goals of this placement	3·98	·89	·76	·84
24. The NT helped me to reduce the theory-practice gap	3·88	·93	·72	·84
25. Focus of the meetings was on my learning needs	3·79	·96	·71	·84
26. In our common meetings I felt that we are colleagues	3·81	·86	·58	·87
27. The common meetings between myself, mentor and nurse teacher were comfortable experiences	3·69	1·05	·59	·87
Factor 4. Leadership style on the ward manager (α= ·86)	3·70	·98	-	-
28. The WM was a team member	3·55	1·22	·79	·75
29. Feedback from the WM could easily be considered as a learning situation	3·49	1·15	·75	·79
30. The WM regarded the staff on her/his ward as a key resource	4·06	·92	·79	·80
Factor 5. Premises of nursing on the ward appreciated (α= ·80)	3·38	1·01	-	-
32. NT was like a member of the nursing team	3·14	1·32	·64	·74
33. NT was able to give his or her pedagogical expertise to the clinical team	3·50	1·11	·67	·71
34. The NT and the clinical team worked together in supporting my learning	3·51	1·13	·64	·74

NT= Nurse Teacher; WM= Ward Manager.

Table 2 Differences between factor loadings in Saarikoski *et al.* (2008), Johasson *et al.* (2010) and the current study

Items	Saarikoski *et al.* (2008)	Johasson *et al.* (2010)	current study
18. The wards nursing philosophy was clearly defined	Factor 5	Factor 2	Factor 2
19. Patients received individual nursing care	Factor 5	Factor 2	Factor 2
21. Documentation of nursing (e.g. nursing plans, daily recording of nursing procedures...) was clear	Factor 5	Factor 2	Factor 2
31. The effort of individual employees was appreciated	Factor 4	Factor 2	Factor 2
32. The NT was like a member of the nursing team	Factor 3	Factor 5	Factor 5
33. The NT was able to give his or her pedagogical expertise to the clinical team	Factor 3	Factor 5	Factor 5
34. The NT and the clinical team worked together in supporting my learning	Factor 3	Factor 5	Factor 5

Factor 2 (Pedagogical atmosphere on the ward); Factor 3 (Role of nurse teacher); Factor 4 (Leadership style of the ward manager); Factor 5 (Premises of nursing on the ward).

Table 3 Confirmatory factor analysis fit indexes of the CLES+T (n=370)

Model[*]	χ^2 [**]	DF[**]	χ^2/DF[**]	IFI[**]	GFI[**]	CFI[**]	RMSEA[**]
Model 1	1314·55	512	2·57	·92	·83	·92	·065
Model 2	2227·32	523	4·26	·82	·71	·82	·094

*Model 1: according to the EFA results. Model 2: according to the conceptual structure of the original version of the CLES+T (Saarikoski et al., 2008).

**χ^2 = chi-square; DF = degrees of freedom; χ^2/DF = Ratio of χ^2 to DF; IFI = incremental fit index; GFI = Goodness-of-fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation.

What is already known about this topic

- The CLES+T scale was developed and published in English (Saarikoski et al., 2008).

- To date, the CLES+T scale has been translated into nine different languages, and is available in English, Finnish, Italian, Greek, Swedish, Dutch, Norwegian, German and now in Spanish.

What this paper adds

- The Spanish version of the CLES+T showed satisfactory psychometric properties.

- Once again, the "supervisory relationship" and the "pedagogical atmosphere on the ward" were found to be the most significant factors in the clinical learning environment.
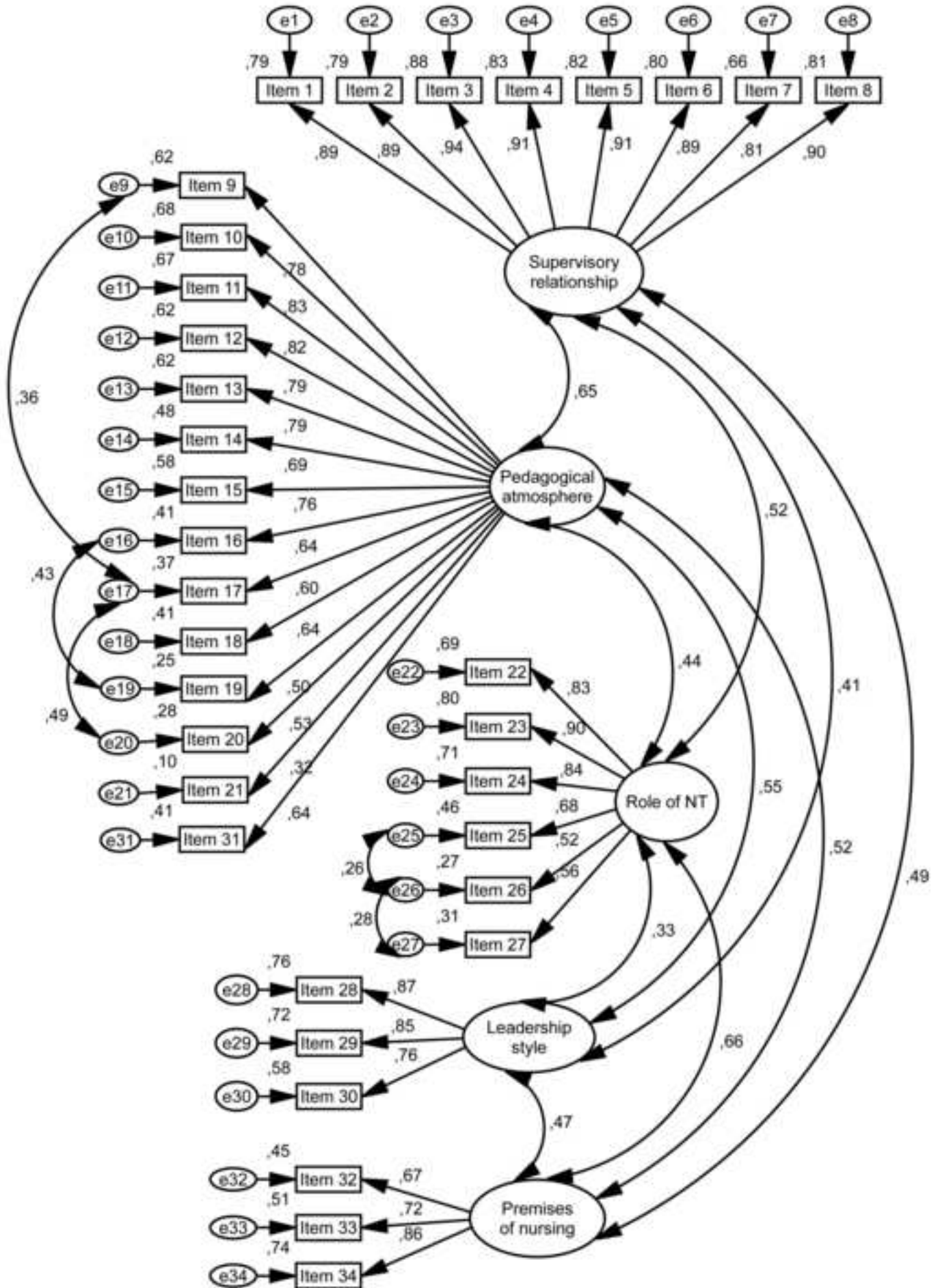
Figure 1 Path diagram for Model 1 derived by CFA. Maximum likelihood estimation. Standardized estimates for associations and residuals (e). N = 370.