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Original research article

Validating the clinical learning environment and supervision and nurse teacher scale (CLES + T scale) in Slovakia

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ABSTRACT

Aim: The application of reliable and valid tools may be helpful to evaluate the effectiveness of the clinical learning environment in nurse education and to enhance international comparison of clinical learning between European countries. The purpose of this study was to investigate the psychometric properties (internal consistency and construct validity) of the Slovak version of the Clinical Learning Environment + Teacher (CLES + T) evaluation scale, and to evaluate its usefulness in the context of clinical learning.

Design: A cross-sectional validation study.

Methods: The sample included 503 students from six Slovak universities. The structure of the instrument was computed with principal component analysis. Cronbach's alpha was calculated to measure the internal reliability of the CLES + T scale.

Results: The factor structure of the Slovak version of the CLES + T scale was in line with the original study and other studies in Western European countries. The internal consistency of the Cronbach's alpha values of five subscales of the CLES + T scale was high.

Conclusion: The Slovak version of the CLES + T is a valid and reliable tool that can be useful to assess students' evaluation of the clinical learning environment as well as the impact of clinical supervision methods on the domains of the learning environment.

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Introduction

The harmonisation of nursing educational systems and their integration with higher education are still a highly discussed area in the European Union (EU). Countries within the EU are at different development stages of educational transformation [1]. A considerable number of studies have analysed the process and outcomes of nursing education reforms in Western European countries [1–4]. The results of these studies [1–3] found wide variations in structures of preregistration nursing programs, including clinical placement organisation, in spite of attempts for compatibility of nursing education programs in the EU countries.

The clinical practice elements of preregistration nursing programs have a pivotal role in the quality assurance of education systems. Although researchers generally constantly call attention to the importance of the clinical learning environment in the quality assurance of education systems, there are fewer studies investigating clinical learning environment in the Czech and Slovak Republic. There also two studies [5, 6] that provided a comparative view of student nurse experiences of clinical learning environments in Central/Eastern EU countries. In addition, quality measures in higher education in nursing in Slovakia are targeted at the theoretical rather than the practical part of education. The quality of clinical learning is monitored mostly in fragmented and one-off measures for example by collecting subjective student feedback or assessing mentors' commitment and skills. Furthermore, the attention has been paid to assessing and monitoring cultural and professional elements to enhance organisations as multiprofessional learning environments [7]. Assessments mostly focus on analysing psychosocial aspects in students – mentor perceptions and experiences in clinical settings. Some characteristics of a clinical learning environment, such as mentorship approaches or supervision models, type and duration of clinical placement were investigated in relation to the students' satisfaction with the clinical learning environment [1, 8–15].

Several measurements for evaluating areas of the clinical learning environment have been developed [9, 10]. The Clinical Learning Environment, Supervision and Nurse Teacher (CLES + T) evaluation scale [10, 11] is one of the most commonly used tools to measure students' perceptions in European countries and has been validated in several cross-sectional validation studies [11, 13, 16–20]. This instrument is an actualised version of the previous version CLES evaluation scale [10]. The CLES evaluation scale was used in several partial cross-sectional studies in Slovakia to evaluate the effectiveness of mentorship programmes [21, 22]. However, the CLES + T had not been previously translated into the Slovak language and its psychometric properties were not examined within the Slovak nursing students' population. The objective of this study was to determine the psychometric properties of the Slovak version of the CLES + T evaluation scale. This validation study complements our previous cross-sectional study [23].

Materials and methods

To test the psychometric properties of the questionnaire, its internal consistency, factor structure and construct validity were explored. For our research we used two source studies. The first one was a study by Saarikoski et al. [24], where properties of the original version were tested. The other one was a study by Cypriot authors [20], which is the latest published European validation study of the CLES + T scale.

Study setting and sample

A convenience sample of 503 nursing students was established on the basis of defined inclusion criteria: each participant was expected to be a second or third-year student studying a Bachelor degree; and to have their clinical placement in hospital. Participants were recruited between March 2015 and November 2016 from the 6 universities in Slovakia. Researchers contacted selected universities, the study was explained, and permission for the purpose of gathering data was sought. CLES + T scale was individually administered in the last week of each student's clinical placement, or one week after a student's clinical placement. A total of 600 questionnaires were distributed to the eligible respondents in the six participating university colleges, of which 503 were returned. The overall response rate was 83.8%. The 503 participants met the criteria for a convenient sample size for a questionnaire validation analysis. The majority of respondents were female (95.4%); their mean age was 21.5 years. 49.3% respondents were in their third-year. 61% of respondents reported rotation between hospital wards during clinical practice.

Instruments

The study questionnaire consisted of two parts.

Part 1: The CLES + T scale [24] consisting of 34 items which are grouped into 5 domains. Cronbach's alpha for each of the five subscales in the original instrument ranged from 0.77 to 0.96.

Part 2: Background information and clinical practice-related variables.

Socio-demographic data including age, gender, as well as clinical practice-related variables were collected (university, academic year, type and duration of clinical placement).

Translation procedure of the Slovak version of the CLES + T scale and content validity

During the first step, we gained official approval from the authors to use CLES + T for the purpose of this study. As another step, the translation of the questionnaire to Slovak was completed. This was performed by two independent translations that created the final version, which was afterwards translated back to English and compared with the original. The items were not modified. The subsequent phase of linguistic validation was an assessment of the

Slovak version by a panel of experts consisting of five experienced nursing teachers who reviewed the relevance in the items of the Slovak translation and their applicability in a Slovak social-cultural context. The experts of Delphi Panel confirmed the relevance and content validity of the items. After linguistic validation, the Slovak version of the tool was further tested (theoretically, as a newly-formed tool) regarding its psychometric properties – factor structure and reliability.

Ethical consideration

Ethical research requirements for conducting research on human subjects were met by all of the involved six universities in the study, including the investigators' university. The students were informed in a cover letter and verbally about the purpose of the research.

Data analysis

To perform the statistical analysis, the IBM SPSS Statistics version 20.0 (IBM, Armonk, NY) was used. Psychometric analysis was performed regarding reliability and factor analysis. The items of CLES + T went through the factor analysis (factor extraction, rotation, interpretation, naming) in order to identify reduced number of common factors. In general, extracted factors obtained by exploratory factor analysis (EFA) can be considered clear, reliable and relevant if the subject ratio of the number of respondents to the number of variables in the analysed scale is 10:1 at least, i.e. the number of respondents is at least ten times higher than the number of the variables (items of the scale). Due to this, the sample of 503 students meets the criterion for adequate size for a validation study. Before the factor analysis, we checked the normality in data distribution using degree of skewness. Significance of

normal and partial correlations of the items was checked by the Kaiser-Meyer-Olkin measure (KMO) and Bartlett's sphericity test. For factor extraction, we used exploratory factor analysis. The dimensionality of the CLES + T Slovak version was confirmed by Principal Component Analysis (PCA) with varimax rotation. Regarding reliability of the research tool, we checked internal consistency with Cronbach's alpha (α_c). A $p < 0.05$ was taken to indicate statistical significance for all comparisons.

Results

Factor structure and construct validity

The structure of the CLES + T scale was tested according to the psychometric analyses published for the CLES + T in other countries [11, 20]. The Kaiser-Meyer-Olkin value was 0.93 and the Slovak version of the CLES + T evaluation scale was significant ($p < 0.001$) for Bartlett's test of sphericity. Six factors were obtained from EFA (Table 1). Results were similar to the original scale [11]. With the use of PCA we extracted six factors with their own values ≥ 1 (Table 1). Up to 66.5% of original variable variance (CLES + T items) in the checked group was explained by six-factorial solution. Variance extracted by factor 1 (supervisory relationship) was the highest (the value was 11.8 before rotation and 6.8 after rotation) and this factor also explained the biggest part of variance (32.8% before rotation and 20% after rotation). Factor loading of the items in an existent factor was in the range between 0.83 and 0.90 (Table 2). Factor loading in all items in other components was higher than 0.5. Factor 2 (role of the nurse teacher) had an eigenvalue of 4.3 (5.0 after Varimax rotation), which accounted for a response variance of 12.7% (or 14.7% after rotation). Factor 3 (pedagogical atmosphere on the ward) had an

Table 1 – Total variance by factors in the Slovak study ($n = 503$) compared to Europe

Share of factors in total variance	Supervisory relationship	Role of nurse teacher	Pedagogical atmosphere on the ward	Premises of nursing on the ward	Leadership style of ward manager	Factor 6
Eigenvalues	11.8	4.3	2.8	1.7	1.4	1.1
% of variance explained (Total = 66.5%)	32.8%	12.7%	8.4%	5.1%	4.2%	3.3%
Eigenvalues (after rotation)	6.8	5.0	3.7	2.8	2.5	1.7
% of variance explained (after rotation) (Total = 66.5%)	20%	14.7%	11%	8.4%	7.3%	5.1%
Total variance by factors in a European comparison	Supervisory relationship	Role of nurse teacher	Pedagogical atmosphere on the ward	Premises of nursing on the ward	Leadership style of ward manager	Total
Saarikoski et al. [11], Finland	40%	7%	13%	3%	4%	67%
Bergjan and Hertel [13], Germany	48%	No value	10%	6%	9%	73%
Papastavrou et al. [20], Cyprus	20.05%	17.62%	13.05%	8.8%	7.9%	67.4%
Henriksen et al. [17], Norway	35%	12%	9%	4%	4%	64%
Johansson et al. [16], Sweden	22.5%	11%	13.3%	6.1%	7.3%	60.2%
Vizcaya-Moreno et al. [19], Spain	20%	12.9%	19.9%	5.5%	8.1%	66.4%

eigenvalue of 2.8 (3.7 after Varimax rotation), which accounted for a response variance of 8.4% (11 % after Varimax rotation). Factor 4 (premises of nursing on the ward) had an eigenvalue of 1.7 (2.8 after Varimax rotation), which accounted for a response variance of 5.1% (8.4 after Varimax rotation) and Factor 5 (leadership style of the

ward manager) had an eigenvalue 1.4 (2.5 after Varimax rotation), which accounted for a response variance of 4.2% (7.3 after Varimax rotation) (Table 1). Factor 6 had an eigenvalue of 1.1 (1.7 after Varimax rotation), which accounted for a response variance of 3.3% (5.1% after Varimax rotation).

Table 2 – Clinical learning environment, supervision and nurse teacher (CLES + T scale) factor loadings (n = 503)

Items on factor 1	Supervisory relationship					
	F1	F2	F3	F4	F5	F6
Overall, I am satisfied with the supervision I received	0.90	0.06	0.18	0.09	0.10	0.04
The supervision was based on a relationship of equality and promoted my learning	0.89	0.08	0.14	0.13	0.13	0.05
There was mutual interaction in the supervisory relationship	0.89	0.11	0.15	0.10	0.11	0.02
Mutual respect and approval prevailed in the supervisory relationship	0.89	0.06	0.17	0.05	0.11	0.02
I continuously received feedback from my supervisor	0.86	0.09	0.08	0.15	0.10	0.05
I felt that I received individual supervision	0.84	0.05	0.14	0.08	0.02	0.12
My supervisor showed a positive attitude towards supervision	0.84	0.05	0.12	0.11	0.11	0.00
The supervisory relationship was characterised by a sense of trust	0.83	0.16	0.09	0.04	0.12	0.10
Items on factor 2	Role of nurse teacher (NT)					
	F1	F2	F3	F4	F5	F6
The NT and the clinical team worked together supporting my learning	0.04	0.78	0.07	0.03	0.14	0.001
Focus in the meetings was on my learning needs	0.20	0.77	0.12	0.06	0.07	0.17
The common meetings between myself, mentor and NT were a comfortable experience	0.18	0.77	0.04	0.10	0.05	0.22
The NT was capable of giving his or her pedagogical expertise to the clinical team	0.01	0.76	0.08	0.05	0.16	0.03
The NT was like a member of the nursing team	0.01	0.75	0.06	0.02	0.13	-0.03
Climate of the meetings was congenial	0.17	0.74	0.06	0.05	0.02	0.35
The NT helped me to reduce the theory practice gap	0.05	0.63	0.20	0.26	-0.04	-0.43
The NT was capable of operationalizing the learning goals of this clinical placement	0.05	0.60	0.24	0.28	0.01	-0.44
In my opinion, the NT was capable of integrating theoretical knowledge and everyday practice of nursing	0.06	0.57	0.25	0.36	0.002	-0.41
Items on factor 3	Pedagogical atmosphere on the ward					
	F1	F2	F3	F4	F5	F6
There were sufficient meaningful learning situations on the ward	0.17	0.11	0.70	0.13	0.32	-0.03
The staffs were easy to approach	0.16	0.11	0.69	0.17	0.06	0.07
The ward can be regarded as a good learning environment	0.19	0.06	0.69	0.18	0.26	0.01
I felt comfortable going to the ward at the start of my shift	0.07	0.12	0.68	0.19	-0.10	0.18
The learning situations were multidimensional in terms of content	0.17	0.11	0.66	0.06	0.29	-0.07
There was a positive atmosphere on the ward	0.21	0.14	0.51	0.28	0.05	0.25
The staffs were generally interested in student supervision	0.26	0.15	0.49	0.14	0.13	0.43
During staff meetings (e.g. before shifts) I felt comfortable taking part in the discussion	0.06	0.26	0.44	0.16	0.06	0.55
The staff got to know the students by name	0.34	0.09	0.40	0.09	0.06	0.50
Items on factor 4	Premises of nursing on the ward					
	F1	F2	F3	F4	F5	F6
There were no problems in the information flow related to patients' care	0.13	0.08	0.23	0.76	0.15	0.11
Patients received individual nursing care	0.16	0.07	0.18	0.73	0.19	0.04
Documentation of nursing (e.g. nursing plans, daily recording of nursing procedures, etc.) was clear	0.09	0.16	0.12	0.66	0.21	-0.07
The ward's nursing philosophy was clearly defined	0.17	0.14	0.28	0.64	0.21	0.08
Items on factor 5	Leadership style of ward manager (WM)					
	F1	F2	F3	F4	F5	F6
The WM was a team member	0.11	0.13	0.12	0.24	0.77	-0.02
Feedback from the WM could easily be considered a learning situation	0.19	0.14	0.15	0.13	0.75	0.08
The WM regarded the staff on her/his ward as a key resource	0.12	0.08	0.24	0.33	0.60	-0.06
The effort of individual employees was appreciated	0.22	0.17	0.16	0.16	0.57	0.24
Items on factor 6	F1	F2	F3	F4	F5	F6
	F1	F2	F3	F4	F5	F6
During staff meetings (e.g. before shifts), I felt comfortable taking part in the discussion	0.06	0.26	0.34	0.16	0.06	0.55
The staff got to know the students by name	0.34	0.09	0.30	0.09	0.06	0.50

Note: F1, factor loading of the items in factor 1 (supervisory relationship); F2, factor loading of the items in factor 2 (role of nurse teacher); F3, factor loading of the items in factor 3 (pedagogical atmosphere on the ward); F4, factor loading of the items in factor 4 (premises of nursing on the ward); F5, factor loading of the items in factor 5 (leadership style of ward manager); F6, factor loading of the items in factor 6.

Reliability (Internal consistency and reliability-item analysis)

The Cronbach's alpha of the 34-item CLES + T was 0.94, suggesting a high internal consistency for the total scale. The internal consistency of the five subscales was found to be good and within the range found in other studies (Table 3). Cronbach alphas for each of the five subscales ranged from 0.80 to 0.97, confirming good internal consistency of the scale in the current study (Table 4). Table 5 shows the results of the significant correlations between the CLES-T subscales.

Table 3 – Internal consistency in a European comparison

Study	Range of internal consistency (Cronbach's alpha)
Slovakia	0.80–0.97
Saarikoski et al. [11], Finland	0.73–0.94
Bergjan and Hertel [13], Germany	0.82–0.96
Papastavrou et al. [20], Cyprus	0.81–0.96
Henriksen et al. [17], Norway	0.85–0.96
Johansson et al. [16], Sweden	0.75–0.96
Vizcaya-Moreno et al. [19], Spain	0.80–0.97
Warne et al. [1], 9 Western European countries	0.83–0.96

Table 4 – Descriptive, internal consistency and reliability of the Slovak version

Item	Mean	SD	Corrected item – total correlation	Cronbach's alpha if item deleted
Supervisory relationship				
<i>8 items, Cronbach's alpha 0.97</i>				
Overall, I am satisfied with the supervision I received	3.11	1.52	0.696	0.93
The supervision was based on a relationship of equality and promoted my learning	2.94	1.50	0.709	0.93
There was mutual interaction in the supervisory relationship	3.02	1.48	0.703	0.93
Mutual respect and approval prevailed in the supervisory relationship	3.04	1.50	0.667	0.93
I continuously received feedback from my supervisor	2.89	1.48	0.669	0.93
I felt that I received individual supervision	2.69	1.46	0.622	0.93
My supervisor showed a positive attitude towards supervision	3.04	1.39	0.631	0.93
The supervisory relationship was characterised by a sense of trust	2.65	1.46	0.661	0.93
Role of nurse teacher				
<i>9 items, Cronbach's alpha 0.90</i>				
The NT and the clinical team worked together supporting my learning	3.20	1.16	0.44	0.93
Focus in the meetings was on my learning needs	3.10	1.17	0.56	0.93
The common meetings between myself, mentor and NT were a comfortable experience	3.06	1.16	0.53	0.93
The NT was capable of giving his or her pedagogical expertise to the clinical team	3.20	1.17	0.43	0.93
The NT was like a member of the nursing team	3.13	1.24	0.38	0.93
Climate of the meetings was congenial	2.63	1.22	0.50	0.93
The NT helped me to reduce the theory practice gap	3.52	1.09	0.40	0.93
The NT was capable of operationalizing the learning goals of this clinical placement	3.76	1.05	0.43	0.93
In my opinion, the NT was capable of integrating theoretical knowledge and everyday practice of nursing	3.81	1.09	0.45	0.93
Pedagogical atmosphere on the ward				
<i>9 items, Cronbach's alpha 0.85</i>				
There were sufficient meaningful learning situations on the ward	3.49	1.10	0.57	0.93
The staffs were easy to approach	3.53	1.03	0.51	0.93
The ward can be regarded as a good learning environment	3.36	1.11	0.56	0.93
I felt comfortable going to the ward at the start of my shift	3.39	1.09	0.41	0.93
The learning situations were multidimensional in terms of content	3.48	1.03	0.51	0.93
There was a positive atmosphere on the ward	3.42	1.03	0.53	0.93
The staffs were generally interested in student supervision	2.93	1.19	0.53	0.93
During staff meetings (e.g. before shifts), I felt comfortable taking part in the discussion	2.88	1.31	0.41	0.93
The staff got to know the students by name	2.30	1.42	0.46	0.93
Premises of nursing on the ward				
<i>4 items, Cronbach's alpha 0.81</i>				
There were no problems in the information flow related to patients' care	3.67	1.08	0.51	0.93
Patients received individual nursing care	3.50	1.11	0.49	0.93
Documentation of nursing (e.g. nursing plans, daily recording of nursing procedures, etc.) was clear	3.78	1.15	0.44	0.93
The ward's nursing philosophy was clearly defined	3.46	1.04	0.55	0.93
Leadership style of ward manager				
<i>4 items, Cronbach's alpha 0.80</i>				
The WM was a team member	3.67	1.17	0.46	0.93
Feedback from the WM could easily be considered a learning situation	3.41	1.18	0.49	0.93
The WM regarded the staff on her/his ward as a key resource	3.82	1.06	0.47	0.93
The effort of individual employees was appreciated	3.19	1.08	0.51	0.93

Table 5 – Correlations between the CLES-T subscales

	Pedagogical atmosphere on the ward	Leadership style of ward manager	Premises of nursing on the ward	Supervisory Relationship	Role of nurse teacher
Scale	0.799	0.668	0.673	0.779	0.670
Pedagogical atmosphere on the ward		0.515	0.551	0.478	0.395
Leadership style of ward manager			0.539	0.375	0.347
Premises of nursing on the ward				0.340	0.380
Supervisory relationship					0.262

Note: Correlation is significant at the 0.01 level.

Discussion

The use of a reliable and valid tool such as the CLES + T is useful for the evaluation of efficiency of organisational and cultural factors of clinical supervision on the subjective perception of clinical environment by nursing students [20]. The CLES + T scale was translated into 23 languages and used in over 40 countries. CLES + T validation in a European context occurred between 2007 and 2009. The psychometric properties of this widely used instrument are well established and compared in a series of studies predominantly for Western European samples [11, 13, 16–20]. However, CLES + T validation in new EU countries has not been published yet. The Slovak version of the CLES + T scale was investigated according to the same psychometric analysis as the original version [11]. A psychometric analysis was needed for two reasons [13]. The instrument could be implemented to evaluate the effectiveness of clinical supervision methods [13] or organisation of clinical practice in Slovakia.

In that study, the Slovak version of the CLES + T scale showed good validity and reliability. The results support the conclusions from several studies [11, 13, 16–20, 25], which have applied the CLES + T to other European countries.

The Cronbach's alpha values of five subscales of the CLES + T scale demonstrated good internal reliability and were comparable to the existing results of Western European countries (Table 3). Six factors were determined from EFA. A five-factor model was confirmed as the most coherent one [11]. The six-factor model included an extra factor with the items of 6–9 of pedagogical atmosphere subscale. However, the first two items had similar loading in two factors, while three items (7–9), had a more significant loading on the sixth factor. Involving the sixth factor was meaningless regarding the conceptual view and did not allow any factor interpretation or characteristics.

In this study, only two items (3 and 6) loaded similarly on the 'pedagogical atmosphere' factor and on the sixth factor. Both items loaded >0.40 on the 'pedagogical atmosphere' factor. Because items' loading only just missed 0.5 and also doesn't detract from the reliability, we left it in the 'pedagogical atmosphere' factor. Due to this reason, we decided on a five-factor solution that is supported by previous studies.

Factor structure was similar to other studies in Europe, namely in Cyprus [20], Spain [19], Finland [11] and Norway [17].

The 'supervisory relationship' factor explaining the biggest part of variance was identified as the strongest one, followed by the 'role of the nurse teacher' factor. When comparing ours with previous validation studies, we can state differences in the second factor. The supervisory relationship was found to be the strongest one with the highest variance percentage and factor loading of the items in most validation studies [11, 13, 16, 17, 19, 20]. It is interesting that the second most significant factor in the studies was the 'pedagogical atmosphere' in the clinical environment.

It is interesting that the subcategory of the 'role of nurse teacher' was identified as the second factor for the learning environment of Slovak students. This factor had higher *eigenvalue* and percentage of variance in this study than in the more recent international studies [11, 16, 19]. Only in the Cypriot [20] and the Norwegian version [17] was 'role of nurse teacher' identified as the second factor in sequence. 'Role of the nurse teacher' had an eigenvalue of 4.3 (5.0 after Varimax rotation), which accounted for a response variance of 12.7% (or 14.7% after rotation) in this study. In the Cypriot study [20], the subcategory of 'role of nurse teacher' accounted for a response variance of 11.02% (or 17.61% after rotation), and in the Norwegian study [17] this subcategory accounted for a response variance of 12%. It should be mentioned that the 'role of nurse teacher' has been identified as a more significant factor than 'pedagogical atmosphere' in mentioned studies. The subcategory of 'pedagogical atmosphere' was identified as the second factor in the Finnish [11], Swedish [16], German [13] and Spanish [19] sample of nurse students. Moreover, in the Italian version [25] the 'pedagogical atmosphere' was identified as the strongest factor. Differences in results of factor analyses between countries could be explained by wide variations in clinical placement organisation or by inconsistency in the determination of the responsibility for clinical education between countries. In addition, there are many differences in supervisory models in Slovakia, varying from a traditional model of group supervision provided by nurse teachers to individual supervision provided by certified mentors. However, the traditional model of the role of nurse teacher in Slovakia is

that the nurse teacher teaches both in clinical practice and in university.

Conclusion

The results of psychometric analysis of the Slovak version of CLES + T are consistent with the extant literature and previous studies, and they also indicate that the Slovak version has the potential of being a valid, reliable instrument for monitoring the quality of clinical learning environment.

Conflict of interest

The authors declare no conflicts of interest.

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