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Students' Self-assessed Competence Levels during Nursing Education Continuum – A Cross-sectional Survey

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Abstract:
During nursing education, nursing students are required to develop their competence to be able to fulfill their duties safely as Registered Nurses. The aims of this study were to explore 1) nursing students' self-assessed competence levels during education 2) the relationship with competence and frequency at which competencies are utilized in clinical practice, and 3) factors related to competence levels. 841 (response rate 67.6 %) nursing students responded to the Nurse Competence Scale in a cross-sectional study. The self-assessed overall competence levels were improving during the education continuum (VAS-means 1st 56.6; 2nd 58.3; 3rd 59.8 and 3.5th -year students 68.4). Every group revealed a significant positive correlation with competence and frequency at which competencies are utilized in clinical practice in clinical placement. Risk factors for low competence were also identified. Systematic multimethod competence evaluations with longitudinal designs are needed to monitor outcomes of nursing education.

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Changes in health care place new demands on the profession of nursing as well as upon nursing education. For instance, changes in the population, new medical technological solutions, increasing work place diversity, and nurse shortages lead to increased demands regarding nurses' competence (World Health Organization [WHO], 2016) Nursing students (hereafter referred to as *students*) are expected to improve their professional competence to fulfil their duties as Registered Nurses upon graduation.

Competence has been described as "the ability to perform the task with desirable outcomes under the varied circumstances of the real world" (Benner, 1984, p. 304). In this study, competence is defined as "functional adequacy and capacity to integrate knowledge and skills to attitudes and values into specific contextual situations of practice" (Meretoja, Leino-Kilpi, & Kaira, 2004b, p. 330–331). Students need self-assessment skills to be able to identify their continuous professional development and learning needs during education. Therefore, self-assessment of competence should start from the initiation of nursing education and be established across the educational continuum (Kajander-Unkuri et al., 2016; Kajander-Unkuri, Salminen, Saarikoski, Suhonen, & Leino-Kilpi, 2013).

Since nursing competency is related to patient safety, quality of nursing care, and professional standards (Fukada, 2018), it is important to explore students' competence levels during nursing education. The examination of students' competence levels throughout their education continuum is essential for developing educational curricula and supervision in clinical placements.

Background

Educators and health care employers have both recognised gaps between education and practice (Scott-Tilley, 2008). In Europe, after the modernizing Directive 2005/36/EC (Recognition of Professional Qualifications) and Directive 2013/55/EU (European Commission [EC], 2005, 2013), the curricula of nursing education have become competence-based. Common competence requirements for nurses in the European Union mentioned in

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Article 31 (EC 2013) include: (a) interpersonal skills; (b)) assessing the quality of nursing; (c) nursing skills and patient care; (d) teaching and supervising patients, their families, colleagues and nursing students; and, (e) management of care and leadership in nursing (Kajander-Unkuri, 2015).

When planning this study, instruments developed to measure competence for practicing nurses with validated psychometric properties (Cowan, Wilson-Barnett, Norman, & Murrells, 2008; Liu, Kunaiktikul, Senaratana, Tonmukayakul, & Eriksen, 2007; Meretoja, Isoaho, & Leino-Kilpi, 2004a) and the Nurse Competence Scale (NCS) were found to be the most widely used competence instruments (Flinkman et al., 2017). The competence categories in the NCS originated from Benner's competency framework (Meretoja et al., 2004a). The NCS has also been used in different clinical settings nationally and internationally, including use with second-year students (Strandell-Laine et al., 2018) and graduating nursing students (hereafter referred to as *GNSs*) (Kajander-Unkuri et al. 2016; 2014). The competence categories of the NCS cover all competence requirements of European Union Directive except *interpersonal skills* (Kajander-Unkuri, 2015).

Contact with patients is suggested to be of great importance contributing to satisfaction and positive outcomes for patients, students, and professionals (Feo, Rasmussen, Wiechula, Conroy, & Kitson, 2017; Suikkala, Koskinen, & Leino-Kilpi, 2018). Capturing the perspective of real patients across the educational continuum offers insights that cannot be identified through other means. In general, patients think highly of being involved in learning process of students (Suikkala et al., 2018.) This can challenge both clinical placements and educational institutions to respond to the need to prepare students to work in partnership with patients across all contexts of health care (Henriksen, Löfmark, Wallinvirta, Gunnarsdóttir, & Slettebø, 2019; Scammell, Heaslip, & Crowley, 2016). Students need support in the development and sustainment of patient relationships and should be given opportunities to reflect with their mentors, teachers, and peers during clinical placement to facilitate this process (Suikkala & Leino-Kilpi, 2005). When the clinical placement is regarded as a setting for the promotion of patient-centered learning, it can enable students to establish relationships with patients (Suikkala, Kivelä, & Käyhkö, 2016; Suikkala & Leino-Kilpi, 2005).

The previous research exploring competence during education has mainly focused on the clinical assessment of students during their clinical placements (Wu, Enskär, Lee, & Wang, 2015) or assessed students' competence near graduation (Lejonqvist, Eriksson, & Meretoja, 2016). Based on the recent reviews, few studies have focused on competence assessments in other phases of nursing education. Competence of students has generally only been evaluated near graduation (Lejonqvist et al., 2016; Wu et al., 2015), where students have self-assessed their competence as acceptable (Gardulf et al., 2016; Kajander-Unkuri et al., 2014; Theander et al., 2016). Factors which positively related to higher competence of GNSs include the pedagogical atmosphere in the clinical learning environment and supervision during clinical placements (Kajander-Unkuri et al., 2014); and, work experience in health care (Gardulf et al., 2016; Kajander-Unkuri et al., 2014). The frequency at which competencies are utilized in clinical practice has been reported to positively correlate with new nurses' higher level of competence (Hengstberger-Sims et al., 2008; Lima, Newall, Jordan, Hamilton, & Kinney, 2016).

The research exploring holistic and comprehensive competence evaluation during the education continuum seems to be lacking in the nursing literature. Students' professional development starts from the first study day and continues throughout the education. The results of this cross-sectional study can be used for verifying the outcomes of education and support the development of student competencies during the education continuum. This study explored the following specific aims:

1. measure students' self-assessed competence levels during education
2. analyse the relationship with competence and frequency at which competencies were utilized in clinical practice
3. examine the factors related to competence levels

Methods

Design and sample

The study used a cross-sectional survey design. The EU directives 2005/36/EC and 2013/55/EU (EC 2005; 2013; University of Applied Sciences Act 1419, 2014, December 18) regulate the content of education in Finland (bachelor's degree, 3.5 years). The education is carried out in universities of applied sciences (UAS). If a student possesses a previous professional qualification as a practical nurse, she/he is able to complete nursing studies in 3 years. A total of 1,244 students were invited to undertake self-assessments of their competence level during the 1st (n = 508), 2nd (n = 428), and the last (n = 308) year of their education from six purposefully selected UASs

representing geographically the whole country. The inclusion criteria for a student included: (a) the student was in the 1st, 2nd or the last year of the education; (b) Finnish speaking; (c) voluntary; (d) able to provide informed consent; and, (e) be practicing in clinical placement at the time of the study. Altogether, 841 students (response rate 67.6 %) completed the questionnaire.

Instrument and data collection

The Nurse Competence Scale (NCS; Meretoja et al., 2004a) contains 73 items distributed in seven competence categories. Competence is assessed using a visual analog scale (VAS 0–100 [0 = low level of competence; 100 = high level of competence]). Across settings, the relevance of the competencies is assessed by measuring the frequency at which competencies are utilized in clinical practice from 0 to 3 (0 = not applicable; 3 = used very often) (Meretoja et al., 2004a.) Recent review shows satisfactory evidence of validity and reliability of the NCS instrument with newly graduated and experienced practicing nurses (Flinkman et al., 2017). In this study, the Cronbach's alpha coefficient for the NCS categories ranged from 0.82–0.94.

Data was collected using an electronic questionnaire between March 2015 and May 2016 during students' clinical placements. The contact teachers in the UASs sent the internet link of the questionnaire to students as they enrolled in the last two weeks of their clinical placements. The contact teachers also sent two reminders messages to complete the questionnaire.

Ethical considerations

The Ethics Committee of the University Hospital of Helsinki and Uusimaa reviewed the research plan according to ethical principles (185/13/03/01/2014, 13.08.2014). Each of the six UASs gave permission to conduct the study. All participants signed informed consents to participate in the study. Anonymity, confidentiality and the right to interrupt participation in the study at any time were guaranteed.

Data analysis

Before the data analysis, the respondents were grouped into four groups based on their responses of their study year (i. e. 1st, 2nd, 3rd and 3.5th year groups). The data were described using descriptive statistics and analysed with inferential statistics using the SPSS 22.0 (SPSS Inc., Chicago, USA) software. Statistical significance was set at p-value ≤ 0.05.

Mean scores were calculated for all NCS categories in all year groups. To compare the mean scores of the year groups, one-way analysis of variance (ANOVA) with post hoc tests (Tamhane test or Tukey test) were used. Dependencies between sum variables were examined using Spearman and Pearson's correlation coefficient.

To examine dependencies between background variables and sum variables, multifactor ANOVA with main effects was used. Dependence between background variables and sum variables was further analyzed with Sidak adjusted pairwise comparisons or with parameter estimates. All sum variables were divided into two groups using lower quartile as a cut point. Stepwise binary logistic regression analysis was used to find out which are risk factors for lower competence.

Results

Out of 1,244 students, 841 participated in the study (response rate 67.6 %). About two-fifths were 1st-year students and one-third were 2nd-year students. Little over one-fourth were at the end of their education. (Table 1).

Table 1: Characteristics of sample.

Characteristics	1st year (n = 361–362)		2nd year (n = 249)		3rd year (n = 132)		3.5th year (n = 98)	
	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)

Age (years)	27.7 (8.5)	29.0 (9.1)	30.0 (9.9)	34.3 (9.0)
Gender				
Female	317 (87.6)	222 (89.2)	115 (87.1)	89 (90.8)
Male	45 (12.4)	27 (10.8)	17 (12.9)	9 (9.2)
Previous professional qualification (yes)	198 (54.7)	144 (57.9)	71 (53.7)	70 (69.4)
Work experience in health care before education (yes)	162 (44.8)	128 (51.4)	70 (53.0)	61 (62.2)
Experience of caring for ill family member (yes)	159 (43.9)	145 (58.2)	87 (65.9)	70 (71.4)
Duration in weeks of clinical placement				
≤ 5 weeks	317 (87.6)	198 (79.5)	82 (62.1)	13 (13.3)
> 5 weeks	44 (12.2)	51 (20.5)	50 (37.9)	85 (86.7)
Clinical placement				
Inspiring	318 (87.8)	214 (85.9)	121 (91.7)	95 (96.9)
Frustrating	44 (12.2)	35 (14.1)	11 (8.3)	3 (3.1)
Being assigned a specific patient during work shift in clinical placement (yes)	112 (30.9)	119 (47.8)	75 (56.8)	55 (56.1)
Having enough time for the patient (yes)	296 (81.8)	209 (83.9)	113 (85.6)	79 (80.6)
Supported in patient relationship by				
mentor	326 (90.1)	231 (92.8)	117 (88.6)	91 (92.9)
fellow student	72 (19.9)	43 (17.3)	30 (22.7)	16 (16.3)
teacher	50 (13.8)	28 (11.2)	16 (12.1)	9 (9.2)
someone other	62 (17.1)	33 (13.3)	17 (12.9)	23 (23.5)

Students' self-assessed competence levels

The students' self-assessed overall level of competence was good among 1st, 2nd, 3rd and 3.5th year groups (VAS means 56.6; 58.3; 59.8; 68.4, respectively). In all groups, the self-assessments were highest in the category *Helping role* and lowest in *Therapeutic interventions*. The only statistically significant difference in competence levels was found between 3.5th-year students and students in their 1st ($p < 0.001$), 2nd ($p < 0.001$), and 3rd year ($p = 0.004$). (Table 2).

Table 2: The level of competence.

Year/Competence category	1st year (n = 353–361)		2nd year (n = 244–249)		3rd year (n = 126–132)		3.5th year (n = 90–96)		Cronbach's alpha
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	(n = 841)
Helping role									0.82
Q	68.2	17.5	69.7	15.8	70.2	16.4	76.2	14.5	
F	2.5	0.3	2.4	0.3	2.5	0.3	2.6	0.3	
Teaching-coaching									0.94
Q	57.9	20.0	60.4	17.9	60.9	18.5	68.3	21.0	
F	2.3	0.4	2.3	0.4	2.3	0.4	2.4	0.4	
Managing situations									0.90
Q	55.9	22.3	57.7	21.2	59.5	20.0	67.2	21.7	
F	2.2	0.5	2.2	0.5	2.1	0.5	2.3	0.5	
Diagnostic function									0.87
Q	55.8	21.3	58.3	18.9	60.3	18.6	70.6	20.5	

F	2.2	0.4	2.2	0.4	2.2	0.4	2.4	0.4	
Ensuring quality									0.87
Q	55.7	21.8	56.9	20.8	59.5	18.4	68.0	22.4	
F	2.1	0.5	2.1	0.4	2.1	0.5	2.2	0.5	
Work role									0.94
Q	52.5	19.7	53.7	19.3	56.0	18.1	65.7	21.2	
F	2.3	0.4	2.2	0.3	2.3	0.4	2.4	0.4	
Therapeutic interventions									0.92
Q	49.9	22.8	51.1	21.6	52.0	21.6	62.5	23.0	
F	2.1	0.4	2.1	0.4	2.1	0.4	2.3	0.4	
Overall competence									0.98
Q	56.6[a]	20.8	58.3[b]	19.4	59.8[c]	18.8	68.4	20.6	
F	2.2	0.3	2.2	0.3	2.2	0.3	2.4	0.3	

level of competence: low (0–25), rather good (>25–50), good (>50–75), and very good (>75–100); Q = VAS mean, F = mean of frequency of action.
a: differs statistically significantly from 3.5th year; $p < 0.001$, b: differs statistically significantly from 3.5th year; $p < 0.001$, c: differs statistically significantly from 3.5th year; $p = 0.004$.

At the category level, the mean scores increased in every group. The highest increase in every competence category was during the last half year of education (Figure 1). The highest increase during education was in *Diagnostic functions* (14.8 VAS points). The highest increase among 3.5th-year students was in *Therapeutic interventions* (10.5 VAS points) (Table 2). The competence of 3.5th-year students was significantly higher in every competence category.

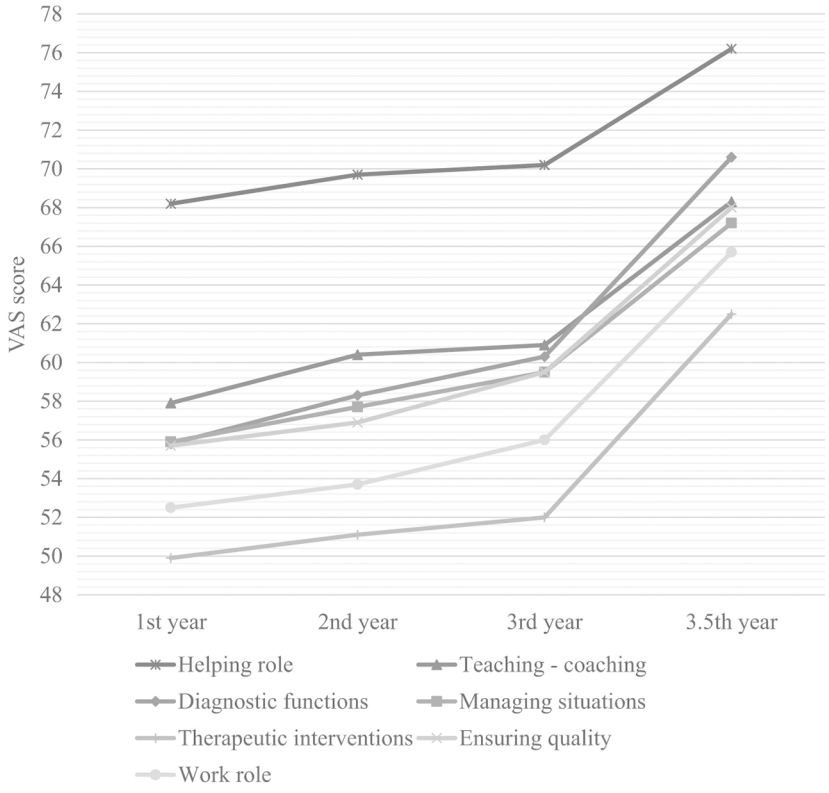

Figure 1: The level of competence in competence categories during education.

Relationship with competence level and frequency at which competencies are utilized in clinical practice

In all competence categories, the 1st, 2nd, 3rd year students reported occasional use of competencies in clinical placement (M = 2.2). The 3.5th-year students reported very frequent use of competencies in clinical placement (M = 2.4). The most frequent use of competencies (M > 2.5) were found in the category of *Helping role* for 1st, 3rd and 3.5th year students. Somewhat lower use of competencies (M = 2.1) were found in the categories *Managing*

situations (3rd year students), *Ensuring quality* (1st, 2nd and 3rd year students) and *Therapeutic interventions* (1st, 2nd and 3rd year students) (Table 2).

The category level mean scores of every group revealed a statistically significant positive correlation between competence level and frequency at which competencies are utilized in clinical practice. Pearson's r-values ranged from 0.199 to 0.630 ($p < 0.001$–0.040) indicating strong correlation ($r > 0.5$) between the competence and frequency at which competencies are utilized in clinical practice in the categories of *Helping role* (1st, 2nd and 3rd year), *Teaching-coaching* (every group) and *Therapeutic intervention* (3.5th year).

Background factors related to competence levels of students

In the 1st year group, students having working experience in health care before education (44.7 %) assessed themselves as more competent (59.8 ± 3.3 vs. 49.8 ± 3.1, mean ± SD, $p < 0.001$). The difference was also statistically significant in every competence category (Table 3). In addition, if the duration of clinical placement was under 5 weeks (87.6 %), students assessed themselves as more competent, (57.9 ± 2.8 vs. 51.7 ± 3.7, $p = 0.036$). The difference was also statistically significant in four competence categories (Table 3).

Table 3: Background factors and their dependence with competence categories in every year group.

The competence-related factor	Significant dependence with competence category	
	1st-year students	***p***
Work experience in health care before nurse education	Helping role	< 0.001
	Teaching-coaching	< 0.001
	Diagnostic functions	< 0.001
	Managing situations	< 0.001
	Therapeutic interventions	< 0.001
	Ensuring quality	0.001
	Work role	< 0.001
Duration of clinical placement ≤ 5 weeks	Diagnostic functions	0.002
	Therapeutic interventions	0.038
	Ensuring quality	0.029
	Work role	0.033
Inspiring clinical placement	Helping role	0.002
Supported by mentor in patient relationship	Teaching-coaching	0.028
Supported by some other in patient relationship	Ensuring quality	0.032
	Work role	0.027
	2nd-year students	***p***
Work experience in nursing	Diagnostic functions	0.013
Duration of clinical placement > 5 weeks	Managing situations	0.036
Being assigned a specific patient during clinical placement	Diagnostic functions	0.015
	Therapeutic interventions	0.004
	Ensuring quality	0.009
	Work role	0.043
	3rd-year students	***p***
Previous professional qualification	Helping role	0.036
	Teaching-coaching	0.013
	Diagnostic functions	0.001
	Managing situations	0.006
Duration of clinical placement > 5 weeks	Helping role	0.030
Supported by some other in patient relationship	Helping role	0.028
	Teaching-coaching	0.001
	Diagnostic functions	0.005
	Managing situations	0.016

	Therapeutic interventions	0.036
	Ensuring quality	0.019
	Work role	0.005
	3.5th-year students	***p***
Previous professional qualification	Helping role	0.035
Work experience in health care before nurse education	Helping role	0.030
Work experience in nursing	Managing situations	0.028
Being assigned a specific patient during clinical placement	Work role	0.041

In the 2nd-year group, students assigned a specific patient who they cared for during work shifts in clinical placement (47.8 %) assessed themselves as more competent (57.8 ± 4.0 vs. 52.6 ± 3.8, $p = 0.019$). The difference was statistically significant also in four competence categories (Table 3). In the 3rd-year group, students having previous professional qualification (53.7 %) assessed themselves as more competent (68.7 ± 4.9 vs. 59.0 ± 5.0, $p = 0.012$). The difference was also statistically significant in four competence categories (Table 3). No statistically significantly competence-related factors were found in the 3.5th-year group.

Stepwise binary logistic regression analysis revealed that there were several risk factors for low competence in every competence category in every student group. All of the risk factors were related to low competence levels in different competence categories during different phases of education. However, only one: if student was not assigned a specific patient who she/he cared for during work shifts in clinical placement, was related to low competence levels in every competence category during education (Table 4).

Table 4: Risk factors for low level of competence.

NCS sum variables	**1st year**		**2nd year**		**3rd year**		**3.5th year**	
and background factors	**OR**	***p*-value**	**OR**	***p*-value**	**OR**	***p*-value**	**OR**	***p*-value**
Helping role								
No working experience in health care before education	3.434	<0.001	–	–	–	–		–
No mentor's support in patient relationship	–	–	0.298	0.015	–	–	–	–
Not being assigned a specific patient during work shift	–	–	–	–	4.974	<0.001	–	–
Teaching – coaching								
No working experience in health care before education	2.122	0.004	–	–	–	–	–	–
Long clinical placement	1.399	0.032	–	–	–	–	–	
No mentor's support in patient relationship	0.363	0.006	0.306	0.017	–	–	–	–
Not being assigned a specific patient during work shift	–	–	1.913	0.038	–	–	–	–
Diagnostic functions								
Long clinical placement	1.507	0.005	–	–	–	–	–	–
No mentor's support in patient relationship	0.477	0.040	0.349	0.040	–	–	–	–
Not being assigned a specific patient during work shift	–	–	–	–	–	–	3.778	0.043
Managing situations								
No working experience in health care before education	1.884	0.011	–	–	–	–	–	–
Long clinical placement	1.480	0.012	–	–	–	–	–	–
Not being assigned a specific patient during work shift	–	–	2.739	0.002	–	–	–	–
No experience of caring for ill family member	–	–	1.942	0.038	–	–	3.167	0.043

Therapeutic interventions								
Long clinical placement	1.590	0.002	–	–	–	–	–	–
Not being assigned a specific patient during work shift	–	–	3.338	<0.001	2.984	0.014	–	–
No experience of caring for ill family member	–	–	–	–	–	–	4.081	0.030
Short clinical placement	–	–	–	–	–	–	0.636	0.036
Ensuring quality								
Long clinical placement	1.711	0.001	–	–	–	–	–	–
Not being assigned a specific patient during work shift	–	–	2.415	0.006	2.690	0.035	–	–
Work role								
No working experience in health care before education	2.395	0.001	–	–	–	–	–	–
Long clinical placement	1.454	0.018	–	–	–	–	–	–
Not being assigned a specific patient during work shift	–	–	2.860	0.001	–	–	–	–
No experience of caring for ill family member	–	–	1.947	0.031	–	–	–	–
No mentor's support in patient relationship	–	–	0.324	0.041	–	–	–	–

Discussion

Students' overall self-assessed competence levels were found to increase every year. The difference between 3rd and 3.5th-year graduating students' competence levels is noteworthy. Considering the measurement points are very close each other and students in both groups are near graduation, the statistically significant difference between competence levels was 8.6 VAS points. Based on the results, the higher competence level among 3.5th-year students indicates a positive competency trend and potentially a marker of a good outcome of nursing education.

In this study, the overall self-assessed competence levels of the 1st-year and 2nd-year students are slightly higher than those reported for the competence level of 2nd-year students in a recent RCT-study using the NCS (Strandell-Laine et al., 2018). While the data sets of this study and that of Strandell-Laine et al. (2018) were collected at the end of students' clinical placements, participants in Strandell-Laine et al.'s (2018) study were practicing in university hospitals where competence requirements are generally higher. In our study, clinical placements included primary care settings and centrals hospitals. This sampling difference should be taken into consideration when comparing the findings of these two studies. Our results related to graduating 3rd and 3.5th year students' competence levels are comparable with an earlier study exploring GNSs using the NCS instrument (Kajander-Unkuri et al., 2014).

Graduating 3.5th-year students' own assessment of their overall competence level was surprisingly high when compared to self-assessments of experienced practicing nurses (Meretoja, Numminen, Isoaho, & Leino-Kilpi, 2015; Numminen, Meretoja, Isoaho, & Leino-Kilpi, 2013) and recently qualified nurses (Lima et al., 2016; Numminen, Leino-Kilpi, Isoaho, & Meretoja, 2017). It is commonly known that students' perceptions of their own competence level may be unrealistically high (Gardulf et al., 2016; Kajander-Unkuri et al., 2016; Theander et al., 2016). One reason might be that systematic self-assessment of competence is lacking during formal education. The NCS instrument could be used as a tool for continuous competence assessment during education continuum. Further, students should be given realistic opportunities to practice their self-assessments skills.

In every year group, the highest level of self-assessed competence was reported in *Helping role* category. This is in line with previous NCS studies with 2nd-year students (Strandell-Laine et al., 2018) and GNSs (Kajander-Unkuri et al., 2014; Lima, Newall, Kinney, Jordan, & Hamilton, 2014). In Gardulf et al. (2016, 2019) and Theander et al. (2016) recent studies, GNSs assessed themselves to be most competent in tasks regarding to direct, individualized patient care, and that they are committed to nursing ethics. These descriptors are similar to the content of the *Helping role* category. The lowest level of competence in every year group was reported in *Therapeutic interventions*, which includes competencies like planning patient care interventions and decision-making concerning patients' clinical situation. Decision-making skills need to be strengthened during in clinical and

theoretical education. Students need clinical placements settings which challenges students' independence, responsibility, critical thinking, decision-making, and ability to use evidence-based knowledge (Manninen, 2014).

This is the first study that reports the frequency of NCS competence use during clinical placements. The frequency at which competencies are self-reported by students in clinical practice was relatively high already from the initiation of the education. Based on our results, students self-reported practicing most of the items of the NCS during their clinical placements. The frequency at which competencies are utilized in clinical practice had a positive correlation with every competence category in every student group. Competencies that students self-assessed high or very high level were more frequently used in clinical placement than the competencies the students self-assessed at lower levels.

The length of clinical placement was related to competence, but not in a systematic way. Among 1st year students, those with less than 5 weeks' clinical placement were more competent than those having longer placements. In Finland, during the 1st year, clinical placement is traditionally approximately 5 weeks. More than 50 % of 1st-year students reported having previous professional qualification and nearly 50 % reported work experience in health care before education, which was related in a statistically significant fashion to all competence categories during 1st year of education. It might be that students with previous professional qualification and previous experience assessed their competence at a higher level. In our study, students found their clinical placements inspiring. The results of a recent review highlighted the importance of successful clinical placement in students' professional growth (Järvinen, Eklöf, & Salminen, 2018). A positive clinical learning environment has also found to improve competence as it improves learning (van Rooyen, Jordan, Ten Ham-Baloyi, & Caka, 2018).

In this study, while the response rate was adequate (67.6 %), and the participants were non-randomly selected. However, the participants represent a third of the UASs in Finland and the sample is likely comparatively representative of the population of Finnish students, when compared against the demographic data of students and geographical location of the UASs (Ministry of Education and Culture, 2016). Further work to examine the international generalizability of the findings remains to be investigated. To date, the NCS has been tested with practicing nurses (Flinkman et al., 2017) and GNSs (Kajander-Unkuri et al., 2014; 2016) and 2nd-year students (Strandell-Laine et al., 2018). In this study, the NCS was used for the first time for a cross-sectional survey during the education. The results of this study support previous research in this domain (Kajander-Unkuri et al., 2014; 2016), including that the NCS instrument can be used to evaluate the competence level of students. However, the categories of *Therapeutic interventions* and *Work role* develop at work; students cannot practice them without supervision during clinical placements. There is also a risk of self-assessment bias which might influence the validity of the assessments. It is possible that the students' positive view of their own competence could be partly unrealistic and uncritical.

Conclusion

These results from students, with the knowledge of previous studies, could promote discussion on how to improve the content and methods of curricula and learning and supervision in clinical placements to develop students' competence. Students' self-assessed competence was found to improve over time, particularly during the last half year of their education continuum. Students would benefit being assigned a specific patient during work shifts and having mentors' support in patient relationship in clinical placements. During students' education continuum, the systematic self-assessment of competence of students should be used and NCS instrument could be a tool for measuring competence assessment. Finally, a prospective longitudinal study is needed to further develop and evaluate students' competence during their respective study period, including times of transition, where a nursing student becomes a professional nurse. A cross-cultural study using different European countries to obtain a better understand competence variation across Europe would also be important for future consideration.

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