



The level of competence of graduating nursing students in 10 European countries—Comparison between countries

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Abstract

Aim: To analyse graduating nursing students' self-assessed competence level in Europe at graduation, at the beginning of nursing career.

Design: An international cross-sectional evaluative design.

Methods: Data were collected in February 2018–July 2019 from graduating nursing students in 10 European countries. Competence was assessed with a validated instrument, the Nurse Competence Scale (NCS). The sample comprised 3,490 students (response rate 45%), and data were analysed statistically.

Results: In all countries, graduating nursing students assessed their competence as good (range 50.0–69.1; VAS 0–100), albeit with statistically significant differences

On behalf of the ProComp consortium and COMPEUnurse consortium

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between countries. The assessments were highest in Iceland and lowest in Lithuania. Older students, those with working experience in health care, satisfied with their current degree programme, with excellent or good study achievements, graduating to 1st study choice and having a nursing career plan for future assessed their competence higher.

KEYWORDS

competence, Europe, evaluation, graduating nursing student, nurse competence scale, nursing education

1 | INTRODUCTION

High competence level of nurses has special importance for the quality of nursing care (Aiken et al., 2017) as well as high potential to make a difference for population health since nurses are the largest professional group in health care and possess vast expertise (World Health Organization [WHO], 2020a). As several global trends related to population health have an impact on the future of health care (WHO, 2020a), nurses should have the competence to respond to these demands (Drennan & Ross, 2019; Joint Action Health Workforce Planning & Forecasting [JAHWF], 2016; Železnik et al., 2017). In population health, sociodemographic changes are a trend contributing to an increased amount and variation in health issues (England & Azzopardi-Muscat, 2017; Eurostat, 2019; OECD/EU, 2018). Furthermore, climate change and the mobility induced by global population growth increase the prevalence of new and cross-border health risks and communicable diseases, which occasionally evolve into pandemics such as the COVID-19 outbreak (WHO, 2020b). This means that nurses need competence to support patients to manage these health issues.

Specialized and complex health care and increasing use of technology also add to nurses' competence requirements (Buchan et al., 2013; European Commission [EC], 2020; JAHWF, 2016). The development towards sustainable health systems is essential (England & Azzopardi-Muscat, 2017), and nurse competence also plays an important role in the transformation of healthcare provision (Buchan et al., 2013; EC, 2020; International Council of Nurses [ICN], 2020) when reducing inpatient care and increasing primary and preventive care, such as community-based nurse-led clinics (Maier, 2019; Maier & Aiken, 2016; OECD/EU, 2018; Randall et al., 2017; WHO, 2020a).

Competence in nursing is connected to competent nursing workforce. Currently, the prevalent trends in nursing workforce are insufficient preparation for retirement and high turnover of nurses while service needs are increasing (Crisp et al., 2018; Halter et al., 2017; OECD/EU, 2018; WHO, 2020a). This leads to shortage of nurses (EC, 2020; WHO, 2020a). Moreover, the fair distribution of nurses globally and locally is at risk as nurse emigration leads to unbalanced movement, causing unwanted brain leakage and competence loss in lower economy countries (EC, 2020;

WHO, 2020a, 2020c). New highly competent nurses are needed to respond to these increasing demands (Scheffler & Arnold, 2019; WHO, 2020a).

2 | BACKGROUND

This study focuses on the competence evaluation of graduating nursing students (hereafter GNSs). Competence evaluation is needed to provide current knowledge about nurse competence to stakeholders such as managers in health care, policy makers and nurse educators to help them meet the competence demands and expectations. In this study, nurse competence is defined as "functional adequacy and capacity to integrate knowledge and skills to attitudes and values into specific contextual situations of practice" (Meretoja et al., 2004, pp. 330–331). According to this definition, nursing competence manifests through functions of helping, guidance, diagnosing, management, therapeutic interventions, quality assurance and acting in a professional role (Flinkman et al., 2017; Meretoja, Leino-Kilpi, et al., 2004).

The competence requirements for Registered Nurses are multidimensional; globally, the requirements vary to some extent in terms of content and depth of requirement descriptions, although there are similarities as well. Ethical competence, professional role as a nurse, clinical skills, evidence-based practice, collaboration and quality assurance have become global standards of competence requirements (American Nurses Association [ANA], 2015; Australian Nursing & Midwifery Council [ANMC], 2016; Canadian Nurses Association [CNA], 2015; Nursing & Midwifery Board of Ireland [NMBI], 2015; Nursing & Midwifery Council [NMC], 2014). For individual countries, the competence that nurses are expected to have is often presented by different recognized institutions, in some cases also regulating the profession, as the standards of practice informed by empirical research. Several countries, including Australia (ANMC, 2016), Canada (CNA, 2015), Ireland (NMBI, 2015), the UK (NMC, 2014) and the USA (ANA, 2015), have national competence requirements guiding the qualification and registration of new and overseas nurses. European countries follow the joint, generic competence requirements set by the EU directive (EC, 2013) about the recognition of professional

TABLE 1 Nursing education in participating countries

Country	Entry qualification	Nursing education system	Duration (years)	Admissions yearly/100,000 inhabitants	Graduates yearly/100,000 inhabitants	National competence standards	National standardized competence assessment at the time of graduation
Czech Republic	Secondary education	College University	3 3	not available	13.9 (2018) ¹	Yes	No
Finland	Secondary education	University of Applied Sciences	3.5	~74.7 (2018) ²	63.3 (2018) ²	Yes	No
Germany	At least 10 years of primary school	Technical college University	3 3	Not available	52.9 (2018) ¹	No	No
Iceland	Secondary education	University	4	~69.7 (2018) ³	31.7 (2018) ⁴	No	No
Ireland	Secondary education	University	4	~30.8 ^a (2018) ⁵	29.3 ^a (2018) ¹	Yes	No
Italy	Secondary education	University	3	~24.8 (2018) ⁶	19.6 (2018) ⁷	Yes	Yes (since 2008)
Lithuania	Entrance score	College University	3.5 4	Not available	21.6 (2018) ¹	Yes	No
Portugal	At least 12 years of education	Polytechnic institution	4	~49.3 ^b (2018) ⁸	40.4 ^b (2018) ⁹	Yes	No
Slovakia	At least 12 years of education	College University	3 3	~18.9 (2018) ¹⁰	19.2 (2018) ¹⁰	Yes	No
Spain	University requirements	University	4	~27.9 (2017) ¹¹	22.0 (2018) ¹¹	Yes	No

Note: 1. OECD (2020); 2. Vipunen—Education statistics Finland (2019); 3. Statistics Iceland (2020a); 4. Statistics Iceland (2020b); 5. NMBI (2018); 6. Mastrillo (2019); 7. AlmaLaurea (2019); 8. PORDATA (2020a); 9. PORDATA (2020b); 10. Slovak Centre of Scientific and Technical Information (2019); 11. Ministerio de Ciencia and Innovación y Universidades (2019).

^aIncludes also specialist nurses, not only general nurses.

^bIncludes also obstetric nursing students/ nurses, not only general nursing students/ nurses.

qualifications, but there are national competence requirements as well (NMBI, 2015; NMC, 2014). In some countries, competence requirements concern continuing professional development as well (ANMC, 2016; Ball et al., 2019; CNA, 2015; Ensio et al., 2019; NMBI, 2015; NMC, 2014), but there is variation across EU (Rafferty et al., 2019).

All in all, there are studies about the generic competence of nurses and GNSs, mainly national ones. Overall, the research has increased in the 21st century (Blazun et al., 2015), and in Europe, it has been conducted from the point of view of GNSs themselves, nurse managers, nurse educators and mentors (e.g. Forsman et al., 2020; Gardulf et al., 2019; Kajander-Unkuri et al., 2016, 2020; Nilsson et al., 2019; Numminen et al., 2014; Theander et al., 2016). However, there is a lack of international comparative research about the competence of GNSs. This kind of research is needed because nurse workforce mobility between countries has implications for patient safety and quality of care as patients have the right to equal health-care services across the EU (EC, 2016b).

In Europe, GNSs have self-assessed their competence on quite a good level (e.g. Forsman et al., 2020; Kajander-Unkuri et al., 2020; Kiekkas et al., 2019) although there seem to be some differences between countries. In Finland, GNSs have assessed their competence as highest in helping patients to cope and providing individualized care. The lowest assessments relate to acting collegially, accountably, autonomously and taking care of one's own continuous professional development (Kajander-Unkuri et al., 2014, 2016, 2020). The evaluations of Finnish GNSs correspond to evaluations in Sweden (Forsman et al., 2020; Gardulf et al., 2016, 2019; Nilsson et al., 2014; Theander et al., 2016) and Greece (Kiekkas et al., 2019). According to Nilsson et al. (2019), however, GNSs' competence in most of the competence areas was higher in central Europe than in either northern or southern Europe. In all countries, the highest evaluations were given in value-based nursing care and the lowest in education and supervision of staff and students. (Nilsson et al., 2019.) Evaluation of GNSs' competence during clinical practice focuses commonly on clinical competence in nursing, communication, ethical decision-making, collaboration and critical thinking (Immonen et al., 2019).

Level of competence is related to several factors (Gardulf et al., 2016; Kajander-Unkuri et al., 2014, 2020; Nilsson et al., 2014), and it also depends on the evaluator (Kajander-Unkuri et al., 2016; Numminen et al., 2014). Nurse educators have assessed GNSs' competence at a higher level than managers (Numminen et al., 2014) whereas mentors have been more critical in their assessments than GNSs (Kajander-Unkuri et al., 2016). International study experience during education (Nilsson et al., 2014), age, previous education at upper secondary school level, working in health care before the nursing education and working in health care in parallel with the nursing education has a positive correlation with GNSs' competence (Gardulf et al., 2016). In addition, pedagogical atmosphere during the clinical practicum, greater readiness for practice (Kajander-Unkuri et al., 2014), previous professional qualification and higher frequency of using competencies

in clinical practice have been positively related with the higher competence level of GNSs (Kajander-Unkuri et al., 2020).

Curricula and educational solutions differ in nursing education across Europe even though EU directives (2005/36/EC, 2013/55/EU) provide common guidelines for nursing education (Humar & Sansoni, 2017; Kaunonen et al., 2018; Lahtinen et al., 2014). Generally, nurse qualification requires a total of 180–240 ECTS over the course of 3–4 years (4,600 hr) on either bachelor or diploma level (EC, 2013). In the countries participating in this study, nursing education is mostly offered at higher education level in universities or universities of applied sciences/polytechnic institutes (Table 1). In 2018, the mean annual number of graduating nurses per 100,000 inhabitants in Europe was 31.9 (WHO, 2020a), varying from 14.9 in Czech Republic to 63.3 in Finland. Almost all the countries in this study have national competence requirements which are integrated in the nursing curricula, but currently, national standardized competence assessment of GNSs at the time of graduation is used only in Italy (Table 1).

To summarize, various issues concerning population health and nurse profession drive the importance of evaluating GNSs' competence. The European context, in terms of the common European labour market where nurses most often migrate for work (EC, 2019) and the same regulation guiding nursing education, creates a unique setting to analyse GNSs' competence across Europe. Furthermore, studying competence at the point of graduation standardizes the analysis of correspondence of GNSs' in terms of educational preparation and professional nursing practice.

2.1 | Research question

In this study, the aim was to analyse GNS' self-assessed competence level at graduation in Europe and to identify possible factors related to competence. The research questions to be responded are the following:

1. What is the self-assessed level of competence of GNSs in Europe?
2. Are there differences between countries in self-assessed competence levels?
3. What factors, if any, are related to the level of competence?

3 | THE STUDY

3.1 | Design

A cross-sectional evaluative design was applied. This study makes use of data generated in two ongoing separate research projects—Competence of Nursing Students in Europe (COMPEUnurse) and Professional Competence in Nursing (ProCompNurse). Collaboration between these two projects was possible as both implemented corresponding data collection protocols and the same main instrument.

3.2 | Methods

The study population consisted of nursing students from northern (Finland, Iceland, Ireland, Lithuania), eastern (Czech Republic, Slovakia), southern (Italy, Portugal, Spain) and western (Germany) parts of Europe (United Nations [UN], 2020). For COMPEUnurse, representatives of higher education institutions from Czech Republic, Finland, Italy, Portugal, Slovakia and Spain belonging to the Florence Network (<http://theflorencenetwork.coventry.domains/>) volunteered to participate in the study. For ProCompNurse, countries (Finland, Germany, Iceland, Ireland, Lithuania, Spain) were selected based on their geographical locations.

After obtaining the consent of the original author and copyright holder of the NCS, the back-translation process was conducted for the background questions and for NCS in countries not having a validated translation, to ensure conceptual and semantic equivalence of the original and translated versions. The translation protocol developed for both projects was as follows: forward translation, back-translation and discussing or reconciliation. (Maneesriwongul & Dixon, 2004; Squires et al., 2013). To ensure the understandability of the questionnaire, pilot studies were conducted in each country.

Convenience sampling was used (Table 2). A student was eligible to participate in the study if she/he (a) was studying in a nursing degree programme leading to the qualification of a Registered Nurse, and (b) was at the final stage of the programme, about to graduate. Both projects used the Nurse Competence Scale (NCS; Meretoja et al., 2004) as the basis for the sample size calculations. The relevant total NCS mean difference was regarded as five points and the standard deviation used was 15.7 (Kajander-Unkuri et al., 2014). With significance level of 0.05 (two-tailed) and statistical power of 80%, the minimum sample size in each country was 156 respondents. It

was recognized that reaching the sample size could be a challenge in countries with smaller populations. Altogether, the surveys were delivered to 7,740 GNSs; of these, 3,490 respondents ended up in the analysis after cleaning the data for blank and double records, giving an overall response rate of 45%, varying from 30%–97% between the countries (Table 2).

The NCS has been used in many international studies showing evidence of validity and reliability with recently graduated and more experienced nurses (Flinkman et al., 2017; Numminen et al., 2013). In this study focusing on GNSs, Cronbach's alpha coefficient for the NCS categories varied between 0.83–0.93 demonstrating strong internal consistency (Table 5).

The data were collected with a structured questionnaire consisting of the Nurse Competence Scale (NCS) and background factors. A local language version (10 in all) was used in each country. The NCS contains 73 items in seven competence categories: helping role (7 items), teaching-coaching (16), diagnostic functions (7), managing situations (8), therapeutic interventions (10), ensuring quality (6) and work role (19). Each competence-item is assessed on a visual analogue scale (VAS 0–100; 0 = low level of competence, 100 = high level of competence). For the definition of competence level, the VAS is divided into four parts: ≤ 25 for low level of competence, $>25-50$ for rather good, $>50-75$ for good and $> 75-100$ for very good level of competence. (Flinkman et al., 2017; Meretoja, Isoaho, et al., 2004).

The analysed background factors were as follows: (a) age; (b) gender; (c) previous degree in health care (yes/no); (d) work experience in health care besides clinical practice during nursing education (yes/no; hereafter work experience); (e) nursing as the 1st study choice (yes/no); (f) a nursing career plan (yes/no); (g) satisfaction with current degree programme (very satisfied–very unsatisfied); and

TABLE 2 Data collection process of the GNSs

Country	Total number of nursing education institutions <i>N</i>	Nursing education institutions surveyed <i>N</i>	Received the survey (sample) <i>N</i>	Records for analysis <i>N</i>	Response rate %
Czech Republic	15	4 universities	710	213	30.0
Finland	21	19 universities of applied sciences	2,432	851	36.5
Germany	Approx. 1,500 (Including two different degree programmes: general nursing and older people nursing)	12 nursing schools of university hospitals 2 nursing schools of other hospitals	556	304	54.7
Iceland	2	2 universities	117	64	54.7
Ireland	13	6 universities	456	399	87.5
Italy	42	2 universities	345	335	97.1
Lithuania	3 universities 7 colleges	1 university 5 colleges	467	272	58.2
Portugal	39	8 polytechnics	880	355	40.3
Slovakia	8	8 universities	590	310	52.5
Spain	58	11 universities	1,187	387	32.6
Total		80	7,740	3,490	45.1

TABLE 3 Characteristics of sample

Characteristics	Czech Republic (N = 210–213) N (%) Mean (SD)	Finland (N = 807–845) N (%) Mean (SD)	Germany (N = 292–303) N (%) Mean (SD)	Iceland (N = 47–64) N (%) Mean (SD)	Ireland (N = 352–399) N (%) Mean (SD)	
Age (years)	26.0 (6.9)	28.7 (7.6)	23.4 (4.4)	27.2 (4.9)	23.8 (5.5)	
min–max	20–51	20–58	18–49	22–44	20–52	
Gender						
Female	194 (91.1)	725 (86.1)	232 (77.6)	60 (93.8)	368 (92.7)	
Male	19 (8.9)	117 (13.9)	67 (22.4)	4 (6.2)	29 (7.3)	
Degree in health care prior nursing education (yes)	146 (69.2)	342 (40.6)	39 (12.9)	11 (17.2)	25 (6.3)	
Work experience in health care besides clinical practice during nursing education (yes)	122 (57.3)	709 (83.9)	186 (61.8)	48 (75.0)	251 (63.7)	
Satisfaction with current nursing education programme as whole (satisfied/ very satisfied)	163 (76.9)	629 (77.6)	218 (74.4)	48 (100)	296 (82.9)	
Level of study achievements						
Very poor/poor	25 (11.7)	36 (4.4)	18 (6.2)	0	22 (6.2)	
Good	170 (79.8)	708 (87.3)	240 (81.9)	39 (81.3)	277 (78.0)	
Excellent	18 (8.5)	67 (8.3)	35 (11.9)	9 (18.7)	56 (15.8)	
Nursing career plan for the future (yes)	173 (81.6)	620 (74.3)	231 (77.5)	28 (43.8)	244 (62.2)	
Graduating to 1st choice profession (yes)	147 (70.0)	740 (88.2)	177 (58.8)	40 (62.5)	280 (70.5)	
Characteristics	Italy (N = 333–335) N (%) Mean (SD)	Lithuania (N = 348–355) N (%) Mean (SD)	Portugal (N = 348–355) N (%) Mean (SD)	Slovakia (N = 304–310) N (%) Mean (SD)	Spain (N = 311–387) N (%) Mean (SD)	Total (N = 3281–3468) N (%) Mean (SD)
Age (years)	23.6 (3.2)	25.4 (7.5)	22.5 (2.7)	22.7 (3.4)	24.2 (5.4)	25.1 (6.2)
min–max	21–47	20–60	20–43	20–52	18–56	18–60
Gender						
Female	274 (81.8)	259 (95.6)	297 (83.9)	304 (98.1)	337 (88.0)	3,050 (87.9)
Male	61 (18.2)	12 (4.4)	53 (15.0)	6 (1.9)	46 (12.0)	414 (11.9)
Degree in health care prior nursing education (yes)	38 (11.3)	33 (12.2)	13 (3.7)	228 (74.0)	95 (24.7)	970 (28.0)
Work experience in health care besides clinical practice during nursing education (yes)	113 (33.7)	110 (40.7)	35 (9.9)	102 (32.9)	109 (28.5)	1785 (51.5)
Satisfaction with current nursing education programme as whole (satisfied/ very satisfied)	313 (93.4)	213 (83.2)	313 (90.0)	274 (89.3)	288 (92.3)	2,755 (84.0)
Level of study achievements						
Very poor/poor	4 (1.2)	24 (9.3)	9 (2.6)	10 (3.3)	20 (6.4)	168 (5.1)
Good	291 (86.9)	201 (77.9)	260 (73.9)	248 (81.6)	241 (77.2)	2,675 (81.5)
Excellent	40 (11.9)	33 (12.8)	83 (23.6)	46 (15.1)	51 (16.4)	438 (13.3)
Nursing career plan for the future (yes)	310 (92.5)	109 (40.5)	284 (80.0)	272 (88.0)	296 (77.3)	2,567 (74.4)
Graduating to 1st choice profession (yes)	276 (82.4)	163 (60.1)	285 (81.0)	245 (79.5)	276 (71.9)	2,629 (76.0)

TABLE 4 The GNSs' level of competence and statistical differences between countries analysed with one-way analysis of variance continued with pairwise comparisons with Tukey's adjustment

Competence category/ Country	Helping role mean, (SD)	Teaching-coaching mean, (SD)	Diagnostic functions mean, (SD)	Managing situations mean, (SD)	Therapeutic interventions mean, (SD)	Ensuring quality mean, (SD)	Work role mean, (SD)	Overall competence mean, (SD), α
Czech Republic (N = 200–203)	59.3 ¹ (17.1)	61.3 ^{7,22,25} (19.1)	63.6 ^{7,12,25} (19.1)	69.1 (17.8)	63.3 (19.8)	56.5 ^{7,11,13,19,21,25} (20.9)	68.7 (17.5)	64.1 ¹⁷ (15.4),0.98
Finland (N = 756–836)	71.8 ¹⁹ (13.9)	65.4 (14.9)	68.2 (16.0)	63.7 ^{4,13,15} (17.4)	58.5 ^{6,13,14,18,21} (18.0)	61.5 ^{19,22} (17.9)	60.0 ^{4,16,20} (16.0)	63.5 ^{6,19,20} (13.8),0.98
Germany (N = 217–301)	69.1 ^{19,22} (13.6)	62.6 ^{8,20} (14.8)	67.7 (16.8)	71.5 (14.1)	59.4 ^{7,22} (19.0)	58.9 ^{8,19,21} (19.5)	66.2 (14.3)	65.1 (11.9),0.96
Iceland (N = 46–63)	75.2 (10.6)	66.3 (15.4)	75.6 (14.6)	71.9 (14.0)	68.3 (13.2)	66.9 (16.5)	66.6 (12.7)	69.1 (11.6),0.96
Ireland (N = 363–396)	71.7 ¹⁹ (14.2)	63.7 (16.3)	66.6 ¹³ (16.3)	65.8 ^{8,18,23} (15.8)	60.9 ^{8,22} (18.5)	61.7 ^{19,20} (18.2)	60.1 ^{5,16,19,23} (16.8)	63.6 ^{7,18} (13.8),0.97
Italy (N = 322–334)	72.2 ¹⁸ (14.0)	67.2 (15.9)	70.1 (16.1)	70.3 (16.4)	65.9 (16.8)	64.0 ¹⁸ (18.2)	68.3 (16.6)	68.1 (14.1),0.98
Lithuania (N = 249–264)	55.6 ¹ (20.7)	47.3 ^{2,10} (19.3)	47.0 ^{2,9} (21.5)	52.1 ^{2,9} (20.7)	37.0 ^{2,9} (22.3)	55.3 ^{5,6,12,19,21} (20.0)	53.7 ^{2,9} (17.8)	50.0 ^{2,9} (16.1),0.98
Portugal (N = 309–338)	73.7 ¹⁷ (11.0)	67.1 (14.1)	66.1 ¹² (15.3)	66.3 ^{17,23} (15.3)	66.8 (16.2)	66.6 (16.7)	63.6 ^{8,14} (16.7)	66.7 (13.1),0.98
Slovakia (N = 296–306)	52.4 ² (17.4)	52.2 ² (18.3)	56.3 ² (19.0)	62.7 ^{4,13,15} (19.1)	56.2 ^{6,11,12,15,19,21} (18.2)	53.8 ^{3,12,24} (18.3)	62.3 ¹⁵ (17.6)	57.0 ² (15.9),0.98
Spain (N = 278–368)	77.4 (11.9)	65.9 (16.3)	67.4 ¹³ (17.4)	70.7 (15.4)	63.9 (19.0)	70.0 (16.7)	66.3 (16.6),0.94	68.1 (14.1),0.98
Overall (N = 3055–3397)	68.8 (16.4)	62.6 (17.3)	65.0 (18.3)	65.7 (17.6)	59.8 (19.5)	61.5 (18.8)	62.7 (17.0)	63.4 (14.9),0.98
Cronbach's alpha	0.86	0.93	0.84	0.87	0.90	0.83	0.93	0.98

Note: ^{1–25} statistically significant difference between this country and ¹ Finland, Germany, Iceland, Ireland, Italy, Portugal and Spain $p < .0001$, ² Czech Republic, Finland, Germany, Iceland, Ireland, Italy, Portugal and Spain $p < .0001$, ³ Finland, Ireland, Italy, Portugal and Spain $p < .0001$, ⁴ Germany, Italy and Spain $p < .0001$, ⁵ Finland and Ireland $p < .01$, ⁶ Italy $p < .0001$, ⁷ Italy $p < .01$, ⁸ Italy $p < .05$, ⁹ Slovakia $p < .0001$, ¹⁰ Slovakia $p < .05$, ¹¹ Ireland $p < .05$, ¹² Iceland $p < .01$, ¹³ Iceland $p < .05$, ¹⁴ Czech Republic $p < .05$, ¹⁵ Czech Republic $p < .01$, ¹⁶ Czech Republic $p < .0001$, ¹⁷ Spain $p < .05$, ¹⁸ Spain $p < .01$, ¹⁹ Spain $p < .0001$, ²⁰ Portugal $p < .05$, ²¹ Portugal $p < .0001$, ²² Portugal $p < .01$, ²³ Germany $p < .01$, ²⁴ Germany $p < .05$, ²⁵ Finland $p < .05$.

Bold values are the highest values in each competence category and in overall competence, underlined values are the lowest values in each competence category and in overall competence.

TABLE 5 The association of background factors with overall competence and competence categories analysed with linear model. Model-based means (Adj mean) are presented together with adjusted p-value (Tukey's correction)

Competence category/ Background factor	Helping role		Teaching-coaching		Diagnostic functions		Managing situations		Therapeutic interventions		Ensuring quality		Work role		Overall competence	
	Adj mean/ slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p	Adj mean/slope B (95% CI) Adj p
Age	0.18 (0.09-0.27) <.0001*	0.20 (0.10-0.31) .0001*	0.14 (0.03-0.25) .011*	0.14 (0.03-0.25) .0114*	0.12 (-0.01-0.24) .0605	0.23 (0.11-0.35) .0001*	0.12 (0.02-0.23) .0226*	0.16 (0.07-0.25) .0005*								
Work experience																
Yes	66.0 (63.6-68.4)	61.5 (58.8-64.2)	63.8 (60.8-66.7)	65.2 (62.4-68.1)	59.2 (56.1-62.2)	60.2 (57.1-63.3)	64.0	62.8 (60.5-65.2)								
No	64.2 (61.9-66.6) .0025*	59.3 (56.7-62.0) .0012*	61.9 (59.0-64.9) .010*	62.2 (59.5-65.0) <.0001*	57.4 (54.3-60.4) .022*	59.3 (56.2-62.3) .24	61.2 (58.5-63.9) <.0001*	60.6 (58.3-62.9) .0001*								
1st study choice																
Yes	65.4 (63.1-67.7)	61.0 (58.4-63.6)	63.9 (61.0-66.8)	64.9 (62.2-67.6)	59.5 (56.5-62.5)	60.2 (57.2-63.1)	63.6 (60.9-66.3)	62.6 (60.3-64.8)								
No	64.8 (62.4-67.3) .33	59.8 (57.0-62.5) .078	61.8 (58.8-64.8) .0047*	62.5 (59.7-65.4) .0012*	57.0 (53.9-60.2) .0029*	59.3 (56.1-62.4) .28	61.6 (58.8-64.5) .0071*	60.9 (58.5-63.3) .0052*								
Level of study achievements																
Excellent	71.0 (69.3-72.6)	64.9 (63.0-66.8)	66.4 (64.4-68.4)	68.5 (66.5-70.5)	62.4 (60.2-64.6)	65.4 (63.2-67.6)	65.9 (63.9-67.9)	66.1 (64.5-67.7)								
Good	66.7 (65.5-67.8)	60.8 (59.5-62.1)	62.4 (61.0-63.8)	64.6 (63.2-66.0)	58.7 (57.2-60.2)	60.6 (59.1-62.2)	62.6 (61.2-64.0)	62.1 (61.0-63.2)								
Poor	62.4 (59.9-64.8)	55.6 (52.7-58.4)	60.3 (57.3-63.3)	60.9 (58.0-63.8)	54.1 (50.8-57.4)	57.7 (54.4-61.0)	59.3 (56.4-62.3)	58.4 (56.0-60.8)								
Very poor	60.4 (52.0-68.8) <.0001*	60.3 (50.9-69.7) <.0001*	62.3 (51.8-72.8) <.0001*	60.9 (51.1-70.8) <.0001*	57.8 (47.2-68.5) <.0001*	55.2 (44.4-65.9) <.0001*	62.7 (53.1-72.3) .0003*	60.3 (52.2-68.4) <.0001*								
Satisfaction with degree programme																
Very satisfied	68.6 (66.1-71.2)	62.8 (59.9-65.7)	65.8 (62.7-69.0)	65.6 (62.6-68.7)	60.3 (57.0-63.6)	61.9 (58.6-65.3)	64.7 (61.7-67.6)	64.2 (61.7-66.7)								
Satisfied	64.7 (62.3-67.1)	59.6 (57.0-62.3)	63.5 (60.5-66.4)	63.4 (60.6-66.2)	57.8 (54.8-60.8)	58.6 (55.6-61.7)	61.9 (61.3-66.8)	61.3 (59.0-63.6)								
Unsatisfied	62.8 (60.2-65.4)	58.2 (55.3-61.0)	62.2 (59.0-65.4)	63.3 (60.3-66.3)	55.3 (52.0-58.7)	58.3 (54.9-61.6)	60.3 (59.2-64.6)	60.0 (57.5-62.5)								
Very unsatisfied	64.3 (60.6-68.0) <.0001*	61.0 (56.8-65.2) .0003*	59.9 (55.4-64.4) .0047*	62.6 (58.3-67.0) .0719	59.6 (54.7-64.6) .0027*	60.0 (55.2-64.9) .007*	63.6 (61.7-67.6) .0021*	61.4 (57.8-64.9) .0001*								
Career plan																
Yes	66.6 (64.3-68.9)	62.2 (59.6-64.8)	64.5 (61.6-67.4)	65.7 (63.0-68.4)	60.3 (57.3-63.3)	61.3 (58.3-64.3)	64.1 (61.4-66.8)	63.4 (61.1-65.7)								
No	63.6 (61.2-66.1) <.0001*	58.6 (55.9-61.3) <.0001*	61.2 (58.2-64.2) <.0001*	61.8 (58.9-64.6) <.0001*	56.2 (53.1-59.3) <.0001*	58.1 (55.0-61.3) .0001*	61.2 (58.4-64.0) .0001*	60.1 (57.7-62.4) <.0001*								

*Statistically significant p-value < .05. Bold values are used for statistical significant values.

(h) self-assessed level of study achievements (excellent-very poor; Table 3). Either nominal or Likert scale measurements were applied.

The data collection period lasted from February 2018–July 2019 and were implemented in collaboration with the contact persons of the educational institutions. The national research teams were responsible for recruiting as many educational institutions as needed to achieve the sample size. In these educational institutes, all GNSs had a similar opportunity to participate in the study. The questionnaires were delivered to the GNSs either in electronic (COMPEUnurse: Webropol; ProCompNurse: REDCap, Harris et al., 2009, 2019) or paper-and-pencil format, depending on the preferences of the educational institutions. The dominant format was electronic. For the electronic format, the GNSs received the link to the questionnaire either via their student email or on a piece of paper when they responded in a computer classroom or with their own laptops or mobile devices. For the paper-and-pencil format, the time and place for the data collection were settled within class time or at home.

3.3 | Analysis

Continuous variables are summarized with mean and range, categorical variables with counts and percentages. Modelling was started with one-way analysis of variance where the total NCS score and sub-scores were compared between the countries. Following this, it was investigated which background factors are associated with the total NCS score and sub-scores using gender, previous degree, work experience, satisfaction with degree programme, level of study achievements, 1st study choice, nursing career plans, country and age as covariates. Due to non-significant result, gender and previous degree were removed from the final model and they are not reported later. Modelling was performed with a linear model. The same model was applied to all subscales. Pairwise comparisons of categories were adjusted with Tukey's method. Confidence intervals (CI) of 95% were calculated. Cronbach's alpha was calculated. All statistical tests were performed as 2-sided, with a significance level set at .05. The analyses were performed using SAS software, version 9.4 for Windows (SAS Institute Inc., Cary, NC, USA).

3.4 | Ethics

Throughout the study, the responsible conduct for research integrity (All European Academies [ALLEA], 2017) and the ethical principles of the Declaration of Helsinki (World Medical Association [WMA], 2013) were followed. The Ethics Committee of the University of Turku gave the Research Ethics committee approval for both research projects (COMPEUnurse Statement 16/2017 6 Mar 2017, ProCompNurse Statement 62/2017, 11 Dec 2017) and additional Research Ethics committee approval were granted in the countries when needed (8 in all). In every country, the participating educational institutions granted research permissions

according to their policies. Permissions for translating and using the NCS were received from the copyright holders. Moreover, in both projects, consortium agreements were signed between the University of Turku as the leader of both projects and the partner organizations before starting the study. All GNSs received a covering letter informing them about the study, the voluntariness of participation, confidentiality and the right to withdraw participation in the study at any time. In addition, data protection was emphasized (EC, 2016a). Students signed consent when agreeing to participate in the study.

4 | RESULTS

4.1 | Sample characteristics

A total of 3,490 GNSs from Czech Republic, Finland, Germany, Iceland, Ireland, Italy, Lithuania, Portugal, Slovakia and Spain participated in the study. The sample size ranged from 64 (Iceland)–851 (Finland). Most GNSs were female and their mean age was 25.1 years (range 18–60 years). In all countries, there were GNSs with an earlier degree in health care and with work experience. In nearly all countries, most participating GNSs had a nursing career plan for the future (Table 3).

4.2 | Level of competence of graduating nursing students

GNSs' self-assessed level of competence in 10 European countries ranged from 50.0–69.1 (mean 63.4, Table 4), being on good level (VAS > 50–75) in all countries, but not reaching the highest value of a particular level. In the competence category level, the highest assessments were in Helping role (VAS 55.6–77.4; mean 68.8) and in Managing situations (VAS 52.1–71.9; mean 65.7) and the lowest in Therapeutic interventions (VAS 37.0–68.3; mean 59.8) and in Ensuring quality (VAS 53.8–70.0; mean 61.5).

There were differences between the countries. Total competence was assessed the highest in Iceland and the lowest in Lithuania. Lithuanian GNSs assessed their competence on a lower level than the GNSs from other countries ($p < .0001$) and statistically significant differences between other countries were also identified. On the competence category level, several statistically significant differences were found. In almost every competence category, Lithuanian and Slovakian GNSs assessed their competence on a lower level than GNSs from other countries (Table 4).

4.3 | Background factors related to the level of competence

In the analysis of linear model, GNSs' satisfaction with their current degree programme ($p = .0001$) was positively related to higher

competence. In addition, GNSs having work experience ($p = .0001$), those rating their level of study achievements as excellent or good ($p < .0001$), graduating to their 1st study choice ($p = .0052$) or having a nursing career plan for their future ($p < .0001$) assessed their competence level statistically significantly higher compared with other GNSs (Table 5). Higher age also had a positive correlation with competence ($p = .0005$).

5 | DISCUSSION

In this study, the level of competence of GNSs in Europe, as seen by the GNSs themselves and factors related to competence were analysed. Competence comparison of the GNSs between different European countries was justified due to the same educational regulations (EC, 2005, 2013) and the common European labour market. Since 2015, about 67,000 nurses with professional qualifications obtained in one EU country have applied for recognition of their qualifications in another country for permanent practice. For the countries in this study, Italy had the most emigrants and Germany the most immigrants; both also ranked among the first in these movement types in the whole of Europe (EC, 2019). Thus, this study covers well the mobility aspect of the nurse workforce in Europe. Furthermore, students are expected to have adequate competence at time of graduating to profession to be able to guarantee patient safety and quality of care. Therefore, GNSs' competence assessment is a key issue for all stakeholders in health care—nursing professionals, managers, educators and policymakers.

The main finding of this study, including 10 European countries, is the GNSs' self-assessed good level of competence, as measured with NCS. "Good" in this scale means scores placing around the middle or somewhat higher. The findings in another recent European study (Nilsson et al., 2019) conducted using other generic tool (Nurse Professional Competence Scale) are somewhat contradictory; the competence level in the present study is lower. As the availability of other multi-country comparisons is limited, solid conclusions about the competence level cannot be drawn. For the individual countries, the trend seems to be similar: the overall finding of this study is in line with the previous studies of GNSs' competence indicating good level of competence measured with the NCS (Kajander-Unkuri et al., 2014, 2016, 2020; Notarnicola et al., 2018) and somewhat lower than measured with other generic tools (Gardulf et al., 2016; Kiekkas et al., 2019). Overall, the competence level of GNSs still seems to be at least satisfactory throughout the continent, supporting workforce mobility in the common European labour market. This finding also aligns with the EU directives guiding nursing education and the purpose of the joint competence requirements (2013/55/EU). However, as dissimilarities still exist, for example in the organization of nursing education (e.g. universities, universities of applied sciences, hospital-based nursing schools, polytechnic institutes), students taking different degree programmes can still hold varying

views about their competence. Thus, this finding warrants more thorough investigation and validation.

GNSs' competence differs between the participating countries: Icelandic GNSs and GNSs from southern Europe (Italy, Portugal and Spain) assessed their competence as the highest whereas Lithuanian and Slovakian GNSs assessed theirs as the lowest. Differences in competence between countries have been shown also in a previous European study (Nilsson et al., 2019). Naturally, differences in nursing education are not sufficient to explain the variation. Issues in working conditions and nurse profession may also play a part. For instance, Lithuanian nurses who assessed their competence as the lowest have reported high workload, work dissatisfaction and experiences of financial and professional insecurity (Riklikienė et al., 2019), which may also compromise ones' perceptions of competence together with the degree of autonomy in nursing care or expectations regarding the professional role (Nilsson et al., 2019). Perceptions of competence may also have to do with the fact that in Slovakia and Lithuania, the nurse–physician ratio is below the OECD/EU average, which may partly explain the different level of independence in the nursing profession (OECD/EU, 2018; Smatana et al., 2016). Moreover, the nature of the nursing activities regarded as major in nurses' role varies across Europe (Marcinowicz et al., 2019), which causes a challenge to create surveys grasping the whole potential range of nurse duties and thus covering all country characteristics.

Competence level varies in different competence areas. For example, GNSs assessed their competence level highest in the helping role including tasks regarding planning individual care, helping the patient to cope, using research findings and providing ethical and individualized care, similarly to earlier studies using the same scale (Kajander-Unkuri et al., 2014, 2016, 2020). Furthermore, in previous studies using other scales than the NCS, GNSs assessed themselves to be the most competent in duties concerning direct, individualized patient care and they are engaged in nursing ethics (Forsman et al., 2020; Gardulf et al., 2016, 2019; Nilsson et al., 2019; Theander et al., 2016). The result is favourable from the viewpoint of nursing education and nursing practice since helping role is considered to be at the core of nursing care (Meretoja et al., 2015). The assessments were lowest in therapeutic interventions, as also indicated in earlier studies (Kajander-Unkuri et al., 2016, 2020; Lima et al., 2014). This includes planning and making decisions concerning patient's clinical situation, coordinating multi-disciplinary teams, consulting other team members, evidence-based work and evaluating care outcomes. One reason why GNSs assess their competence the lowest in these areas may have to do with the fact that GNSs still work under the supervision of their preceptors and do not care for the most critical and demanding patients on their own, for instance (Theisen & Sandau, 2013). Moreover, multi-disciplinary education is not yet fully customary, not to mention joint study programmes. It has been found that at the beginning of their career, nurses have deficiencies in grasping the full complexity of care situations (Numminen et al., 2013). Thus, GNSs are regarded as not having yet reached full competence in these areas of practice.

We also found six factors being positively related to GNSs' competence level. Work experience in health care besides clinical placements during nursing education has previously been identified as such a factor (e.g. Gardulf et al., 2016; Kiekkas et al., 2019; Rizany et al., 2018). At least, this argues for continuing the development of clinical training and placements that provide students with various opportunities to practise nursing and receive systematic feedback and thus advance their competence while still students (Immonen et al., 2019). To find such robust educational solutions replacing outside-school-hours work experience, further innovation and research are needed. Another individual factor, age, was also found to be related to competence in earlier studies, but with somewhat contradictory findings in terms of competence categories (Gardulf et al., 2016; Kiekkas et al., 2019). The chronological age itself is not regarded as the contributing factor but students of different ages may have varying strengths based on their life experience demonstrated in competence development. Thus, this connection needs subtle investigation in future.

Nursing as the 1st study choice has also been recognized previously as a factor related to competence in terms of greater orientation for caring and nursing expertise (ten Hoeve et al., 2016) and higher graduating rates (Salamonson et al., 2014). For optimal competence development, it is critical to ensure that nursing entrance examinations select those who are suitable for the profession and have the capability to succeed in their studies. Therefore, certainty of career choice is suggested to be one of the core domains in examinations. (Haavisto et al., 2019.) Looking forward, having a nursing career plan for the future, also as a competence-related factor, can benefit nursing students by its influence on in-depth approach to learning and professional development (Kim & Shin, 2020; Yilmaz et al., 2016). Therefore, it would be useful to explore in detail the resulting competence outcomes for students by including or not including intensive career planning in the curriculum.

Study achievement was related to competence level. This link has not been investigated often but a connection between the two has been shown (Blackman et al., 2007). Knowing the indicative value of grades for competence level is an additional and useful tool for the students themselves and educators to follow competence development, for instance. However, its predictive value warrants further study. Satisfaction with degree programme as a factor related to competence encourages educators to continue improving the quality of undergraduate programmes (Kiekkas et al., 2019). However, a single question relating to students' perceptions of satisfaction with their education is inadequate for a comprehensive understanding of their satisfaction (Smith, 2018); therefore, this connection needs to be further studied. However, this finding points out the value of satisfaction for a fundamental thing such as competence development.

The sample corresponds to a previous European study in terms of the age of GNSs and the amount of GNSs having work experience in health care during nursing education (Nilsson et al., 2019).

Our sample has slightly more female GNSs than the previous study (Nilsson et al., 2019), and the amount of female GNSs is slightly more than the number of practising female nurses in Europe (Boniol et al., 2019). As an important detail, one in four GNSs has thought of leaving the nursing profession although they have not yet graduated. The number of those with such thoughts varied between countries, being the highest in Lithuania (59.5%) and Iceland (56.2%) and the lowest in Italy (7.5%). Previously in the RN4CAST study, altogether 9% of practising nurses in 10 European countries reported intention to leave their profession, varying from 5%–17% between participating countries (Heinen et al., 2013), suggesting a turn for worse. This finding is dramatic from the perspective of competence gain because there is already a nurse shortage in many countries and retirement causes further loss of nurse competence (EC, 2019; WHO, 2020a, 2020b).

5.1 | Limitations

There are limitations in this study related to the sample and measurement. The sample was convenient in each participating country, raising concern about representativeness in addition to the modest response rate of 45%. However, the same inclusion criteria with respect to degree programme and study phase were applied in each country to ensure corresponding samples across Europe, although there can be differences regarding curricula and clinical practicums. The major strength of this study is that it comprises high variation of countries, and the overall sample size is sufficient for statistical analysis. Overall, only preliminary conclusions and cautious generalizations can be made.

The Nurse Competence Scale, which has previously been validated in many countries (Flinkman et al., 2017), is a reliable instrument for the assessment of competence. In this study, internal consistency among competence categories varied from 0.83–0.93, being acceptable, in line with earlier studies (Kajander-Unkuri et al., 2014, 2020; Notarnicola et al., 2018). As the NCS is based on Benner's From Novice to Experts framework (Meretoja, Isoaho, et al., 2004), it covers various levels of items on the continuum of professional development. Thus, some of the advanced level items may be problematic to answer for students at the point of graduation.

Competence assessment was based on GNSs' self-evaluation, which has been criticized for its subjectivity as students have been found to both over- and underestimate their competence (Forsman et al., 2020; Kajander-Unkuri et al., 2016). Thus, it would have been beneficial to combine self-assessment with information received using objective methods (Forsman et al., 2020; Glasgow et al., 2019). However, it has also been found that nurses' evaluation of their own competence and skills is in fact in line with their perceptions of their own development needs. This supports nurses' capability to evaluate their own competence critically (Taylor et al., 2020; Wangensteen et al., 2018).

6 | CONCLUSIONS

Nurses' professional competence is an important factor for providing safe and high-quality care to patients. This study is among the first to analyse the competence of GNSs in different European countries. The results indicate that despite different educational solutions and curricula, based on their self-assessments, GNSs are graduating with a good level of competence, but the competence levels still differ across EU countries. This study confirmed some of the previously known related factors, but also more novel ones were identified. Overall, there is a need for further studies about the development of competence after graduation.

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CONFLICT OF INTEREST

No conflicts of interest have been declared by the authors.









AUTHOR CONTRIBUTIONS

SK-U, SK, AB, MCT, IE, VK, DL, EL, JN, CSO, AP, MR, LS, LS, JS, HS, LV-J and HL-K made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; involved in drafting the manuscript or revising it critically for important intellectual content; given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

DATA AVAILABILITY STATEMENT

All data generated during this study are included in this published article.

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