












RESEARCH ARTICLE

Nursing students' self-directed learning abilities and related factors at graduation: A multi-country cross-sectional study

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Funding information

This work was supported by the Finnish Nursing Education Foundation sr [2017, 2018].

Abstract

Aim: To describe nursing students' level of self-directed learning abilities and identify possible factors related to it at graduation in six European countries.

Design: A cross-sectional comparative design across the countries.

Methods: The study was conducted from February 2018 to September 2019. Nursing students ($N = 4,135$) from the Czech Republic, Finland, Italy, Portugal, Slovakia and Spain were invited to respond to the research instruments (the Self-Rating Scale of Self-Directed Learning and the Nurse Competence Scale) at graduation. The data were analysed using the chi-square test, Pearson correlation coefficient and the linear model.

Results: The nursing students' ($N = 1,746$) overall self-directed learning abilities were at high level in all countries. Statistically significant differences occurred between countries. Spanish nursing students reported the highest level of self-directed learning abilities while students from the Czech Republic reported the lowest. Higher level of self-directed learning abilities was related to several factors, particularly with the self-assessed level of competence and country.

KEYWORDS

competence, Europe, graduating nursing student, nursing education, self-directed learning

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1 | INTRODUCTION

The focus on self-directed learning (hereafter SDL) is always very topical even though it is a widely investigated aspect of learning in healthcare education globally (Cadorin et al., 2017; Murad et al., 2010). SDL is described as a process where an individual first recognizes his/her learning needs and sets learning goals. Through identified resources for learning and chosen and implemented learning strategies, he/she finally assesses the achieved results. The andragogy model of Knowles is founded on adults who generate a need for learning from their life experience, setting learning goals and following the accomplishment of their own learning goals; SDL can hence be considered as person-guided teaching (Knowles et al., 2015).

Worldwide, student-centred teaching and learning approaches are emphasized (OECD, 2012,2018). In the guidelines of the European Higher Education Area (EHEA), students are considered as active learners and they are responsible for their own development and the specific competences acquired (EHEA, 2020; Rascón-Hernán et al., 2019). To attain the required accountability, students need to self-direct their learning to foster a lifelong learning orientation (Kaulback, 2020). For healthcare professionals, SDL is an approach to remain flexible, open to change, proficient, resourceful and develop resilience in a constantly evolving healthcare organisation (Cadorin et al., 2017; Shirazi et al., 2017). SDL involves many elements of learning such as self-monitoring, interpersonal communication, motivation, planning and implementing (Cadorin, Bressan, et al., 2017). Because of its relevance, SDL has been recognized as an essential element of the EHEA since 2001 (EHEA, 2020). Specifically, SDL has been documented to foster nurses' professional development by permitting them to enlarge their theory base and increase the quality of the clinical nursing (Shen et al., 2014). Therefore, being a self-directed learner as a student is important, not only to achieve the academic outcomes but also to undertake the continuing professional education to remain up-to-date and providing safe care to patients.

Internationally, nurses' continuing professional development is required in the ICN Code of Ethics for nurses (International Council of Nurses, 2021) and more specifically, for example, in the competence standards of the American Nurses Association (2015), Australian Nursing and Midwifery Council (2016) and Nursing and Midwifery Council (2014). Nurses' professional development is crucial for the quality of nursing care, as nurses' competence level has been found to be related to patients' outcomes in health care (Aiken et al., 2017). There are also several risks related to population health which will have an effect on nurses' competence requirements (OECD/European Union, 2020). In addition, the complex and specialized clinical environment and the increasing demands of using technology and evidence-based clinical decision-making set requirements for nurses' continuing professional development through SDL (Cadorin et al., 2015). In the specific context of nursing competences, SDL has been recognized as both an antecedent (Pryce-Miller, 2010) and a consequence (Murad et al., 2010) of competences achieved. There are some studies about nursing students' SDL abilities, but

only in national settings (e.g. Cadorin et al., 2016; Lee et al., 2020). International comparative studies seem to be lacking. In addition, as far as we can tell, there are no studies where nursing students' SDL abilities have been assessed and compared at the point of graduation. Therefore, this study is aimed at filling this gap, with the intent of advancing the knowledge on nursing students' SDL abilities based on their self-assessments, providing insights into lifelong learning and professional development projects and for nurse teachers regarding the areas of SDL where nursing students need support during their education.

2 | BACKGROUND

Self-directed learning is more and more expected over the continuum of healthcare professionals' education globally (Al Moteri, 2019; Hill et al., 2020). It has been indicated to evolve abilities, attitudes and individual qualities that supply nursing students with continuous learning skills and permit them to achieve professional competences (Kaulback, 2020; Rascón-Hernán et al., 2019). In nursing education, the importance of self-directed and lifelong learning has been pointed out in promoting the skills and attitudes required at work in complex and ever-changing healthcare settings to meet the professional development needs (Al Moteri, 2019; Shen et al., 2014). Moreover, it has a role in adults' learning models, where it has adapted to nursing pedagogy globally (Cadorin et al., 2015; Green & Schlairet, 2017) as in adults, SDL may evolve continually, representing an essential strategy for dealing with daily life changes (Loeng, 2020).

Self-directed learning is seen as a prerequisite of lifelong learning, allowing continuing and critical appraisal of the knowledge acquired in a challenging and changing world characterized by increasing amounts of new evidence (Cadorin, Ghezzi, et al., 2017; Qalehsari et al., 2017). In nursing education, the use of lifelong learning strategies leads to a better quality of education, professional competence, and ultimately, better nursing care outcomes (Qalehsari et al., 2017).

Self-directed learning is a multidimensional construct which has been found to consist of learners' awareness of their own learning needs, attitudes and motivation to learn, aptitude of choosing suitable learning strategies, methods and activities, with interpersonal skills considered a prerequisite for becoming self-directed learners (Behar-Horenstein et al., 2018; Cadorin et al., 2013; Knowles et al., 2015) and for constructing knowledge. Effective SDL requires awareness, attitudes and motivation whereas the learning methods and strategies and interpersonal skills need to include self-management skills to be able to successfully accomplish the SDL process (Behar-Horenstein et al., 2018; Cadorin et al., 2013). Constructing knowledge concerns individuals' capability to direct their own cognitive behaviour in an autonomous and active manner through a process that is not based on the knowledge transmitted but experience (Cadorin et al., 2013). Al Moteri (2019) identifies three main obstacles to developing nursing students' SDL abilities; these are associated with the process (learning/teaching experience), the person itself (nursing student's

TABLE 1 Estimations of teaching and learning strategies provided in participating HEIs for nursing graduates 2018–2019 in theoretical nursing education^a

	Teaching and learning in the classroom (traditional lessons), %	Teaching and learning in skills laboratory, %	Teaching and learning in simulation laboratory, %	Online or web-based teaching and learning strategies, %	Student's independent learning outside HEI, %	Collaborative teaching and learning strategies (group work, discussions, case studies and study groups), %	Reflective teaching strategies (case studies, reflective writing assignments), %	Problem-based teaching and learning strategy, %	Flipped classroom teaching and learning strategy, %	Teaching and learning with virtual interventions (e.g. virtual reality, augmented reality, serious games, escape room games, smartphone apps), %
Czech Republic	30	10	5	10	30	10	5	0	0	0
Finland	30	7–10	7–10	7–10	30–40	5–10	0–1	0	0	0
Italy	50	5	5	0	30	5	5	0	0	0
Portugal	25–30	7.5–15	2.5–5	0–5	30–45	7.5–15	2.5–8	2.5	0–1	0–1
Slovakia	30	10	5	10	30	10	5	0	0	0
Spain	25	7	13	5	20	10	7	5	5	3

Abbreviation: HEI, Higher Education Institution.

^aEstimations are based on contact persons of participating HEIs (estimated percentages on the total amount of time devoted to nursing education).

own dependence and scarcity of self-confidence) and the situation (e.g. passive teaching methods could make the nursing student a passive learner). Contextual factors, such as cultural, social and educational setting, the impact of former event and self-concept, affect students' ability to implement self-direction in learning (Behar-Horenstein et al., 2018).

Self-directed learning is considered the capability of seeking for new information, assessing it critically, and implementing it in the process of making decisions in clinical practice (Avdal, 2013). SDL has been associated with higher problem-solving ability (Cadorin, Bressan, et al., 2017; Hwang & Oh, 2021), more flexibility, clinical competence, as well as the ability to cope with challenges that emerge in the healthcare context (Pryce-Miller, 2010). Today, all these abilities are highly required for new nurses who are entering complex and changing clinical environments (World Health Organization, 2020).

Self-directed learning has been identified as an essential ability in learning nursing; however, nursing students' self-assessed level of SDL abilities varies in different countries. Nursing students have assessed their SDL abilities as high in Italy (Cadorin et al., 2016) and in Taiwan (Cheng et al., 2014), while nursing students from South Korea (Lee et al., 2020) and the United Kingdom (Williamson, 2007) assessed theirs as moderate. Several related factors have been identified in previous studies. Age (Slater & Cusick, 2017; Wong et al., 2021), gender (Lee et al., 2020; Tekkol & Demirel, 2018; Wong et al., 2021), parents' educational level (Lee et al., 2020), previous education level, the academic year attended (Slater & Cusick, 2017), learners' awareness of personal learning needs (Williamson, 2007), learners' attitude to learn (Cadorin et al., 2016; Tekkol & Demirel, 2018; Wong et al., 2021), types of study programmes, study years (Wong et al., 2021), teaching-learning strategies (Cadorin et al., 2015; Wong et al., 2021) and the satisfaction with the university experience (Avdal, 2013; Zhoc & Chen, 2016) have a positive relationship with SDL abilities. In studies published in the early 2000s, no relation or a negative relation between SDL and study achievement level was reported (Avdal, 2013). Since then, various studies have reported a positive relationship between SDL and study achievement (Avdal, 2013; Tekkol & Demirel, 2018; Zhoc & Chen, 2016), and competence achievement (Murad et al., 2010; Wong et al., 2021).

In the participating countries of this research project (Czech Republic, Finland, Italy, Portugal, Slovakia and Spain), nursing education is guided by the EU Directives (2005/36/EC, 2013/55/EU), which determine the minimum length (3 years; 4,600 hr) of the nursing education and the amount of theoretical education and clinical training. The duration of the theoretical education is at least one third and it consists of nursing in relation to different medical areas and ethics of the profession, basic sciences such as anatomy and physiology and pharmacology, and social sciences. The clinical training covers at least one half of the minimum duration of the nurse education (2,300 hr) and consists of seven areas of nursing where nursing students need to have their clinical practicums (European Commission, 2005, 2013). In the participating countries, the length of the nursing education varies from 3–4 years (3 years in the Czech Republic, Italy and Slovakia, 3.5 years in Finland, and 4 years in Portugal and Spain). The entry

requirements are secondary education in the Czech Republic, Finland and Italy, at least 12 years of education in Portugal and Slovakia, and university requirements in Spain (Humar & Sansoni, 2017; Lahtinen et al., 2014). In nursing education, a variety of teaching and learning strategies have been used (Kaunonen et al., 2018; Tuning i.a.) such as lectures in classroom, skills and simulation laboratories, on-line and web-based teaching, group work and other collaborative teaching and learning strategies (Table 1). According to the OECD (2020), there were 27.6 graduated general nursing students per 100,000 inhabitants in Czech Republic, 82.0 in Finland, 18.6 in Italy, 25.1 in Portugal, 26.4 in Slovakia and 21.2 in Spain in 2018.

2.1 | Research question

The study was aimed to describe nursing students' level of self-directed learning abilities and identify factors possibly related to it at graduation in six European countries. The research questions were:

1. What is the level of nursing students' SDL abilities based on their self-assessments at graduation?
2. Are there differences in nursing students' level of SDL abilities between countries?
3. What are the factors related to the SDL abilities?

3 | THE STUDY

3.1 | Design

We applied a cross-sectional comparative survey design (Kelley et al., 2003; Polit & Beck, 2018). This independent sub-study, involving the Czech Republic, Finland, Italy, Portugal, Slovakia and Spain, was based on a large-scale dataset created in a European longitudinal study, Competence of Nursing Students in Europe (COMPEUnurse). The COMPEUnurse study project focuses on competence of nursing students and possible related factors at the point of graduation and in early years of practice in Europe (<https://sites.utu.fi/nursingresearchprogrammes/pedagogic/>). The study about the competence of graduating nursing students in different European countries has been found to be, in general, on a good level (Kajander-Unkuri et al., 2021).

3.2 | Methods

3.2.1 | Sample

The participants of our study were nursing students from six countries in Europe (Czech Republic, Finland, Italy, Portugal, Slovakia and Spain) at graduation. The collaboration between the higher

education institutions (HEIs) of these countries was volunteered and related to the Florence Network (<https://theflorencenetwork.covenstry.domains/about/>).

We used convenience sampling. We included nursing students who studied to be graduated nurses responsible for general care (EU directives 2005/36/EC, 2013/55/EU) and who were in their last semester about to graduate after completing their ongoing final clinical practicum. The minimum sample size was calculated based on the main instrument used in the research project; the Nurse Competence Scale (Meretoja et al., 2004). Based on the power analysis (power = 0.80, significance level = .05 (two-tailed)), the required number of respondents was 156 per country, which was reached in every country. The overall number of nursing students invited to the study across the participating countries was 4,135. The sample consisted of 1,746 graduating nursing students with the response rate 42.2% (Czech Republic 30%, Finland 32.9%, Italy 97.1%, Portugal 40.3%, Slovakia 52.5% and Spain 36.5%).

3.2.2 | Instruments

We used the Self-Rating Scale of Self-Directed Learning (SRSSDL_ITA) to measure graduating nursing students' level of SDL abilities. The original development of the instrument is Williamson (2007) and the instrument is later validated by Cadorin et al. (2013), Cadorin, Ghezzi, et al. (2017). The SRSSDL_ITA includes 40 items summarized in eight components: "Awareness" (7 items), "Attitudes" (8), "Motivation" (6), "Learning strategies" (5), "Learning methods" (4), "Learning activities" (4), "Interpersonal skills" (4) and "Constructing knowledge" (2). Nursing students gave their response to each item in a Likert scale (five-point) from 1 (never) to 5 (always). The scores were summed up, giving a total score of 200. The total score was then split into three sections to describe the level of SDL as low (40–90), moderate (91–140) and high (141–200). The instrument has shown good reliability (Cronbach's alpha = 0.93 with ranges between 0.68 and 0.81) and validity with EFA (Total variance = 54.3%; KMO = 0.93; Bartlett's Test of Sphericity, 0.000) and CFA (RMSEA = 0.031 and SRMR = 0.055) (Cadorin et al., 2013; Cadorin, Ghezzi, et al., 2017). In this current study, Cronbach's alpha coefficient values for the SRSSDL_ITA components varied from 0.79 to 0.90, demonstrating strong internal consistency (Table 2).

Several individual background factors potentially related to SDL abilities were enquired (Kajander-Unkuri et al., 2021). These questions applied either Likert or nominal scale. In addition, competence was also assessed with the Nurse Competence Scale (NCS; Meretoja et al., 2004) and analysed as a possible related background factor. The NCS consists of 73 items which form 7 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

TABLE 2 Graduating nursing students' self-directed learning abilities (SRSSDL_ITA) analysed with one-way analysis of variance continued with pairwise comparisons corrected with Tukey's method

Country	Self-directed learning abilities			
	Awareness (min 7, max 35) Average score (SD)	Attitudes (min 8, max 40) Average score (SD)	Motivation (min 6, max 30) Average score (SD)	Learning strategy (min 5, max 25) Average score (SD)
Czech Republic (N = 209–212)	27.2 ¹⁻³ (4.4)	32.0 ^{1,2} (5.1)	22.2 ^{1,2} (4.5)	19.0 ^{1-3,11} (3.4)
Finland (N = 328–336)	29.3 ⁴ (2.8)	33.0 ^{1,7} (3.8)	21.1 ^{1,2,8} (2.9)	20.4 ^{1,7} (2.4)
Italy (N = 331–335)	30.9 (3.2)	34.7 (3.7)	25.8 (3.2)	21.9 (2.5)
Portugal (N = 349–352)	29.2 ^{4,10} (3.6)	33.9 (4.2)	25.1 ¹⁰ (3.5)	21.1 ⁹ (2.8)
Slovakia (N = 301–306)	26.8 ¹⁻³ (4.8)	32.4 ^{1,7} (5.9)	22.7 ¹⁻³ (4.7)	19.7 ^{1,2,6} (3.5)
Spain (N = 199–203)	30.2 (3.8)	35.0 (4.2)	26.2 (3.1)	21.7 (2.9)
Overall	29.0 (4.0)	33.5 (4.6)	23.8 (4.1)	20.7 (3.1)
Cronbach's alpha	0.87	0.87	0.85	0.90

Note: Level of self-directed learning abilities (Total SRSSDL_ITA): 40–90 low, 91–140 moderate, 141–200 high. 1–11 statistically significant difference between this country and: ¹Italy and Spain $p < .0001$; ²Portugal $p < .0001$; ³Finland $p < .0001$; ⁴Italy $p < .0001$; ⁵Slovakia $p < .0001$; ⁶Finland $p < .05$; ⁷Portugal $p < .05$; ⁸Czech Republic $p < .05$; ⁹Italy $p < .05$; ¹⁰Spain $p < .05$; ¹¹Slovakia $p < .05$.

Abbreviations: N, sample size; SD, Standard Deviation; SRSSDL_ITA, Self-Rating Scale of Self-Directed Learning.

level, the VAS is divided into four parts: ≤ 25 for low, $>25-50$ for rather good, $>50-75$ for good and $>75-100$ for very good level of competence (Flinkman et al., 2017; Meretoja et al., 2004). The NCS has been used in international studies showing evidence of validity and reliability with graduating nursing students (Kajander-Unkuri et al., 2021), recently graduated and more experienced nurses (Flinkman et al., 2017).

At first, we obtained the consent of the original authors and copyright holders of the Self-Rating Scale of Self-Directed Learning (SRSSDL_ITA) and the Nurse Competence Scale (NCS); then, we conducted the back-translation process according to the protocol agreed in the study project (Squires et al., 2013). We also conducted pilot studies in each country to ensure the understandability of the used instruments.

3.2.3 | Data collection

The data collection has begun in February 2018. In Finland, students graduated monthly and the sample size based on the power analysis was reached in December. In other countries, students graduated once a year and in Italy the target sample size was reached in November. Because we did not reach the target sample size in the Czech Republic, Portugal, Slovakia and Spain in 2018, we continued the data collection in April-May in the Czech Republic and Slovakia and in July-September 2019 in Portugal and Spain. An information letter about the study was sent by e-mail to the potential nursing students by the contact person(s) at each participating HEI. The email also included the Internet link to the questionnaire. In addition, two reminders were sent two and four weeks after the first contact (Kelley et al., 2003; Polit & Beck, 2018).

3.3 | Analysis

Continuous and normally distributed data were summarized using mean and standard deviation (SD). Associations between SDL ability score (total score and subscores) and explanatory variables were examined with a linear model. The explanatory variables in the model were the following: country, age, healthcare degree, turnover intentions, satisfaction with nursing degree programme, study achievements and competence (categorized as 0–50, 50+–75, 75+–). The model also included interaction between country and competence. Tukey's correction method for multiple comparisons was used. Furthermore, when the country by competence class interaction was significant, pairwise contrasts were created to study where the association between SDL abilities and competence differed. From these models, models-based means and estimate slope for continuous explanatory variables are presented. Assumptions for model were evaluated using studentized residuals. In addition, association between categorized SDL abilities (low level; average score 40–90, moderate level 91–140 and high level 141–200) and categorized competence was evaluated with chi-square test. Association between students' competence (total and subscores) and SDL abilities was evaluated with Pearson correlation coefficient. The significance level 0.05 (two-tailed) was used in the statistical analyses. In addition, 95% confidence intervals were calculated. We used SAS software, Version 9.4 of the SAS System for Windows (SAS Institute Inc., Cary, NC, USA) for data analysis in this study.

3.4 | Ethics

We followed the European code of conduct for research integrity (All European Academies, 2017) and the ethical principles of the

Learning methods (min 4, max 20) Average score (SD)	Learning activity (min 4, max 20) Average score (SD)	Interpersonal skills (min 4, max 20) Average score (SD)	Constructing knowledge (min 2, max 10) Average score (SD)	Total SRSSDL_ITA (min 40, max 200) Average score (SD), α
12.8 ^{1,2,5} (3.0)	14.9 ^{1,7} (3.3)	15.5 ^{1,6,7} (3.2)	6.5 ¹ (2.0)	149.6 ^{1,2,6} (22.8), 0.96
13.4 ^{1,2,11} (3.1)	15.3 ¹ (2.9)	16.2 ⁴ (2.6)	6.4 ^{1,7,11} (2.0)	154.8 ^{1,2} (14.8), 0.92
16.0 (2.7)	17.0 (2.4)	17.2 (2.4)	7.6 (2.4)	170.9 (16.3), 0.95
15.4 ¹⁰ (2.4)	15.8 ¹ (2.7)	16.5 ⁹ (2.3)	6.9 ¹ (1.9)	163.8 ¹ (17.7), 0.96
14.3 ¹⁻³ (3.1)	14.7 ^{1,2} (3.0)	15.1 ¹⁻³ (3.0)	6.9 ¹ (1.9)	152.0 ^{1,2} (23.2), 0.96
16.6 (2.8)	17.4 (2.6)	16.8 (3.0)	8.1 (1.8)	171.4 (17.8), 0.95
14.8 (3.1)	15.8 (3.0)	16.2 (2.8)	7.0 (2.0)	160.5 (20.5)
0.79	0.80	0.83	0.89	0.96

Declaration of Helsinki (World Medical Association, 2013) throughout the study. Respondents' right to privacy, anonymity and right to withdraw from the study were fully ensured. Students signed an informed consent when agreeing to participate in the study. The ethical approval including data protection for COMPEUnurse study project was obtained from the Ethics Committee of the University of Turku, Finland (Statement 16/2017 6.3.2017).

4 | RESULTS

4.1 | Sample characteristics

A total of 1,746 (=N) graduating nursing students from the Czech Republic, Finland, Italy, Portugal, Slovakia and Spain completed the questionnaire. The majority were women (88%) and their mean age was 24.6 years (variation between 19 and 56, SD 5.5). A little over one-third (37%) had a previous professional qualification in health care, and 42% had work experience in health care (besides clinical practicums during nursing education). The majority of the graduating nursing students (89%) were satisfied with their nursing degree programme, their self-assessed study achievements were either good (82%) or excellent (14%) and 87% of them had never or fairly seldom had turnover intentions.

4.2 | The level of SDL abilities

The graduating nursing students' overall SDL abilities were at high level in all six European countries, scores ranging from 149.6 to 171.4 (average score 160.5, SD 20.5). Comparison between countries revealed that the highest overall levels of SDL abilities were among Italian and Spanish graduating nursing students (scores

170.9, SD 16.3 and 171.4, SD 17.8, respectively). The lowest levels of SDL abilities were among Czech, Finnish and Slovak graduating nursing students (scores 149.5, SD 22.8; 154.8, SD 14.8; 152.0, SD 23.2, respectively). Statistically significant differences occurred between countries ($p < .0001$) (Table 2).

Graduating nursing students assessed the components Awareness, Attitudes and Motivation, which are perceived as the requirements for effective SDL, with the average scores of 29.0 (SD 4.0), 33.5 (SD 4.6) and 23.8 (SD 4.1), respectively. In these assessments, graduating nursing students from Italy and Spain assessed their abilities highest compared with Czech and Slovak graduating nursing students ($p < .0001$). Statistically significant differences were seen between the countries among the assessments of the components Learning strategy, Learning methods and Interpersonal skills, which are needed to successfully manage the process of SDL (Table 2).

4.3 | Background factors in relation to the level of SDL abilities

In the linear model analysis, older graduating nursing students ($F_1 = 13.39$, $p = .0003$) assessed their SDL abilities at higher level. In addition, graduating nursing students not having a previous health-care degree ($F_1 = 6.56$, $p = .011$), being very satisfied with their nursing education ($F_3 = 11.33$, $p < .0001$), who assessed their level of study achievements as excellent ($F_3 = 15.85$, $p < .0001$), or who had never had any turnover intentions ($F_3 = 4.95$, $p = .0020$) assessed their level of SDL abilities as statistically significantly higher compared with other graduating nursing students (Table 3). The model indicated significant differences in graduating nursing students' SDL abilities between countries ($F_5 = 23.87$, $p < .0001$) and a significant association between SDL abilities and competence level ($F_2 = 130.49$,

TABLE 3 The association of background factors with self-directed learning abilities analysed with linear model^a

Background factor	Self-directed learning abilities									
	Awareness Adj mean/ slope B (95% CI) Adj p	Attitudes Adj mean/ slope B (95% CI) Adj p	Motivation Adj mean/ slope B (95% CI) Adj p	Learning strategy Adj mean/ slope B (95% CI) Adj p	Learning methods Adj mean/ slope B (95% CI) Adj p	Learning activity Adj mean/ slope B (95% CI) Adj p	Interpersonal skills Adj mean/ slope B (95% CI) Adj p	Constructing knowledge Adj mean/ slope B (95% CI) Adj p	Total SRSSDL_ITA Adj mean/ slope B (95% CI) Adj p	
Age	0.047 (0.013–0.078) .0065*	0.041 (0.0078–0.082) .046*	0.070 (0.036–0.10) <.0001*	0.031 (0.0044–0.057) .022*	0.054 (0.029–0.081) <.0001*	0.016 (–0.011–0.042) .25	0.036 (0.011–0.061) <.0041*	0.0015 (–0.017–0.020) .88	0.30 (0.14–0.46) .0003*	
Degree in health care										
Yes	27.1 (26.1–28.2)	32.2 (30.9–33.6)	22.6 (21.5–23.7)	20.0 (19.1–20.9)	14.4 (13.5–15.2)	15.5 (14.6–16.4)	15.7 (14.9–16.5)	7.3 (6.6–7.9)	154.3 (149.0–159.5)	
No	27.5 (26.4–28.5)	33.0 (31.7–34.3)	22.8 (21.7–23.9)	20.3 (19.5–21.2)	14.6 (13.8–15.5)	15.8 (15.0–16.7)	16.1 (15.3–16.9)	7.2 (6.6–7.8)	156.9 (151.7–162.0)	
	.088	.0027*	.37	.054	.14	.053	.015*	.76	.011*	
Competence										
Rather good (vas ≤50)	25.2 (24.1–26.4)	30.4 (29.0–31.8)	21.2 (20.0–22.3)	18.8 (17.9–19.7)	13.4 (12.5–14.3)	14.7 (13.7–15.6)	14.7 (13.8–15.5)	6.6 (6.0–7.2)	144.5 (139.0–150.0)	
Good (vas > 50– 75)	27.4 (26.3–28.4)	32.5 (31.2–33.8)	22.7 (21.7–23.8)	20.2 (19.4–21.1)	14.4 (13.6–15.2)	15.6 (14.7–16.4)	15.8 (15.1–16.6)	7.2 (6.6–7.8)	155.4 (150.3–160.5)	
Very good (vas > 75– 100)	29.2 (28.1–30.3)	34.9 (33.6–36.3)	24.2 (23.1–25.3)	21.5 (20.7–22.4)	15.7 (14.8–16.5)	16.7 (15.9–17.6)	17.1 (16.3–17.9)	7.9 (7.3–8.5)	166.8 (161.6–172.1)	
	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	
Satisfaction with nursing degree programme										
Very satisfied	28.1 (27.0–29.2)	33.6 (32.2–34.9)	23.6 (22.5–24.7)	20.6 (19.7–21.4)	15.0 (14.2–15.9)	16.1 (15.2–16.9)	16.5 (15.7–17.3)	7.5 (6.9–8.1)	160.5 (155.3–165.8)	
Satisfied	27.1 (26.1–28.1)	32.7 (31.4–34.0)	22.7 (21.7–23.8)	20.1 (19.3–20.9)	14.5 (13.7–15.3)	15.6 (14.7–16.4)	15.8 (15.0–16.6)	7.3 (6.7–7.9)	155.3 (150.3–160.3)	
Unsatisfied	26.7 (25.6–27.8)	32.5 (31.1–33.9)	22.0 (20.8–23.1)	19.8 (18.9–20.7)	13.8 (12.9–14.6)	14.9 (14.0–15.8)	15.6 (14.7–16.4)	6.6 (6.0–7.3)	151.2 (145.7–156.6)	
Very unsatisfied	27.2 (25.7–28.8)	31.7 (29.8–33.7)	22.5 (20.9–24.1)	20.2 (18.9–21.4)	14.7 (13.5–15.9)	16.1 (14.9–17.4)	15.7 (14.5–16.8)	7.5 (6.6–8.4)	155.4 (147.8–162.9)	
	<.0001*	.0053*	<.0001*	.029*	.0002*	.0004*	.0002*	.0002*	<.0001*	
Study achievements										
Excellent	29.9 (29.3–30.5)	34.3 (33.6–35.1)	24.4 (23.8–25.0)	21.3 (20.8–21.8)	15.2 (14.8–15.7)	16.0 (15.6–16.5)	16.7 (16.3–17.2)	6.9 (6.6–7.3)	164.3 (161.4–167.2)	
Good	28.5 (28.1–29.0)	32.8 (32.3–33.4)	23.2 (22.8–23.7)	20.3 (20.0–20.7)	14.3 (14.0–14.7)	15.4 (15.1–15.8)	15.8 (15.5–16.1)	6.8 (6.6–7.1)	156.8 (154.6–159.0)	
Poor	26.9 (26.0–27.8)	31.0 (29.8–32.2)	22.6 (21.6–23.5)	19.1 (18.4–19.9)	14.0 (13.2–14.7)	16.0 (15.2–16.8)	15.5 (14.8–16.2)	7.3 (6.8–7.8)	151.7 (147.0–156.1)	
Very poor	23.8 (20.0–27.6)	32.4 (27.7–37.1)	20.6 (16.7–24.5)	19.9 (16.9–23.0)	14.5 (11.5–17.5)	15.2 (12.1–18.2)	15.5 (12.7–18.4)	7.9 (5.7–10.0)	149.7 (131.2–168.2)	
	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	.0078*	<.0001*	.21	<.0001*	

TABLE 3 (Continued)

Self-directed learning abilities																
Background factor	Awareness		Attitudes		Motivation		Learning strategy		Learning methods		Interpersonal skills		Constructing knowledge		Total	
	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
Turnover intentions																
Never	27.7 (26.6–28.7)		33.1 (31.8–34.4)		23.2 (22.1–24.3)		20.3 (19.5–21.1)		14.8 (14.0–15.6)		16.2 (15.4–17.0)		7.4 (6.9–8.0)		158.6 (153.5–163.6)	
Fairly seldom	27.1 (26.1–28.2)		32.5 (31.2–33.7)		22.8 (21.7–23.8)		20.2 (19.4–21.1)		14.6 (13.8–15.4)		15.9 (15.1–16.8)		7.2 (6.6–7.8)		156.0 (150.9–161.1)	
Fairly often	26.9 (25.7–28.0)		32.5 (31.1–33.9)		22.3 (21.1–23.4)		19.8 (18.9–20.7)		14.5 (13.6–15.4)		15.4 (14.4–16.3)		7.0 (6.4–7.7)		154.0 (148.4–159.5)	
Very often	27.4 (26.0–28.9)		32.5 (30.7–34.3)		22.5 (21.1–24.0)		20.4 (19.2–21.5)		14.1 (13.0–15.3)		15.3 (14.1–16.4)		7.2 (6.4–8.0)		153.8 (147.0–160.7)	
	.0067*		.043*		.0059*		.15		.19		.0088*		.047*		.002	

Abbreviations: Adj mean, model-based mean; Adj p, model-based p; CI, confidence interval; VAS, Visual Analogue Scale.

*Statistically significant p-value < .05.

Statistically significant values are in bold.

^aLinear model (multi-way analysis of covariance) including country, age (continuous), degree in health care (categorical), NCS category, satisfaction category, study achievement category, turnover intentions category, and interaction between country and NCS category in the model. Model-based means (Adj mean) are presented together with adjusted p-value (Tukey's correction).

TABLE 4 Correlations between self-directed learning abilities and competence (Pearson's r)

Competence (NCS)	Self-directed learning abilities								Total SRSSDL_ITA
	Awareness	Attitudes	Motivation	Learning strategy	Learning methods	Learning activity	Interpersonal skills	Constructing knowledge	
Helping role	0.47*	0.37*	0.35*	0.41*	0.36*	0.33*	0.38*	0.25*	0.49*
Teaching – coaching	0.42*	0.37*	0.34*	0.40*	0.33*	0.33*	0.37*	0.25*	0.47*
Diagnostic functions	0.42*	0.38*	0.30*	0.38*	0.31*	0.31*	0.37*	0.24*	0.45*
Managing situations	0.39*	0.37*	0.31*	0.34*	0.27*	0.28*	0.32*	0.21*	0.42*
Therapeutic interventions	0.37*	0.33*	0.33*	0.35*	0.29*	0.26*	0.32*	0.26*	0.41*
Ensuring quality	0.39*	0.34*	0.34*	0.35*	0.34*	0.29*	0.34*	0.27*	0.44*
Work role	0.36*	0.34*	0.34*	0.34*	0.28*	0.28*	0.30*	0.23*	0.40*
Overall competence	0.47*	0.42*	0.38*	0.43*	0.36*	0.35*	0.40*	0.29*	0.52*

Abbreviations: NCS, Nurse Competence Scale; r, Pearson's coefficient; SRSSDL_ITA, Self-Rating Scale of Self-Directed Learning.

*Significance level p < .0001.

$p < .0001$). However, the association between SDL abilities and competence level varied significantly between the countries ($F_5 = 2.20$, $p = .0158$). More detailed interaction tests revealed that the association between SDL abilities and competence level differed between Portugal and Slovakia ($p = .0158$), Finland and Slovakia ($p = .0011$), and Finland and the Czech Republic ($p = .0269$).

The nursing students' SDL abilities and competence correlated positively and statistically significantly ($r = .52$, $p < .0001$). Furthermore, a positive and statistically significant correlation was found between every component of SRSSDL_ITA and every competence category. The strongest correlations were between Awareness and Helping role ($r = .47$, $p < .0001$), Awareness and Teaching – coaching ($r = .42$, $p < .0001$) and Awareness and Diagnostic functions and ($r = .42$, $p < .0001$) (Table 4).

Based on their level of competence, the nursing students were split into groups (1) rather good level; VAS < 50 , (2) good level; VAS mean > 50 – 75 and (3) very good level; VAS mean > 75 – 100 , with nearly 60% were at good level. In addition, based on the level of SDL abilities, the students were split into three groups (low level; average score 40–90, moderate level 91–140, and high level 141–200), and the majority of them (85.4%) were at high level. The association between the level of SDL abilities and the level of self-assessed competence was statistically significant ($p < .0001$) (Table 3).

5 | DISCUSSION

In this study, graduating nursing students' level of self-directed learning abilities in six European countries and the factors related to SDL abilities at graduation were analysed. The study is important as student-centred teaching and learning approaches are emphasized globally (OECD, 2012, 2018), and although our results are from across Europe, they are useful for new nurses, nurse managers and nurse teachers internationally. Understanding graduating nursing students' level of SDL abilities will provide a reference for nursing students of their SDL status for lifelong learning and professional development at the point of graduation. As new nurses, they need to have abilities to achieve lifelong learning and continuously update their competence. In addition, the findings might be useful for nurse teachers to give knowledge of the areas of SDL where nursing students need support during the nursing education.

The main finding of this study indicates the graduating nursing students have a high level of SDL abilities as assessed with SRSSDL_ITA. Different levels of SDL abilities have been found in previous studies conducted, e.g. in Italy (Cadorin et al., 2016) and Taiwan (Cheng et al., 2014), South Korea (Lee et al., 2020) and the United Kingdom (Williamson, 2007). Because there is no other comparative study between the countries, coherent conclusions about the SDL level cannot be drawn. Individuals of a certain success level admitted to university are expected to have SDL abilities (Tekkol & Demirel, 2018). Students construct their own SDL meaning based on their motivation to learn and interaction between prior knowledge. Acquiring the necessary abilities for SDL depends on the perceptions of teachers and students of the character and objective of SDL

along with the motivation, responsibility and commitment to participate in the process (Pryce-Miller & Serrant, 2019).

In this study, graduating nursing students' SDL abilities differ between participating countries: Italian, Portuguese and Spanish graduating nursing students assessed their SDL as highest and those from the Czech Republic as lowest. There were also differences between countries in SDL components. The requirements for effective SDL, the components awareness, attitudes and motivation (Behar-Horenstein et al., 2018; Cadorin et al., 2013), were assessed the lowest among Czech, Finnish and Slovak graduating nursing students. The differences may be explained by variation in the duration of nursing education, for example, as in Portugal and in Spain, nursing education lasts four years (Kajander-Unkuri et al., 2021), or by variations in some contextual factors, e.g. social, cultural, educational settings, and the impact of previous experiences on learners' motivation and ability to act self-directed (Greveson & Spence, 2005). In Italy, Portugal and Spain, significantly fewer graduating nursing students reported having a previous degree in health care compared with Czech, Finnish and Slovak nursing students (Kajander-Unkuri et al., 2021). In our study, graduating nursing students with a previous degree in health care assessed their SDL abilities lower than other graduating nursing students. This might be because the previous degree in health care is usually a practical nurse degree in the Czech Republic, Finland and Slovakia. Practical nurses have completed a vocational qualification and a level-four training according to the European Qualifications Framework (European Union, 2018). It has been found that practical nurses tend to be task-oriented and focused on organizationally driven care (Turjamaa et al., 2014) and this working tradition might have influenced on how these students assess their SDL abilities. However, this connection needs more research.

The differences between countries may also depend on other factors associated with practical experiences of graduating nursing students such as differing clinical and theory teaching strategies on clinical decision-making and development of critical thinking (Cadorin et al., 2015; Shirazi et al., 2017). Czech, Finnish and Slovak graduating nursing students assessed the lowest components learning strategy, learning methods and interpersonal skills, which are needed for effectively managing the process of SDL (Behar-Horenstein et al., 2018; Cadorin et al., 2013). Teaching activities which focus on group dominated learning instead of the teacher-centred teaching improves students' SDL ability (Wang et al., 2021). Countries where graduating nursing students assessed their SDL abilities were low, could explore their teaching strategies and, if needed, develop them to support and enhance nursing students' SDL abilities.

Several factors being positively related to graduating nursing students' SDL abilities were found. Age was related to SDL abilities in line with Slater and Cusick (2017). However, the chronological age itself might not contribute to higher SDL abilities. It has been found that adult learners, who have more life and study experience seem to be more self-directed when it comes to learning processes (Williamson, 2007). There was a positive association between SDL ability and satisfaction with the nursing degree programme, similar to a previous study (Zhoc & Chen, 2016). Furthermore, graduating nursing students' study achievements were associated with SDL

ability, and similar findings have been reported earlier (Avdal, 2013; Tekkol & Demirel, 2018; Zhoc & Chen, 2016). These results replicate previous indication that SDL facilitates positive and higher levels of learning and foster rewarding learning outcomes and hence, satisfactory experience at the university (Zhoc & Chen, 2016). We also found statistically significant differences between SDL components and background factors. Although mean differences were statistically significant, some of them were perhaps meaningless in practice.

Nurse turnover is a serious problem globally and in a European study (10 countries), around quarter of nursing students had planned to leave nursing even before graduating (Kajander-Unkuri et al., 2021). In our study, graduating nursing students, who had never had any turnover intentions assessed their level of SDL abilities as statistically significantly higher than other graduating nursing students. Developing higher SDL abilities during the nursing programmes according to the educational strategies implemented might increase understanding of the potentialities and value of the nursing profession, and thus increase the attractiveness of the profession and the intention to remain.

Graduating nursing students' higher self-assessed competence level was related to SDL abilities in line with Murad et al. (2010) who found that SDL is effective in graduating nursing students' competence achievement. However, the correlations between components of SDL abilities and competence categories were weak, and the correlation between total SDL abilities (total SRSSDL_ITA score) and overall competence (total NCS score) was moderate. Thus, this result must be treated with caution. According to nurse teachers, SDL is one of the factors relating to graduating nursing students' competence (Järvinen et al., 2021). Professional development after graduation requires equipping graduating nursing students with needed abilities to continue to learn after graduation (Al Moteri, 2019) and supporting nursing students' continuous life-long learning as professional nurses are one of the requirements for nurse teacher (World Health Organization, 2016). Self-directed lifelong learning is a crucial component of competence for nurses to meet the needs and requirements of professional development (Al Moteri, 2019). Therefore, it is necessary to strengthen nursing students' SDL ability upon graduation.

5.1 | Limitations

In every participating country, we used convenience sampling, which is a limitation of our study. Together with the moderate response rate, 42%, it might prevent representativeness. However, to our knowledge, there are no studies analysing and reporting comparisons of graduating nursing students' level of SDL abilities across European countries. The data collection process took 18 months to reach the required number of respondents per country based on power analysis. This could have influenced on the results. Nevertheless, no changes were made to the nursing curricula during this time in the participating HEIs. Using a self-assessed method could have influenced the students' high assessments, known as self-assessment bias. However, self-assessment is considered as an essential element of a multi-method assessment strategy.

6 | CONCLUSIONS

This international comparative study produced new knowledge about graduating nursing students' SDL abilities. Graduating nursing students' high assessments of their SDL abilities are related to a better level of study achievement, satisfaction with the nursing degree programme, and self-assessed competence. Assessments of awareness, attitudes and motivation components of SDL abilities were the highest and were especially associated with nursing students' higher-level competence. During nursing education, it is particularly significant to support the progress of the SDL abilities of nursing students who have completed a previous degree in health care, in order of continuation of their professional development after graduation. An evidence-based and systematic evaluation of the SDL abilities of nursing students across Europe should be established to foster the lifelong learning and professional development of nurses.

ACKNOWLEDGEMENTS

We would like to thank all graduating nursing students who participated in this study and all contact persons in all organizations who kindly helped with the data collection. We are grateful to professor Riitta Meretoja for her expertise of the NCS-instrument and the international use of it.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data: LV-J, AP, AB, LC, LS, HL-K, EL, JN, CSO, MR, RZ, SK-U; Involved in drafting the manuscript or revising it critically for important intellectual content: LV-J, AP, AB, LC, LS, HL-K, EL, JN, CSO, MR, RZ, SK-U; 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: LV-J, AP, AB, LC, LS, HL-K, EL, JN, CSO, MR, RZ, SK-U; 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: LV-J, AP, AB, LC, LS, HL-K, EL, JN, CSO, MR, RZ, SK-U.

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (<http://www.icmje.org/recommendations/>)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

ETHICAL APPROVAL

The Ethics Committee of the University of Turku, Statement 16/2017 6.3.2017.

DATA AVAILABILITY STATEMENT

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

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How to cite this article: Visiers-Jiménez, L., Palese, A., Brugnolli, A., Cadorn, L., Salminen, L., Leino-Kilpi, H., Löyttyniemi, E., Nemcová, J., Simão de Oliveira, C., Rua, M., Zeleníková, R., Kajander-Unkuri, S., & the COMPEUnurse-Consortium (2022). Nursing students' self-directed learning abilities and related factors at graduation: A multi-country cross-sectional study. *Nursing Open*, 9, 1688–1699. <https://doi.org/10.1002/nop2.1193>