Research article

Nurses retrospective view on nursing education: A repeated cross-sectional study over three decades

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ARTICLE INFO

ABSTRACT

Background: As the healthcare landscape undergoes transformative shifts due to factors like ageing demographics, technological innovations, rapid global dissemination of infectious diseases, and imperatives for accessible, cost-effective care, a pressing need emerges for the contemporisation of nursing education. Notably, there is a paucity of research delving into nurses' introspective evaluations of their educational experiences after their immersion in professional settings.
Objective: This study aimed to examine nurses' evaluations of their educational background over 30 years and identify relationships between their assessments and their demographic.
Design: The study embraced a recurrent cross-sectional survey methodology, encompassing three distinct quantitative cross-sectional evaluations conducted in the years 1999, 2009, and 2021.
Context/participants: The cohort for this inquiry consisted of nurses stationed in Estonian general hospitals and inpatient departments of developmental plan institutions, each with at least one year of professional experience. Cumulatively, 832 nurses were engaged across three sequential evaluations: Study I (n = 463), Study II (n = 198), and Study III (n = 171).
Methods: Data procurement was executed via a structured survey, with subsequent analytical procedures encompassing descriptive and correlational methodologies.
Results: A discernible augmentation in the educational calibre of nurses was observed with each successive evaluation. This escalation concomitated enhanced positive assessments in areas like evidence-informed education, skill development, and autonomous operational capabilities. Yet, a critical appraisal persisted concerning their competencies in navigating complex patient interactions and addressing socio-religious dilemmas.
Conclusions: The merit of this investigation lies in its illumination of nursing education's evolution, as perceived retrospectively by nurses who have operationalized their academic learnings in real-world scenarios. Their vantage point, inherently informed by practice, uniquely positions them to earmark avenues of refinement. This exploration paves the way for enrichments in nursing education, spotlighting the imperative of equipping nurses to adeptly manage intricate situations.

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1. Introduction

Regardless of socioeconomic trends, the global burden of disease and the complexity of medical cases are increasing [1]. Nurses represent the largest occupational group in the healthcare sector, comprising approximately 59% of the global healthcare workforce [2]. The imperative to train professionally competent nurses capable of meeting the demands of modern healthcare while upholding high ethical standards has emerged as a response to the ever-evolving world [3–5]. In developed countries, nurses play a crucial role in improving health services. They lead patient care as innovators and change agents [6]. Nursing education must continually evolve and adapt to changing trends such as an ageing population, technological advancements, the proliferation of infectious diseases, and the imperative for accessible and affordable treatment [5,7,8].

Governments worldwide have taken action to improve healthcare by upgrading the quality of nursing education. The global challenge for higher education institutions is to provide modified undergraduate curricula and practical learning opportunities that meet healthcare demands, the most important factors being technological advancements, patient-centredness, and increasing amounts of data [9–11]. In Europe, the Bologna Process has driven the rise in nurses' educational standards and facilitated the transition from vocational training to bachelor's degree programmes [12,13]. Similarly, it has shifted nursing education to higher education institutions and introduced master's degree programmes [14–18]. However, cultural, social, experiential, and economic disparities between countries present challenges to nursing education, which, although regulated in each country, remains heterogeneous [12,13, 19,20].

Some perspectives suggest that the competencies and skills of nurses with higher educational qualifications do not meet the expectations of clinical settings. There is a gap between the educational theories and actual practice [21–24]. Analyses of nurses' competencies and performance provide valuable insights for developing new training plans, designing curricula, implementing new learning methods, and improving the quality of nursing education [24,25]. In today's rapidly changing healthcare environment, nurses face numerous challenges. Still, a central question revolves around how to ensure that nurses with higher levels of education meet the expectations of clinical practice. While several studies have examined nurses' competencies and educational backgrounds, clear research gaps persist in understanding the specifics of this field [21–25]. This study examined the retrospective evaluations of Estonian nurses regarding their education based on the GANES framework. Our objective was to understand how these evaluations have evolved and how they relate to nurses' educational levels, age, work experience, and specialisation.

2. Background

In Estonia, nursing education has transitioned from Soviet-era practices to European Union - guideline-aligned higher education. While some European Union countries deemed the shift from vocational education unnecessary, the Bologna Process encouraged educational harmonisation, facilitating nurse mobility and promoting the pursuit of higher education [12,26].

The level and quality of nursing education vary widely across the world. Well-educated nurses are essential for achieving optimal health outcomes. Nursing education plays a significant role in preparing students for their future professional practice, where they must be culturally competent. The impact of globalisation on healthcare necessitates the development of curricula that emphasise globalisation and skills such as cultural competence [27–29]. Thus, international guidelines are required to realise global consistency in high-quality education. The Global Alliance for Leadership in Nursing Education and Science (GANES) has developed a global framework to promote and harmonise high-quality undergraduate education for registered nurses [27]. This framework identified three important pillars in nursing education. The first pillar outlines the expected graduate learning outcomes in: 1) knowledge and practical skills; 2) communication and collaboration; 3) critical thinking, clinical reasoning, and clinical decision-making; and 4) professionalism and leadership [9]. Over time, nursing education has become competency-based, focusing on the observable abilities of a nurse, such as knowledge, skills, values, and attitudes [30]. The overriding principle of nursing practice is patient-centredness, expressed in honesty, individuality, self-determination, privacy, family-centredness, safety, holistic nursing principles, and health-centredness. Adherence to the individuality principle requires the patient to be treated as a unique and valuable person who should receive support according to their needs [31,32].

The second pillar of the GANES framework concentrates on guidelines for curriculum development, admissions, and learning experiences [27]. The third pillar serves as a guide for higher education institutions, addressing key aspects such as ensuring that faculty members are well qualified and supported, providing adequate resources for teaching and learning, fostering strong leadership within the institution, and implementing effective assessment methods to evaluate student performance and program outcomes [9].

The proportion of professionally educated nurses with bachelor's degrees is significantly related to improved health outcomes [9, 33]. Recent scholarly investigations underscore an increasing body of evidence suggesting a correlation between nursing staffing, nursing education levels, and in-hospital mortality rates [20,34,35]. The current healthcare system requires nursing education to be accompanied by a transition to higher levels of clinical decision-making, team leadership, and political skills, thus empowering nurses to manage care in complex settings and across health and social sector boundaries [9].

Given the paramount importance of global perspectives and nurses' evaluations in elevating the quality of nursing education and patient care, a notable research gap remains, especially in specific regions like Estonia. While the GANES framework provides a global foundation for assessing nursing education, there has been a scarcity of in-depth research tailored to specific cultural and geographical contexts such as Estonia. This research deficiency may overlook local nuances and experiences essential for adapting and optimising educational programs. Thus, to bridge this gap and gain a richer understanding of the quality and relevance of nursing education for Estonian nurses, this study aims to analyse the retrospective opinions of Estonian nurses about their education using the three pillars of the GANES framework. To achieve this goal, the following research questions were formulated.

RQ1. How have nurses' retrospective evaluations of their education changed over the past 30 years?

RQ2. What is the relationship between nurses' education level and their retrospective evaluation of their education?

RQ3. What is the relationship between nurses' retrospective evaluation of their education and their age, work experience, and specialisation?

3. Materials and methods

3.1. Study design

This quantitative study employed a repeated cross-sectional survey design, with data collected once every ten years (see Table 1). Materials and methods are described in accordance with the STROBE guidelines [36]. Data were collected at different time points from the same target population but not from the same individuals [37], allowing for the comparison of opinions regarding nurse education from different generations. The years in which the study was conducted were significant for nursing education in Estonia. In 1999, the first nurses graduated from higher education in professional nursing. In 2009, the transition to outcomes-based curricula took place, and in 2021, the master's degree program in Health Sciences was launched.

3.2. Participants

In each study year, the sample included nurses working in the inpatient departments of Estonian hospitals with at least one year of nursing experience. The first study included nurses from the internal medicine and surgery departments of 14 hospitals. By 2009 (Study II), several hospitals had closed or changed functions due to healthcare restructuring [38], and only six hospitals with internal medicine and surgery departments participated. Nurses working in hospitals under the Hospital Network Development Plan [39] participated in Study III (See Table 1).

A total of 832 participants were enrolled in this study (Study I, n = 463; Study II, n = 198; and Study III, n = 171). Table 2 presents their characteristics. A more detailed description of the participants is provided in the results section.

3.3. Data collection

This study adhered to the principles of the Declaration of Helsinki. Studies I and II required approval from the participating institutions, and Study III was approved by the Research Ethics Committee of the University of Tartu (approval numbers 332/T-21 December 21, 2020 and 345/M-7 June 14, 2021). Paper questionnaires were used in Studies I and II, whereas Study III used an electronic questionnaire. All data were anonymised, and participants provided informed consent. Participation was voluntary, and each nurse provided only one response per study. The questionnaire underwent minor revisions for clarity; however, the content remained consistent across the three studies. Completion took approximately 60 min.

3.4. Instruments

The International Working Group of the Baltic-Finnish NuRsE project developed the questionnaire in 1997 and tested in 1998. It is based on Donabedian's model [40–42], with additional influence from Maanen's views [43], Benner's model [44], and Rauhala's holistic human approach [45]. Donabedian's model provided a conceptual framework for studying and evaluating healthcare services and quality [46], to which the development of nursing practices and healthcare in Baltic countries was also incorporated [47].

The questionnaire consisted of 42 items, a part of which was used in this study. Questions 1–10 focused on background information and were either numerical (age, work experience) or included multiple-choice answers (nursing education; nursing specialisation).

Table 1
Hospitals included in Studies I, II, and III.

	North Estonia, Tallinn	South Estonia	West Estonia	East Estonia
Study I, 1999	Järvamaa Hospital	Viljandi Hospital	Pärnu Hospital	Rakvere Hospital
	Keila Hospital	Põlva Hospital	Kuressaare Hospital	Tapa Hospital
	Tallinn Mustamäe Hospital	Võru Hospital	Hiiumaa Hospital	
	Tallinn Oncology Hospital	Jõgeva Hospital		
	Järve Hospital			
Study II, 2009	Järvamaa Hospital		Pärnu Hospital	Ida-Viru Central Hospital
	The North Estonia Medical Centre			
	East Tallinn Central Hospital			
	West Tallinn Central Hospital			
Study III, 2021	Järvamaa Hospital	Viljandi Hospital	Pärnu Hospital	East Viru Central Hospital
	Raplamaa Hospital	Põlva Hospital	Kuressaare Hospital	Narva Hospital
	The North Estonia Medical Centre	South-Estonia Hospital	Läänemaa Hospital	
	East Tallinn Central Hospital	Valga Hospital	Haapsalu Neurological Rehabilitation Centre	
	West Tallinn Central Hospital	Tartu University Hospital		

Table 2

Age, work experience, specialisation, and level of education of the participating nurses.

		Age				Work experience, y				Nurse specialist		Level of education		
		21–30	31–40	41–50	>51	1–5	6–10	11–20	>21	No	Yes	Vocational education	Higher education	Master's degree
1999	n (%)	200 (43.2)	124 (26.8)	75 (16.2)	59 (12.7)	107 (23.1)	99 (21.4)	128 (27.6)	127 (27.4)	222 (47.9)	207 (44.7)	458 (98.1)	2 (0.4)	0
		mean 36/min 21/max 66/SD 11				mean 15/min 1/max 47/SD 11								
2009	n (%)	41 (20.7)	66 (33.3)	53 (26.8)	35 (17.7)	32 (16.2)	30 (15.2)	56 (28.3)	76 (38.4)	83 (41.9)	92 (46.5)	108 (54.5)	87 (43.9)	0
		mean 41/min 23/max 73/SD 11				mean 19/min 1/max 47/SD 2								
2021	n (%)	34 (19.9)	35 (20.5)	53 (31.0)	49 (28.7)	43 (25.1)	23 (13.5)	25 (14.6)	80 (46.8)	106 (62.0)	65 (38.0)	16 (9.4)	130 (76.0)	25 (14.6)
		mean 43/min 22/max 72/SD 12				mean 19/min 1/max 52/SD 14								

This study analysed statements q1–q27 from question Q39, which focused on nurses' retrospective evaluation of education and served as the dependent variable. A Likert scale [48] was used to measure responses, with scores ranging from 1 (strongly disagree) to 4 (strongly agree). Nurses were asked to think about their nursing education and accordingly rank each statement. Associations between education levels over the years and of age, work experience, education, and specialisation with nurses' opinions on their education were examined. Statements were grouped by theme based on the Global Pillars for Nursing Education ([27]; See Table 3.) The statements used to examine learning and experience were presented negatively and reversed in the analysis.

3.5. Data analysis

All statistical procedures were executed utilising IBM SPSS Statistics (version 22.0, IBM Corp, Armonk, NY). Before embarking on the main analyses, a preliminary scrutiny of the data was undertaken to ascertain that no breaches of the assumptions for the selected statistical tests were present.

Descriptive Statistics: We computed various descriptive statistics to comprehensively portray our sample cohort. These included characteristic frequency distributions, means, and standard deviations. To understand the distribution pattern of the distinct categories within the dataset, chi-square tests were employed, specifically for categorical variables. This initial analytic step was instrumental in framing the context for the more intricate analyses that followed.

Addressing Data Completeness and Outliers: During data cleaning, instances of missing data were confronted using a listwise deletion approach. This ensured that all subsequent analyses were firmly rooted in datasets entirely devoid of gaps.

The ANOVA method was our primary tool for discerning potential differences in nurses' retrospective evaluations of their education spanning different years. Fundamental assumptions tied to the ANOVA method were meticulously examined. This involved confirming the normal distribution of data, the homogeneity of variances, which was corroborated using Levene's test, and the independence of observations.

To address RQ1, ANOVA and post-hoc tests were employed. ANOVA assessed whether the mean rating of nurses' education varied significantly among the years (1999, 2009, 2021). Post-hoc tests compared mean ratings pairwise to identify the years with statistically significant differences. Dispersion analyses and post-hoc tests were selected as they are appropriate for examining homogeneity in mean ratings.

To address RQ2, ANOVA was utilised (Table 4) to examine if mean ratings of nursing education differed between those with vocational nursing education (comparing 1999, 2009, and 2021) and those with higher education in nursing (comparing 2009 and 2021).

To address RQ3, Pearson's correlation coefficient was employed (Table 5) to measure the strength of the linear relationship between nurses' work experience (in years), age (in years), nursing specialisation (yes/no), and education level (vocational, applied

Table 3

Grouping of statements q1–q27 from survey Q 39 within the context of the GANES Global Pillars for Nursing Education Framework.

GANES	Grouping of Statement	Q39	Statement
Critical Thinking, Clinical Reasoning and Clinical Judgement	Research, quality, and independence	q2	The development of nursing was addressed based on scientific research
		q3	The education prepared me to perform only separate tasks
		q4	The training prepared me to understand the individual needs of patients
		q5	The training prepared me to develop the quality of nursing care
		q12	The training has strengthened my independent learning skills
Learning Experiences	Teaching-oriented learning style	q6	The teachers did not allow any discussions during the lectures
		q7	I mainly learned everything by heart
		q8	During the training, the teachers always told me what I had to do in advance
		q23	My training consisted mainly of practising nursing activities
Professionalism and Leadership	Personal development	q1	During my training as a nurse, I realised my purpose in life
		q11	During my studies, my individual needs were taken into account
		q17	The teachers supported the growth of my personality
		q24	During the training I developed my skills to protect the weaker ones
Communication	Relationship in the learning process	q10	My personality did not strengthen during my nursing training
		q13	The knowledge obtained was primarily based on medical knowledge
		q16	The training has provided me knowledge about mainly somatic diseases
		q21	In a study situation I was in an I-thou relationship with my teacher
Collaboration	Teamwork in the learning process	q9	Teaching was based on critical discussions in the learning group
		q15	The teacher encouraged learners to take joint responsibility
		q18	During my training I practised solving people's social problems
		q19	During the training it was possible to get acquainted with religious topics
		q20	Health promotion was included in the training
Knowledge and Practice Skills	Nursing theory in the nursing curricula	q14	The teaching was based on nursing models
		q22	During the training, we addressed being goal-oriented as equal partners with teacher
		q25	Caring for patients in a serious condition was part of the training
		q26	The knowledge offered during the training was based on previous knowledge from the nursing practice
		q27	Discussions during the training increased my ability to understand different experiences

Table 4
Nurses' education evaluations in studies I, II, and III: Mean scores, statistical significance, and comparisons by education level.

		Research, quality and independence					Teaching-oriented learning style				Personal development				Relationship in the learning process				Teamwork in the learning process					Nursing theory in the nursing curricula				
		q2	q3	q4	q5	q12	q6	q7	q8	q23	q1	q11	q17	q24	q10	q13	q16	q21	q9	q15	q18	q19	q20	q14	q22	q25	q26	q27
mean[a]	1999	2.5	2.3	3.0	3.0	3.0	2.9	3.1	3.0	2.6	2.6	2.6	2.4	2.7	2.1	2.8	2.6	3.0	2.0	2.6	2.3	2.1	2.6	2.5	2.3	3.1	2.7	3.0
	2009	3.3	2.6	3.4	3.4	3.3	3.3	3.2	3.3	2.7	2.9	2.3	2.6	2.8	1.8	3.1	2.7	2.9	2.6	2.8	2.6	2.2	3.0	3.1	2.6	3.0	3.1	3.2
	2021	2.8	2.4	3.0	3.1	3.1	3.0	3.0	2.9	2.5	2.7	2.6	2.7	2.8	2.2	2.5	2.6	3.0	2.2	2.7	2.7	2.4	3.0	2.8	2.6	3.1	2.8	3.2
p-value[b]		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	**0.22**	0.00	0.00	**0.27**	**0.37**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.34**	0.00	0.00
Non-higher education																												
mean[a]	1999	2.5	3.1	3.0	3.0	3.0	2.9	3.1	3.0	2.6	2.6	2.6	2.4	2.7	2.1	2.8	2.6	3.0	2.0	2.6	2.3	2.1	2.6	2.5	2.3	3.1	2.7	3.0
	2009	2.7	3.0	3.0	3.1	3.0	3.0	2.8	2.9	2.3	2.8	2.6	2.8	2.9	2.2	2.6	2.6	2.9	2.2	2.7	2.6	2.3	2.9	2.7	2.6	3.1	2.8	3.2
	2021	2.8	2.2	3.2	3.2	3.4	3.1	3.1	3.3	2.3	3.3	2.6	2.7	2.8	1.9	3.4	2.3	3.2	2.3	2.8	2.7	2.2	3.0	2.7	2.7	3.4	3.3	3.2
p-value[b]		0.02	0.06	**0.40**	**0.47**	0.03	**0.19**	0.01	0.04	0.00	0.00	1.00	0.00	0.04	**0.27**	0.00	**0.38**	**0.34**	0.01	**0.27**	0.00	0.07	0.01	0.06	0.00	0.07	0.00	0.01
Applied higher education or bachelor's degree																												
mean[a]	2009	2.9	2.9	3.1	3.2	3.2	3.0	3.1	2.9	2.6	2.6	2.7	2.6	2.8	2.2	2.5	2.6	3.1	2.2	2.7	2.8	2.5	3.1	3.0	2.6	3.2	2.8	3.2
	2021	3.4	2.6	3.4	3.3	3.3	3.3	3.1	3.3	2.7	2.9	2.3	2.5	2.8	1.9	3.1	2.7	2.9	2.6	2.8	2.6	2.2	3.0	3.2	2.5	2.9	3.1	3.1
p-value[b]		0.00	0.02	0.00	0.14	0.15	0.00	**0.57**	0.01	**0.34**	0.03	0.00	**0.30**	**0.88**	0.01	0.00	**0.36**	**0.18**	0.00	**0.63**	0.04	0.03	**0.44**	0.10	**0.46**	0.04	0.00	**0.54**

[a] A Likert scale was used, with scores ranging from 1 (fully disagree) to 4 (fully agree).
[b] The mean difference is significant at the 0.05 level.

Table 5

Pearson correlation between work experience, age, nursing specialisation, and nursing degree concerning questions in 1999, 2009, and 2021.

	Research, quality and independence					Teaching-oriented learning style				Personal development				Relationship in the learning process				Teamwork in the learning process					Nursing theory in the nursing curricula					1	2	3	4
	q2	q3	q4	q5	q12	q6	q7	q8	q23	q11	q24	q17	q1	q13	q16	q21	q10	q18	q19	q20	q9	q15	q22	q14	q25	q26	q27				
2021 1	-,215ᵃ	−.071	−.112	.013	−.016	.108	-,206ᵃ	-,234ᵃ	-,154*	−.094	−.146	−.021	.049	.010	−.065	.072	.051	−.060	−.014	−.149	-,201ᵃ	−.123	−.089	−.140	−.085	−.001	.014	1			
2	-,161*	−.111	−.068	.008	.099	.041	-,169*	-,191*	-,150*	.063	−.043	.073	.073	.038	.034	.109	.038	−.024	−.026	−.009	−.116	.005	.030	−.103	−.097	−.005	.077	,820ᵃ	1		
3	.040	.121	.027	.119	.028	.110	−.034	.057	−.130	−.074	−.043	−.017	.022	.031	−.050	.003	.113	.075	.072	.034	.029	.051	.128	.035	.053	−.074	.005	,258ᵃ	,187*	1	
4	.133	.144	.042	,164*	.014	−.063	−.097	−.007	-,176*	−.131	−.013	.093	−.065	-,161*	.114	-,153*	−.104	.020	.036	.052	,179*	.064	.072	.135	−.039	−.100	.069	−.080	-,152*	,287ᵃ	1
2009 1	−.123	−.043	−.088	.009	−.002	.031	−.001	−.002	.107	−.041	.086	.134	.072	.107	.005	−.061	.033	−.070	−.121	−.090	−.006	.081	.000	-,154*	−.012	,155*	−.048	1			
2	−.120	−.048	−.099	.049	.058	−.023	−.055	−.058	.027	.022	.097	.129	.041	.102	−.014	−.069	.029	−.102	−.103	−.066	−.021	.095	.038	-,155*	−.004	.127	.002	,936ᵃ	1		
3	.084	−.103	.108	.141	.055	−.067	−.132	.051	−.095	.072	.053	.122	.143	.001	.082	.092	−.083	.052	.035	,152*	.014	.029	,169ᵃ	.045	.007	.059	.071	−.009	.017	1	
4	.093	−.101	.082	.067	.090	−.017	-,173*	−.051	-,187*	.107	−.119	−.093	−.134	−.099	.000	.105	.021	,151*	.132	,168*	−.019	.042	.043	,234ᵃ	.092	.004	−.009	-,478ᵃ	-,411ᵃ	.074	1
1999 1	.011	,158ᵃ	.091	.083	,096*	.003	−.065	.009	.039	−.038	,137ᵃ	.045	,290ᵃ	,148ᵃ	−.036	.051	.036	−.062	-,184ᵃ	−.078	−.008	−.008	−.026	−.078	,118*	.066	,097*	1			
2	.031	,153ᵃ	,098*	,115*	,123ᵃ	−.020	−.081	−.001	.061	−.019	,134ᵃ	.087	,296ᵃ	,178ᵃ	−.006	.049	.011	−.028	-,158ᵃ	−.045	−.001	.038	.004	−.070	,111*	.072	,108*	,934ᵃ	1		
3	.083	.060	.092	.040	,112ᵃ	−.026	−.001	−.030	,147ᵃ	.085	.064	.018	,129ᵃ	.036	.012	−.001	.052	.065	.002	.045	−.022	.040	.097	.081	.096	.021	.045	,161ᵃ	,130ᵃ	1	

1 Work experience, 2 Age, 3 Nursing specialisation certification, 4Nusing degree

[a] significant at the 0.01 level (two-tailed), *significant at the 0.05 level (two-tailed). - There is a problem with this footnote and I cant't change it myself. If ** is a) then * should be b)

higher education/bachelor's, and master's), with their evaluation of their education. Pearson's coefficient was chosen because the characteristics were ordinal, and correlation could describe the direction and strength of the relationships between them. To assess the robustness of the Pearson correlation coefficient, bootstrapping was performed. Bootstrapping is a statistical method that involves resampling data with replacement to estimate the sampling distribution of a statistic. By repeatedly resampling from the observed data, bootstrapping provides a way to assess the variability of the sample estimates and can be used to derive confidence intervals, standard errors, and significance tests.

4. Results

4.1. Participants

The mean ages in Studies I, II, and III were 36, 41, and 43 years, respectively. One reason for the increase in the average age of nurses could be that, in Estonia, the number of people aged 40–64 has increased [49]. The range of work experience was 1–47 years in Studies I and II and 1–52 years in Study III (Table 2). The educational level of nurses increased significantly when comparing the three studies. In Study I, the vast majority, 98.1% (n = 458), were nurses with vocational education since a master's degree was unavailable. In Study II, 54.5% (n = 108) of nurses underwent vocational training, and in Study III, 9.4% (n = 16). In Studies I and II, there were no master's degrees. In Study II, 43.9% (n = 87) of nurses had higher education; however, the availability of master's degrees was limited. In Study III, 14.6% (n = 25) had master's degrees. In Studies I, II, and III, 44.7% (n = 207), 46.5% (n = 92), and 38% (n = 65) of respondents, respectively, were reportedly specialist nurses (Table 2).

The retrospective assessment of nursing education over the past 30 years changed for most statements. Only 4 of the 27 statements showed no statistically significant changes. Statements addressing nurses' opinions on developing research and independence skills in education showed a significant increase. Nurses believed that evidence-based practice, the ability to perform individual tasks, understanding individual patient needs, quality development skills, and independent learning skills have all improved.

Upon reflecting on their education, nurses exhibited a critical perspective. Despite the low average rating for teacher-centred approaches (1.47–2.54), a comparison between Study I and III reveals a tendency towards teacher-centredness. Among statements examining nurses' individual and professional development, there was a significant increase in their ratings of opportunities. Ratings of faculty support and nurses' personal development increased across the three studies. In collaboration and communication, ratings of skills in social problem-solving and dealing with religious issues improved significantly across the three studies. There was also a significant change in purposeful learning with faculty as partners and the ability to understand experiences through conversations. For many statements, the opinions of respondents in Study II were higher than those in Studies I and III, but the opinions in Study III were higher than those in Study I.

Nurses with vocational education retrospectively rated their education higher in each subsequent study. It should be noted that professional nursing education was not yet available in Estonia at the time of the first study. Therefore, respondents in each subsequent study had a longer gap since completing their education. The retrospective evaluations of nurses' higher education in Studies II and III can be seen as more critical, with ratings decreasing in several aspects. At both levels of education, nurses' opinions on the dependence of their education on evidence-based practices increased significantly, and they highly valued discovering their life goals and having critical discussions during their studies. In research and critical thinking, the ratings of nurses in higher education increased, and they rated their education as based less on isolated tasks. Graduate nurses increasingly rated learning as learner-centred, whereas their ratings for individuality and empowering themselves declined. Nurses with higher education rated their ability to solve patients' social problems, address religious issues, and care for patients in critical condition significantly lower in Study III than in Study II (Table 4). In the second study, as nurses' education increased, their agreement with the statement that they had learned to solve patients' social problems increased. In contrast, their agreement that nursing education was based on the practice of nursing interventions decreased. In the third study, aligning with the statements, the relationship with the teacher was I-thou, which decreased with increasing education (r ≤ 0.5). Based on the bootstrap analysis, the assertion that nursing education is grounded in medical knowledge was not substantiated. (Table 5).

The relationships between sociodemographic indicators and education-related statements (Table 5) varied across studies. However, correlations were weak (r ≤ 0.5). In Study I, as nurses' age and work experience increased their agreement with the statement that they understood their life goals during their studies increased, and their confidence in the ability to protect the vulnerable and care for critically ill patients also grew. In correlation with increased age and accrued work experience, a heightened comprehension suggested that education emphasised individual skills and medical knowledge. However, while age advancement indicated a decline in the agreement that religious topics were discussed during education, the bootstrap analysis did not validate a similar correlation from the progression of work experience.

In Study II, higher-educated nurses, while agreeing more with promoting health, disagreed that learning focused solely on care delivery. In Study III, as nurses aged and gained experience, they disagreed more with education being research-based, memorisation-oriented, and teacher-directed. Higher education levels were correlated with more critical discussions during learning and less agreement with having an I-thou relationship with teachers.

5. Discussion

Nursing education, as a reflection of global health trends and local needs, plays a pivotal role in determining the quality of patient care. Understanding how nurses evaluate their education provides crucial insights into the strengths and gaps of the educational

system, which can subsequently influence healthcare outcomes.

The study aimed to determine the retrospective evaluation of nurses regarding their education. Nursing education is the most effective means for achieving' career advancement. Good leadership skills and motivation in nurses contribute to improving the health of their patients [20,34,35,50].

Consistent with global trends, our findings indicate a significant shift in nursing education in Estonia, with an increasing emphasis on critical thinking, analysis, and collaboration. This is in line with global standards, which underscore the importance of these skills in improving patient care.

The first research question analysed nurses' retrospective evaluations of their education over the past 30 years. This survey conducted thrice over three decades, found that Estonian nurses' retrospective evaluations of nursing education have changed significantly over the past 30 years. Nurses can evaluate the knowledge, skills, values, and attitudes acquired from their education based on their work competencies [51]. We found that nurses increasingly rated their education more positively over time in areas aligned with the GANES framework [27]. Nurses rated research, independent work, evidence-based practice, and professional development higher each year. Since 1999, nursing education has shifted from vocational to higher education. Lifelong learning has continued over the years, and many nurses acquired higher education while working professionally. Education focused on acquiring specific skills has evolved toward critical thinking, analysis, and collaboration to best provide patient care [52,53]. Several studies have confirmed that the proportion of well-prepared nurses with bachelor's degrees is significantly associated with better health outcomes [20,33,54–57]. Our study shows that the number of nurses with higher education has increased significantly over the past 30 years, clearly reflected in their evaluations of their education. The decrease in the number of specialised nurses was probably due to the change in the concept of specialist nurses in the Estonian healthcare system. This has led to expanding the rights, duties, and responsibilities of specialist nurses and to more specific qualifications (master's degree or specialised education).

The second research question analysed the relationship between nurses' retrospective evaluations and their level of education. Our results show that the percentage of nurses with bachelor's degrees increased significantly. Aiken et al. [33] found that a 10% increase nurses with bachelor's degrees reduced mortality by 7%. Similar results have been reported in other studies [58–60]. In Estonia, nurses have been educated exclusively at the tertiary level since 1996. However, in the labour market, there are still nurses with different levels of education and work experience. Our study showed that nurses with shorter work experience usually have a bachelor's degree, whereas those with longer work experience have vocational education. This is attributable to vocational education for nurses being discontinued in Estonia and not all nurses having higher education. Nurses with higher education today are more critical of their education than ten years ago. Nurses in Study III were less satisfied with their ability to deal with social and religious issues than in Study II. Additionally, nurses did not rate their ability to handle difficult patients highly. The reason for this could be that nurses with higher levels of education have higher expectations and are, therefore, more critical of their education. Several studies have found a gap between the theory taught and practice in the workplace [21–24]. While physical and mental care activities are taken for granted in nurses' work, social problems, especially religious concerns, receive far less attention [61]. Nurses are aware of patients' social problems, but do not know how to support them [62], a conclusion supported by our findings.

The third question focused on the associations between sociodemographic indicators and nurses' evaluations of their education. Three decades is a long period of time, and both nursing and nursing education in Estonia have undergone significant changes. This could explain why the correlations in the three studies were significantly different. However, some trends in associations were observed in the three waves of the study. In Study I, the less educated nurses were, the more positive they were about their education, and in Study III, nurses were more critical as their education level increased. However, against a backdrop of more critical attitudes, the nurses rated the increase in learner-centred education as the level of education increased. These trends do not imply a decrease in the quality of nursing education; instead, they suggest that highly educated nurses are better at analysing and identifying knowledge gaps in practice. While some countries still offer vocational nursing education, an increasing number require a bachelor's degree for registered nurses [2]. Study III revealed a negative correlation between scientific research and teamwork in the learning process. This suggests contemporary nursing education emphasises critical thinking, problem-solving, and teamwork.

Using bootstrapping provided an assessment of our statistical metric's variability and robustness. In conducting the analysis and presenting results, bootstrap outcomes were considered. Consistency between the bootstrapped findings and Pearson correlation underscores the reliability of our determinations, suggesting that the correlations observed are not merely idiosyncratic to our sample but potentially generalizable. Importantly, no significant discrepancies between the methods were observed, further bolstering the confidence in our conclusions.

Given the gap between theoretical knowledge and practical application, particularly in dealing with socio-religious issues, nursing curricula may benefit from incorporating more real-world scenarios and soft-skills training. This will not only enhance the capabilities of nurses but also ensure holistic care to patients.

The strength of this study lies in its cross-sectional examination of nursing trends over 30 years. The same research design and instruments were used in all three surveys to collect data from Estonian nurses at different time points. A different sample was drawn from the target population in each year. This study aimed to analyse changes in the population over time (also known as aggregate changes over time). It is also worth noting that studies on nursing education that span such a long period are rare.

5.1. Limitations

Several constraints characterise this study. Firstly, its cross-sectional design restricts the inference of causality. The response rate was notably low, potentially influenced by the medium of the questionnaire in earlier phases and tightened data protection norms. Consistent sample selection was maintained across phases; however, reforms in the Estonian healthcare system might introduce

variations. Results, while insightful, should be approached with caution given the inability to establish definitive causal relationships between variables.

5.2. Policy recommendations

Based on the findings of this study, it becomes evident that enhancing the quality and relevance of nursing education is paramount. There is a discernible positive trend in evaluations as the level of nursing education rises, underscoring the importance of focusing on higher education programs in nursing. This observation suggests that the emphasis on advanced educational opportunities is crucial for Estonia and has implications for global nursing education.

Furthermore, nursing curricula should actively incorporate real-life scenarios to bridge the gap between academic learning and practical application. Such an approach would allow students to more effectively apply their theoretical knowledge, potentially addressing the heightened criticality observed in evaluations from those with advanced education. Another pivotal finding from the study is the challenge nurses face concerning social and religious matters. Addressing this requires integrating soft skills training within nursing curricula, ensuring that professionals are well-equipped to navigate these nuanced challenges.

Given the significant changes observed in healthcare systems in Estonia and globally over the past three decades, periodic reviews and updates of nursing education programs are essential. This continuous revision ensures alignment with contemporary best practices in the field. Moreover, the ever-evolving nature of healthcare necessitates introducing continuous training and development programs for nurses, ensuring they remain abreast of the latest practices and trends.

In the context of the competencies required, nursing programs should strongly emphasise fostering areas such as critical thinking, problem-solving, and teamwork. This focus ensures that nurses are adeptly prepared to handle the myriad challenges intrinsic to their profession.

5.3. Further research considerations

This research provides vital insights into how nursing education in Estonia has transformed over 30 years. Yet, a potential gap exists in exploring the influence of political factors on these educational trajectories. Subsequent investigations could explore the impact of various political reforms, especially in the context of post-Soviet Estonia. Additionally, drawing comparative analyses between Estonia and other nations could offer a broader understanding of global trends in nursing education. By incorporating such perspectives into future studies, we can aspire to achieve a holistic understanding of the nursing education landscape, thereby equipping policymakers with robust insights for decision-making.

6. Conclusions

Conducted thrice over three decades, this study demonstrates significant changes in the education of nurses in Estonia. Influenced by global changes as well as the legacy of the Soviet era, the transformation of Estonian nursing and nursing education has been rapid. The main shift over these years has been from vocational to higher nursing education. The rise in nurses' education level has led to a gradual increase in their positive appraisal of evidence-based education, developmental skills, and independent work abilities. However, they remain critical when evaluating their ability to cope with difficult patients and resolve social and religious issues.

A limitation to consider is the potential influence of confounding variables, such as individual biases or external socioeconomic factors, that might have impacted nurses' retrospective perspectives. Furthermore, the study focused primarily on Estonian nurses, so it would be prudent for future research to explore how these findings relate to international nursing education trends.

Comparisons with similar studies reveal a global trend towards higher education for nurses, aligning with our findings in Estonia. However, the specific challenges faced by Estonian nurses, such as coping with difficult patients and resolving social and religious issues, offer a unique perspective, underscoring the importance of context in nursing education.

This study is crucial as it provides insights into the development of nursing training from a retrospective viewpoint, helping to identify general education trends, and find recommendations for improving the quality of nursing education. The lessons and recommendations from the findings can also improve the quality of nursing education in other countries. For example, updating and adapting nursing education according to the needs and objectives of nursing professionals could enhance its effectiveness and relevance.

Data availability statement

The data will be made available on request.

Funding statement

Ethics declarations

This study was reviewed and approved by the Research Ethics Committee of the University of Tartu, with the approval numbers:

332/T-21 December 21, 2020 and 345/M-7 June 14, 2021. According to the Estonian legal system, studies I and II required written or verbal permission from the institutions involved in the study.

All participants provided informed consent to participate in the study.

CRediT authorship contribution statement

Ulvi Kõrgemaa: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Merike Sisask:** Writing – review & editing, Supervision, Resources, Conceptualization. **Ülle Ernits:** Writing – review & editing, Resources, Methodology, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

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