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Perceived self-efficacy in physical examination skills, clinical practice experiences, and utilization of findings in care plans among senior nursing students: a cross-sectional study

Arife Şanlialp Zeyrek[1*] and Özlem Fidan[1]

Abstract

Background In nursing education, physical examination skills are a fundamental requirement for clinical practice. Nevertheless, there is a lack of evidence concerning the perceived self-efficacy of senior nursing students in these skills, their use in the clinical environment, and their integration into care plans. The study aimed to determine the perceived self-efficacy of senior nursing students regarding physical examination, their application of physical examination skills in the clinic, and their use of physical examination findings in care plans.

Methods This descriptive cross-sectional study was conducted during the 2023–2024 academic year at a university in Western Turkey. A convenience sampling method was employed, and 107 students (71%) who met the inclusion criteria, completed all forms, and voluntarily agreed to participate were included in the study. Data were collected using the Student Identification Form, Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students, and student care plans.

Results In this study, the total score of nursing students' perceived self-efficacy in physical examination was 2.18 ± 0.41 ('not very sure'). The Cardio sub-dimension of physical examination skills (2.50 ± 0.54) had the highest mean sub-dimension score, while the eye sub-dimension (1.75 ± 0.54) had the lowest mean sub-dimension score. More than half of the students were found to have no confidence in their ability to perform 14 physical examination skills and never practiced the skills in the clinic. It was determined that the students used only 20 physical examination skills in the data collection phase of the care plans, and only 6 of these skills were practiced by more than half of the students.

Conclusions This study reveals a significant gap in the self-efficacy and practical skills of nursing students related to physical examination. Based on these findings, the nursing curriculum should include more hands-on training and clinical practice should provide students with more opportunities to apply physical examination skills.

*Correspondence:
Arife Şanlialp Zeyrek
asanlialp@pau.edu.tr

Full list of author information is available at the end of the article

Background

Health assessment forms the basis of the nursing process that enables nursing care to be provided systematically with a unique approach [1]. Health assessment, which includes physical assessment skills, is the systematic and continuous collection of patient data using examination and auscultation, percussion, and palpation skills [2]. This assessment, one of the basic competencies of nursing practice [3], is the basis for collecting information about patients' health status and evaluating the quality of nursing care [4]. A physical examination is performed as a confirmatory criterion to verify the information obtained in the interview with the individual [5].

The use of physical examination skills by nurses provides many benefits, such as creating a comprehensive objective database, confirming subjective data, interpreting clinical findings, effectively planning, evaluating, and ensuring continuity of nursing care, and strengthening nurse-patient communication [1, 6]. In particular, comprehensive physical assessment skills enable nurses to go beyond routine physiological monitoring and detect signs of deterioration in the patient early [7].

Prelicensure nursing education programs are designed to provide graduates with a comprehensive foundation of knowledge and skills essential for clinical practice, with physical assessment skills being recognized as a fundamental component of all undergraduate nursing curricula [8]. However, there are discussions about the scope of physical assessment skills in nursing programs [9]. In addition, it is claimed that the increase in physical assessment skills acquired by students in nursing education reflects the medical model and that this situation leads to some problems [9]. There are concerns that there is a disconnect between what students learn in nursing programs and what they practice in the clinical setting [8]. Despite the central role of health assessment in nursing education, previous research suggests that physical assessment skills taught in nursing programs are not regularly used in practice by both nurses and nursing students [1, 2, 8, 10, 11]. Birks et al. (2013) found that only 57% of schools trained their students in all 121 physical assessment skills examined as a result of an in-depth analysis of the use of physical assessment skills among nurses [8]. Similarly, Cicolini et al. (2015) found that 30 essential skills are routinely taught in the nursing curriculum in Italy [11]. Moreover, there are concerns about the competence of nursing graduates [11], although undergraduate programs aim to teach nursing students the correct methods of physical assessment of patients [8]. In their study with 208 graduating nursing students in Australia, Douglas et al. [9] found that none of the examinations, including palpation, percussion, and auscultation skills, were performed, only 5 of the 126 skills were practiced in practice, and most of the examination skills (70%) were never used. These studies suggest that more time should be allocated for students to practice and interpret patient assessment skills before and during clinical rotations [8, 11].

Studies evaluating physical examination skills have generally been conducted with nurses. Considering that nursing students need to conduct comprehensive nursing assessments competently in the post-graduate period [12], the number of studies examining the use of physical assessment skills and self-efficacy in nursing students is surprisingly low. How nursing students perceive their self-efficacy, skill levels, and abilities in performing physical examinations may affect their motivation to perform examinations and the quality of patient care [13]. Research results reveal that self-efficacy perception positively affects individuals' performance. Therefore, determining nursing students' perceptions of physical examination self-efficacy is important to increase the efficiency of the course and the quality of patient care [13, 14]. Considering the importance of self-efficacy in physical examination, it is observed that the amount of existing data to obtain results related to self-efficacy affecting physical assessment practices is limited.

In this regard, this study aimed to determine students' perceptions of self-efficacy in performing physical examination skills and the extent to which they use their skills in clinical practice. Moreover, it was observed that the effect of physical examination, which is one of the most critical stages of the data collection process, which is the basic step of the nursing process, on nursing care planning and diagnosis has not been sufficiently investigated in the literature. Physical assessment plays a vital role in developing personalized care plans and making accurate nursing diagnoses. When students do not effectively use physical assessment findings, they may lack a sufficient data foundation for patient care. This can negatively affect the quality and outcomes of nursing interventions. Accordingly, it was aimed to examine the extent to which senior nursing students use physical examination findings when planning nursing care.

The research questions were:

1. What are the perceptions of senior nursing students about their self-efficacy levels in performing physical examinations?

2. What is the application status of the physical examination skills of senior nursing students in the clinic?

3. What is the usage status of physical examination findings in the care plans of senior nursing students?

Methods

Study design, setting, and participants

The study was cross-sectional and descriptive. The population of the study consists of senior nursing internship students ($N = 180$) from a university located in western Turkey during the spring semester of the 2023–2024 academic year. The inclusion criteria for the study were as follows: (a) voluntary participation, (b) enrollment in a senior internship course, and (c) filling out all forms. Participants were recruited through a convenience sampling method. The researchers initially contacted all eligible students enrolled in the senior internship course via email and class announcements. They were provided with detailed information about the study's objectives, procedures, and the voluntary nature of participation. Informed consent was obtained from those who agreed to participate. Among the 180 students, 22 were excluded from the study because they did not fully complete the forms. Ultimately, the study was conducted with 107 students (71%) who met the inclusion criteria.

Data collection tools

Data were collected using the Student Identification Form, Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students, and student care plans.

Student identification form

Within the scope of this study, a questionnaire form was prepared to obtain information about students' demographic and occupational preferences. The form included questions such as students' age, gender, clinical unit types, average academic achievement, satisfaction with studying nursing, and wanting to work as a nurse after graduation.

Physical examination perceived self-efficacy instrument for undergraduate nursing students

Utli et al. [15] adapted the scale developed by Nasaif et al. [16] into Turkish. The scale was used to measure students' perceptions of their confidence level in performing physical examinations. It has a total of 6 sub-dimensions and 48 items. Each item in the scale starts with the statement "How confident are you in your ability" and continues by naming the specific skill that students should master for each body system. It is a 4-point Likert scale. Each student was asked to rate their level of confidence in each item. The interpretation of the average score range

is as follows: 1–1.75 (not at all confident), 1.76–2.51 (very uncertain), 2.52–3.27 (confident), and 3.28–4.00 (very confident). The mean score determines the overall level of trust that students perceive for each factor. The minimum score to be obtained from the scale is 1, while the maximum score is 4. The Cronbach Alpha value of the scale was calculated as 0.986. The Cronbach Alpha value of this study was 0.97.

To determine whether the students practiced their physical examination skills in the clinical setting, the options "I practiced this skill in clinical practice" and "I did not practice this skill in clinical practice" were added to the scale. These additions were made to assess the correspondence between students' perceived self-efficacy and practical skills. To ensure content validity, the scale with these additional response options was reviewed by five experts (members of the nursing faculty in fundamentals of nursing and faculty members responsible for Health Assessment Methods courses) in the field of nursing education (PhD, RN). The experts assessed the clarity and relevance of the new items to the study objectives. The content validity index (CVI) for the revised scale was calculated using the Davis technique. The content validity of the revised scale was good with item- (all items) and scale-level index of 1.

Form on the use of physical examination skills in student care plans

Senior nursing students enroll in the case presentation course concurrently with the internship course they select during the 1st and 2nd semesters of their 4th year. As part of this course, students are required to prepare a care plan for a patient they are responsible for in the clinical setting and present a case based on their experience. The data collection form utilized by the students is standardized and designed within the framework of Gordon's Functional Health Patterns, encompassing both physical and mental examination findings. This form includes sub-categories such as health perception and management, nutrition-metabolism, elimination, activity-exercise, sleep-rest, cognitive-perceptual, self-perception, role-relationship patterns, sexuality-reproduction, coping-stress tolerance, values-belief, safety-protection, and comfort [17].

The physical examination skills incorporated into students' care plans were systematically analyzed to assess how effectively these skills were applied in patient care. For this analysis, a data collection form was developed by the researchers based on the routine physical assessment skills taught in the undergraduate nursing curriculum [8, 12, 18] and the items from the 'Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students.' To ensure content validity, the form was reviewed by three experts in the field of Fundamentals of

Nursing (Ph.D., RN) and two faculty members responsible for Health Assessment Methods courses (Ph.D., RN). The content validity index was calculated using the Davis technique [19], and the items were found to have a content validity ratio/index greater than 0.80. The developed form consists of 60 physical examination skills.

Care plans prepared by the students were independently analyzed by two researchers. Each researcher reviewed the care plans separately and marked each physical examination skill as 'used' or 'not used' according to whether it was clearly included in the care plan documentation. Following the independent analyses, the researchers held a consensus meeting to address any discrepancies and agree on the final assessments of each physical examination skill. To increase the reliability of the assessment process, inter-rater reliability assessments were conducted for each skill. These assessments yielded Cohen kappa coefficients above 0.85 for all items, indicating a high level of agreement between the raters for all skill areas examined. In addition, the researchers confirmed that no skills other than those listed on the physical examination skills form were identified in the care plans.

Data collection

After obtaining ethics committee permission during the data collection phase, students were first given necessary explanations regarding the study's purpose, procedures, and their rights as participants. Following this, informed consent was obtained from the nursing students using an informed consent form. The students who volunteered to participate in the study were asked to fill out the questionnaire forms between classes and to send the care plans they prepared to the researchers via e-mail. It took about 10 min to fill out the forms.

Statistical analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences 27.0 software program (IBM Corp., Armonk, NY, USA). Frequencies, percentages, and averages were used for descriptive statistical analysis. The normality of the data was evaluated by skewness and kurtosis coefficients. Multiple linear regression analysis was performed to examine the effects of independent variables on students' perceived self-efficacy in physical examination. Coefficients for correlations between the independent variables, variance inflation factor, and tolerance values were examined. Normally distributed data about the independent variables were included in the regression model. In all analyses, $p < 0.05$ was considered statistically significant.

Table 1 Sociodemographic characteristics of the nursing students ($n = 107$)

Sociodemographic characteristics	Mean ± SD
Age	22.52 ± 1.24
Academic Average	3.07 ± 0.26
	Number (%)
Gender	
Female	87 (81.3)
Male	20 (18.7)
Clinical unit types	
Medical unit	22 (20.6)
Surgical unit	32 (29.9)
Critical care unit	29 (27.1)
Special Unit	24 (22.4)
Satisfaction with studying nursing	
Yes	95 (88.8)
No	12 (11.2)
Wanting to work as a nurse after graduation	
Yes	96 (89.7)
No	11 (10.3)

SD; standard deviation

Table 2 The total and sub-dimension mean scores of the physical examination perceived self-efficacy instrument for undergraduate nursing students

Scale		Min	Max	Mean ± SD
Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students	Face and Neck	1	3.67	2.33 ± 0.53
	Eye	1	3.20	1.75 ± 0.54
	Cardio	1.14	3.71	2.50 ± 0.54
	Ear, Nose, and Throat	1	3.25	1.84 ± 0.57
	Thoracic	1	3.50	2.21 ± 0.54
	Other Skills	1.38	3.29	2.21 ± 0.42
	Total	1.23	3.33	2.18 ± 0.41

Min = Minimum; Max = Maximum; SD = Standard Deviation

Results

The sociodemographic characteristics of the nursing students who participated in the study are presented in Table 1. The mean age of the 107 nursing students was 22.52 ± 1.24 years, with 81.3% ($n = 87$) of them being female. The students' academic average was 3.07 ± 0.26. Additionally, 88.8% of the students reported satisfaction with studying nursing, and 89.7% expressed wanting to work as a nurse after graduation (Table 1).

The total and sub-dimension mean scores of the Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students are illustrated in Table 2. The total mean score of the scale was 2.18 ± 0.41 (not very sure). Of the physical examination skills, the Cardio sub-dimension (2.50 ± 0.54) was determined as the highest sub-dimension mean score, while the Eye sub-dimension (1.75 ± 0.54) had the lowest sub-dimension mean score (Table 2).

The students' confidence in the items of the Physical Examination Perceived Self-Efficacy Instrument, their performance of physical examination skills in clinical practice, and the physical examination skills used in the data collection phase of care plans are presented in Table 3. When the scale items were examined, it was determined that more than half of the students did not have confidence in performing three physical examination skills from the eye sub-dimension, three from the Ear, Nose, and Throat sub-dimension, two from the Thoracic sub-dimension, and seven from the other skills sub-dimension, and did not apply them in the clinic. More than 80% of the students stated that they had either no confidence or only limited confidence in their ability to perform the 24 physical examination skills. Furthermore, more than 90% of the students have never practiced the 24 physical examination skills in the clinic. However, the majority of students conduct the following assessments: palpating the carotid artery and the posterior tibial pulse (78.5%), the dorsalis pedis pulse (74.8%), and the four abdominal quadrants (70.1%); auscultating bowel sounds in all quadrants (88.8%); evaluating the patient's gait (87.8%); checking muscle strength for the upper limbs (83.2%) and lower limbs (88.8%); and performing the finger-to-finger test (86.9%). Moreover, it was determined that more than half of the students practiced these skills in the clinic (Table 3). It was found that students used 20 physical examination skills at the data collection stage of care plans, but only 6 skills were practiced by more than half of the students. The majority of the students stated that they performed the skills "Auscultate the bowel sounds in all quadrants" (85%) and "Inspect and palpate extremities for edema" (83.2%) at the data collection stage of the care plan (Table 3).

Multiple linear regression analysis was performed to determine the factors affecting nursing students' perceived self-efficacy in physical examination and the results are shown in Table 4. Gender and age affected the level of perceived self-efficacy in physical examination. Female had a higher level of perceptions of self-efficacy in physical examination than male ($\beta = -0.218$, $p = 0.045$). Besides, the older the students were, the higher the perceived self-efficacy in physical examination ($\beta = .220$, $p = 0.036$). Academic average, satisfaction with studying nursing, and wanting to work as a nurse after graduation were not significant variables in the multiple linear regression analysis (Table 4).

Discussion

The purpose of this study was to determine the perceived self-efficacy of senior nursing students in performing physical examination skills, assess their use of these skills in clinical practice, and explore how they incorporate physical examination findings into nursing care plans. Physical assessment is an essential element of nursing education and practice in providing safe and effective patient care [20]. Studies have revealed that one of the biggest obstacles for nursing students in performing physical examinations is a lack of self-efficacy [7, 9, 21]. According to Bandura's Self-Efficacy Theory, an individual's belief in their ability to perform a specific task influences motivation, learning, and overall performance [22]. In the context of nursing, self-efficacy is crucial, as it affects students' willingness to engage in clinical practice and apply learned skills in patient care.

This study examined the total scores of senior nursing students' perceived self-efficacy in physical examination and found that their confidence in their physical examination skills was low. Likewise, Kıskaç and Rashıdı [13] found in their study that nursing students taking internal medicine courses were not very confident in their perceived self-efficacy in physical examination. However, it is important to acknowledge that self-efficacy perceptions were assessed using self-reported data, which may lead to response bias. Students may have underestimated their confidence levels due to their perceptions. Future studies that include direct observations and skill-based assessments may provide a more comprehensive understanding of their true competence.

In the examination of the items of the perceived self-efficacy scale in the physical examination, more than 80% of the students indicated that they were not very confident or were not confident at all in their competencies in 24 items. It was also found that they did not apply these skills at all or were rarely applied in clinical practice. In their study, Secrest et al. [18] created a questionnaire about 120 physical examination skills listed in nursing textbooks. According to the findings of the study, although 92.5% of these skills are taught and practiced in nursing undergraduate programs, it was reported that nurses use only 29% of these skills on a daily or weekly basis. Giddens [10] reported that only 30 out of 126 physical assessment skills were routinely performed in a survey of 193 nurses. Doğdu et al. [6] examined the physical examination skills used by nursing students and found that the majority of students did not apply these skills as part of their daily patient assessments. Douglas et al. (2015) stated that a lack of confidence in physical examination skills is associated with less use of these skills [9]. In this study, lack of confidence is thought to be a possible reason for the less use of physical examination skills.

Further, previous studies have indicated that factors preventing the use of physical examination skills include clinical culture [6, 9], lack of time [6], professional role boundaries [21], and the absence of a role model [9]. In a study conducted by Alamri and Almazan (2018) in the Arabian Peninsula, the barriers faced by nursing students regarding physical assessment skills were examined [23].

Table 3 Students' confidence in the perceived self-efficacy in physical examination instrument items, their performance of physical examination skills in clinical practice and physical assessment skills used in the data collection phase of care plans

Scale Items	Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students (How confident are you in your ability?)								Performance of Physical Examination Skills in Clinical Practice	Physical Assessment Skills Used in the Data Collection Phase of Care Plans
	Not at all confident		Very uncertain		Confident		Very confident		Performed	Integrated in care plan
	n	%	n	%	n	%	n	%	n (%)	n (%)
Face and neck										
Locate the maxillary and frontal sinuses	3	2.8	29	27.1	63	58.9	12	11.2	14 (13.1)	-
Locate the thyroid gland landmark	14	13.1	56	52.3	33	30.8	4	3.7	8 (7.5)	-
Palpate the posterior aspect of the thyroid	25	23.4	64	59.8	14	13.1	4	3.7	5 (4.7)	-
Eye										
Check the patient's visual acuity using the Snellen chart	30	28	52	48.6	20	18.7	5	4.7	20(18.7)	-
Detect the patient's peripheral vision	15	14.0	38	35.5	46	43	8	7.5	19(17.8)	-
Detect the patient's accommodation test	63	58.9	38	35.5	6	5.6	-	-	-	-
Detect the patient's convergence reflex test	66	61.7	38	35.5	3	2.8	-	-	-	-
Detect the Extraocular Muscle movement	61	57	42	39.3	4	3.7	-	-	-	-
Cardio										
Auscultate the pericardium for S1 and S2	8	7.5	41	38.3	45	42.1	13	12.1	52 (48.6)	-
Auscultate the pericardium for Extra heart sounds	49	45.8	46	43	10	9.3	2	1.9	12 (11.2)	-
Palpate the carotid artery	6	5.6	17	15.9	48	44.9	36	33.6	89 (83.2)	13 (12.1)
Auscultate the carotid artery	49	45.8	45	42.1	13	12.1	-	-	8 (7.5)	-
Palpate the posterior tibial pulse	0	0	23	21.5	52	48.6	32	29.9	86 (80.4)	13 (12.1)
Palpate the dorsalis pedis pulse	2	1.9	25	23.4	45	42.1	35	32.7	80 (74.8)	13 (12.1)
Checking for any enlargement of varicose veins	13	12.1	51	47.7	31	29	12	11.2	43 (40.2)	-
Ear, Nose, and Throat										
Palpate the helix, tragus, and mastoid process	8	7.5	35	32.7	43	40.2	21	19.6	49 (45.8)	-
Perform Rinne test	55	51.4	45	42.1	7	6.5	-	-	-	-
Perform Weber test	57	53.3	45	42.1	5	4.7	-	-	-	-
Inspect tympanic membrane	56	52.3	44	41.1	7	6.5	-	-	-	-
Thoracic										
Calculate the chest anterior posterior diameter	55	51.4	41	38.3	11	10.3	-	-	-	-
Check for respiratory expansion	5	4.7	23	21.5	56	52.3	23	21.5	77 (72)	-
Check for tracheal deviation	50	46.7	46	43	11	10.3	-	-	7 (6.5)	-
Palpate the chest wall (anterior & posterior)	4	3.7	24	22.4	60	56.1	19	17.8	30 (28)	-
Percuss the chest wall (anterior & posterior)	32	29.9	54	50.5	19	17.8	2	1.9	10 (9.3)	-
Auscultate the chest wall, from the posterior	8	7.5	36	33.6	42	39.3	21	19.6	60 (56.1)	32 (29.9)
Auscultate the chest wall, from the anterior and lateral	6	5.6	36	33.6	47	43.9	18	16.8	54 (50.5)	32 (29.9)
Palpate the tactile fremitus	67	62.6	39	36.4	1	0.9	-	-	-	-

Table 3 (continued)

Scale Items	Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students (How confident are you in your ability?)								Performance of Physical Examination Skills in Clinical Practice	Physical Assessment Skills Used in the Data Collection Phase of Care Plans
	Not at all confident		Very uncertain		Confident		Very confident		Performed	Integrated in care plan
	n	%	n	%	n	%	n	%	n (%)	n(%)
Other Skills										
Inspect the contour of the abdomen	10	9.3	29	27.1	54	50.5	14	13.1	73 (68.2)	-
Auscultate the bowel sounds in all quadrants	-	-	12	11.2	49	45.8	46	43.0	96 (89.7)	91 (85)
Check for bruit in the abdominal aorta	71	66.4	36	33.6	-	-	-	-	-	-
Percuss the abdomen quadrants	47	43.9	40	37.4	20	18.7	-	-	5 (4.7)	-
Palpate the 4 abdomen quadrants	3	2.8	29	27.1	48	44.9	27	25.2	71 (66.4)	-
Measure the liver length by palpation	79	73.8	28	26.2	-	-	-	-	-	-
Detect any tenderness in Costovertebral Angle	83	76.6	25	23.4	-	-	-	-	-	-
Evaluate the patient's gate	2	1.9	11	10.3	56	52.3	38	35.5	80 (74.8)	-
Test the patient's balance through Romberg Test	54	50.5	40	37.4	13	12.1	-	-	-	53 (49.5)
Check muscles strength for the upper limbs	1	0.9	17	15.9	51	47.7	38	35.5	80 (74.8)	53 (49.5)
Check muscles strength for the lower limbs	-	-	12	11.2	58	54.2	37	34.6	79 (73.8)	-
Perform finger-to-finger test	5	4.7	14	13.1	53	49.5	35	32.7	84 (78.5)	-
Test for Biceps reflex	41	38.3	48	44.9	18	16.8	-	-	-	-
Test for triceps reflex	44	41.1	49	45.8	14	13.1	-	-	-	-
Test for planter reflex	53	49.5	46	43	8	7.5	-	-	-	-
Test for achilles	46	43	51	47.7	10	9.3	-	-	-	-
Practice the active range of motion for the Temporal Mandibular Joint	56	52.3	45	42.1	6	5.6	-	-	-	-
Practice the active range of motion for the shoulder	7	6.5	31	29	52	48.6	17	15.9	69 (64.5)	-
Practice the active range of motion for the elbow	6	5.6	31	29	54	50.5	16	15	67 (62.6)	-
Practice the active range of motion for the hip	8	7.5	39	36.4	51	47.7	9	8.4	55 (51.4)	-
Locate the Maximum Impulse Point	73	68.2	34	31.8	-	-	-	-	-	-
*Assess using Glasgow Coma Scale										59 (55.1)
*Inspect corneal light reflex										63 (58.9)
*Inspect overall skin color and skin lesions										45 (42.1)
*Inspect and palpate extremities for edema										89 (83.2)
*Inspect the oral cavity										71 (66.4)
*Evaluate breathing										54 (50.5)
*Evaluate face for movement and sensation										14 (13.1)
*Palpate and inspect capillary refill										13 (12.1)
*Palpate extremities for tenderness										14 (13.1)
*Inspect/palpate breast										6 (5.6)

Table 3 (continued)

Scale Items	Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students (How confident are you in your ability?)								Performance of Physical Examination Skills in Clinical Practice	Physical Assessment Skills Used in the Data Collection Phase of Care Plans
	Not at all confident		Very uncertain		Confident		Very confident		Performed	Integrated in care plan
	n	%	n	%	n	%	n	%	n (%)	n(%)
	n	%	n	%	n	%	n	%		
*Auscultating the apical pulse										18 (16.8)
*Inspect hair/scalp										13 (12.1)

* Skills not included in the Physical Examination Perceived Self-Efficacy Scale for Undergraduate Nursing Students

In this study, it was stated that students felt inadequate during physical examinations and experienced a lack of self-confidence. It is suggested that this lack of confidence may be due to inadequate practice or lack of feedback from tutors [23]. According to Bandura, the absence of verbal persuasion and guided practice can inhibit the development of self-efficacy, as students must be repeatedly exposed to external encouragement and skill-based tasks to build confidence [24].

In this study, we found that nursing students who completed their internships in the special unit had higher perceived self-efficacy scores regarding physical examination skills. Birks et al. (2013) reported in their study that nurses perform more comprehensive physical assessments in specialized areas such as intensive care and feel the need to develop their skills in this area [8]. This situation shows that clinical cultures in specialized units provide a favorable environment for both positive interactions and advanced skill practices. This supports Bandura's claim that mastery experiences and social modeling contribute to increased self-efficacy [22]. In environments with limited mentoring or where experienced nurses do not model or emphasize the importance of comprehensive physical examinations, students may not receive the guidance needed to perform these skills effectively [25]. In the nursing context, when novice nurses or students are integrated into a service culture that promotes support and mentoring, their self-efficacy may increase, leading to improved learning outcomes and better patient care.

This study determined that students never practiced certain physical examination skills in the clinic and considered themselves inadequate. Furthermore, an examination of the physical examination skills that students lacked confidence in showed that these skills usually included techniques such as complex testing procedures, palpation, percussion, or auscultation. Egilsdottir et al. [26] found that all students either used skills such as percussion and auscultation very little or did not know how to perform these skills. Factors that hindered practice were a lack of support in the learning environment and preceptors not using physical assessment skills [24]. Byeormen et al. (2021) emphasized that students have difficulty evaluating and correctly interpreting heart and lung auscultation and abdominal and chest percussion. Students indicated that their concerns were related to the accuracy of the assessments they performed and the correct interpretation of the anatomical or pathological mechanisms that caused certain sounds [25]. Also, the fact that advanced physical examination skills such as testing procedures, palpation, percussion, or auscultation are traditionally seen as the expertise of the doctor may have led to this result. In a systematic review, role ambiguity involving nurses' professional responsibilities

Table 4 Multiple linear regression model for factors of perceived self-efficacy in physical examination of nursing students

Variables	Physical Examination Perceived Self-Efficacy Instrument for Undergraduate Nursing Students			
	B	SE	β	*p*
Constant	−0.166	0.921		0.857
Age	0.073	0.034	0.220	0.036
Academic Average	0.255	0.155	0.166	0.102
Gender				
Female			Ref	
Male	−0.229	0.113	−0.218	0.045
Satisfaction with studying nursing				
Yes			Ref	
No	−0.367	0.187	−0.283	0.052
Wanting to work as a nurse after graduation				
Yes			Ref	
No	0.165	0.192	0.122	0.393

Note: $R = 0.363$, $R^2 = 0.089$, $F = 3.072$, $p = 0.013$

Abbreviations: β, beta; SE, standard error

for performing physical assessment was emphasized [21]. Role ambiguity among nursing students can lead to uncertainty about when and how to perform specific physical assessments during patient care. This undermines a person's confidence in their competence and can lead to low self-confidence.

In this study, among the physical examination skills, the students were most confident in their abilities: palpating distal pulses, checking the depth of respiration, evaluating the abdomen, checking upper and lower extremity strength, and evaluating the patient's gait. At the same time, it was found that most of the students practiced these physical examination skills in the clinic. Successful performance of clinical tasks in the past builds confidence in completing similar tasks in the future [27]. Kolb's Experiential Learning Theory emphasizes the importance of hands-on learning, reflection, and application [28]. Ensuring that nursing students engage in practical experiences, reflect on their performance, and integrate theoretical knowledge enhances their self-efficacy and skill acquisition. Douglas et al. [9] study, similar to this study, also presents the skills that nurses frequently or regularly perform, including assessing respiratory effort, palpating extremities for temperature, examining the abdomen and palpating distal pulses for circulation. In a study evaluating the frequency of physical examination skills used during clinical rotations, palpation for assessing the heart and peripheral circulatory system emerged as the most frequently utilized technique. In contrast, assessments of neurology, as well as auscultation and percussion in the abdominal, respiratory, and circulatory systems,

were employed the least [26]. The physical examination of skills in which students were confident and frequently practiced revealed that these did not include complex techniques such as percussion. In their study, Tan et al. (2021) found that the most frequently practiced skills included basic assessments such as vital sign checks, cardiovascular assessments, and respiratory assessments, which are fundamental to patient care. In contrast, less frequently practiced skills included more specialized or advanced techniques such as head and neck examinations and certain neurological assessments that may be less applicable to clinical settings by nurses [21].

The implementation of physical assessment as part of the nursing process enables nurses to make assessments based on the patient's history and symptoms and to make clinical decisions to create an effective nursing care plan using these assessment findings [21]. Previous studies have reported that nurses and nursing students face various difficulties at all stages of the nursing process, but they have more difficulty in collecting data, especially using interview and physical examination methods [29, 30]. Şahan and Gezer's [31] qualitative study examining nursing students' experiences with physical examination reported that students routinely practiced few physical examination skills such as listening to lung and bowel sounds and performing inspections. In addition, in the same study, when nursing students were asked about their ability to use the data collected during physical examination in nursing diagnoses, it was found that most of the students stated that "physical examination is useful" and "they can make effective diagnoses using physical examination data", while some students stated that "although they used physical examination data, they made inadequate diagnoses". In this study, as a result of the analysis of the data collection phase of the care plans prepared by the students, it was determined that almost all of the students stated that they performed the skills of 'auscultating bowel sounds in four abdominal quadrants' and 'checking for edema'. Yet, they were found to have never used many of the skills in the scale at the data collection stage of the care plans. The frequent documentation of bowel sound auscultation and edema assessment, compared to other assessments, may reflect that these skills are emphasized more than others in the nursing curriculum. Curricular differences among nursing programs may result in unequal emphasis on physical examination skills, leading to increased competence in some areas and gaps in others [25]. This situation highlights the importance of considering the breadth and depth of physical assessments taught in the nursing curricula and conceptualizing a physical assessment framework. To develop an effective care plan, the physical assessment framework should shift from a biomedical approach to a nursing model such as the nursing process [21].

Salvador et al. [32] reported in their study that most of the students were insufficient in creating a clear framework and integrating critical thinking in systematic data collection from the patient. Stating that students frequently made mistakes in this area, the researchers emphasized that these skills should be focused on at the earliest possible stage, along with patient interviews, physical examination, health, and family history. This study suggests that the low self-efficacy perceived by the students in physical examination skills may have caused them not to use physical examination skills sufficiently in the data collection phase of the patient care planning process in the clinic.

In the present study, gender, and age were found to affect the level of perceived self-efficacy in physical examination. The female nursing students had a higher level of perceived self-efficacy in physical examination than their male student. Cruz et al. (2015) stated that female students having lower physical assessment barriers resulted in better outcomes in nursing performance and experience [33]. Additionally, studies conducted by Li et al. (2014) also showed that women performed better than men in the accuracy of physical assessment [34]. The lower perceived barriers to physical assessment and higher performance of female students may positively influence their self-efficacy beliefs, explaining the gender difference in self-efficacy scores. However, the underlying factors of this relationship need to be investigated in more detail.

The study also found that nursing students' perceived self-efficacy scores in physical examination tended to increase with age. Douglas et al. (2015) found that similarly to this study, lack of confidence scores tended to decrease with age [9]. Students in older age groups may feel more competent due to their life experiences. In contrast, younger students may have lower self-confidence and perceptions of self-efficacy due to their inexperience.

Limitations

This study has several limitations, and the results should be interpreted within this context. First, the single-center design limits the generalizability of the findings. The cultural context within the Turkish nursing setting may also have an impact on the results, which may not apply to nursing students in different regions or countries. Since data collection was conducted through a questionnaire, the responses were based on the participants' self-reports. This introduces the potential for response bias, as students may have either overestimated or underestimated their confidence in their physical examination skills.

Additionally, one limitation is the relatively low response rate (71%). The lack of non-response analysis made it difficult to determine whether there were systematic differences between respondents and non-respondents. Due to the anonymous nature of the data collection, the sociodemographic characteristics of these groups could not be compared. This limitation is acknowledged considering that non-response bias could have a potential impact on the findings. Although convenience sampling offers advantages in terms of time and cost, it has limitations in terms of sample representativeness and possible biases. Convenience sampling carries the risk that the sample may not fully reflect the target population. This can lead to sampling bias and limit the generalizability of the results.

Furthermore, the cross-sectional design of the study does not allow for the observation of changes in self-efficacy that may occur over time with increased clinical experience or additional training. Lastly, the study uses self-reported measures of physical examination skills, which introduces the potential for response bias because participants may overestimate or underestimate their abilities. Although self-reports are widely used in educational research because of their practical advantages, they do not provide an objective measure of clinical competence. The decision to use self-reported data was based on the difficulty of directly observing clinical competence in large student populations in a single-center design. In addition, self-reports provided a rapid and cost-effective means of collecting data on students' perceived confidence in their abilities, a key aspect of self-efficacy.

To address these limitations, future research should consider multicenter studies to enhance generalizability and include Objective Structured Clinical Examinations (OSCEs) to validate self-reported skills. Involving faculty in direct observations during clinical rotations would provide unbiased assessments that complement self-reported data. A mixed-methods design combining quantitative and qualitative approaches could provide a more comprehensive perspective on students' skill practice. A prospective design can provide insights into how clinical experience and additional training affect these competencies by evaluating changes in self-efficacy after the targeted educational interventions. These approaches will provide a deeper understanding of nursing students' competencies in physical examination skills and the factors influencing these skills.

Conclusions

In this study, it has been determined that senior nursing students have low perceived self-efficacy regarding physical examination. It was also found that they did not apply these skills at all or were rarely applied in clinical practice. In addition, it was found that students used 14 physical examination skills in the data collection phase of care plans, and only 6 of these skills were practiced by more than half of the students.

Physical examination and health assessment are the basic skills necessary for nurses to provide safe, competent, and holistic nursing care. The fact that nursing students at the graduation stage are not adequately prepared for health assessment, which is the first step of the nursing process, may hinder their ability to make critical clinical decisions and evaluate patients effectively. Necessary revisions should be made in educational content and clinical practices to improve nursing students' physical assessment competencies. Educational strategies such as simulation-based education can be particularly effective, allowing students to practice physical examination skills in a controlled, risk-free environment. Simulations allow students to develop their techniques and receive immediate feedback, which is essential for increasing confidence and skill. Additionally, mentoring programs should be implemented where experienced nurses provide guidance and support to students during clinical placements. This will allow students to observe skilled professionals, receive constructive feedback, and practice skills in a supportive environment. Additionally, structured skills assessments should be integrated into the nursing curriculum to ensure that students are regularly assessed on their physical examination competencies, help identify areas for improvement, and create a sense of accomplishment.

It is important to integrate physical examination skills into the nursing process so that students can successfully collect and analyze clinical data. Nursing students should be prepared and competent in creating care plans before going to clinical settings. The importance of physical examination and health assessment skills in the data collection phase should be emphasized for nurses to provide holistic care.

Finally, further research, particularly intervention studies, is recommended to explore methods for increasing self-efficacy in physical examination skills. This could include examining the impact of simulation-based training, mentoring programs, and structured skills assessments in both classroom and clinical settings. These efforts are critical to ensuring that nursing students are equipped to provide holistic care and make sound clinical judgments after graduation.

Author contributions
Ö.F. Conceived and designed the research A.Ş.Z and Ö.F. wrote the main manuscript text A.Ş.Z. analyzed the dataA.Ş.Z and Ö.F. revised the paper The authors read and approved the fnal manuscript.

Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
Ethics committee approval was obtained from Pamukkale University Non-Interventional Clinical Research Ethics Committee (decision dated 30.04.2024 and numbered 08, E-60116787-020-523663) and permission was obtained from the Pamukkale University Faculty of Health Sciences institution where the research was conducted. The study involved only volunteers. Only volunteers participated in the study. All participants were informed and informed consent to participate prior to being part of the study. All participants declared their voluntary participation in the study before participating in the study. Permission was obtained from the authors who adapted the scales into Turkish. To ensure anonymity and prevent academic penalization, participant responses were analyzed without identifiable student information. Students were explicitly informed that reporting low skill usage would not affect their academic evaluations. The principles of the World Medical Association Declaration of Helsinki and the principles of research and publication ethics were adhered to throughout the study. Participants were informed that they could withdraw from the study at any time.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Department of Nursing, Faculty of Health Sciences, Pamukkale University, Denizli, Turkey

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